Date:	Monday, October 12, 2009				
Time of T(0)	2:27:24				
erturbation Hz	2:33:06				
T(-2) to T(-16)]	60.0420	Hz			
(+18 to T(+30)]	59.8834	Hz			
equency Actual	-0.159	Hz			
T(-2) to T(-16)]	3645.04	MW			
(+18 to T(+30)]	3780.42	MW			
elta MW Actual	135.38	MW			
al Adjustments	-52.55	MW			
bation Average	-33.60	MW			
bation Average	93.26	MW			
R for FRO Delta	126.86	MW			
r FRO Adjusted	74.31	MW			
Schedules MW	350.00		Pre-Perturbation Bias Setting	-103.000	MW/0.1 Hz
ming Load MW	-165.48		Post-Perturbation Bias Setting	-103.000	MW/0.1 Hz
ped Hydro MW	0.00		EPFR for Bias Setting Pre-Perturbation Average	-43.2598	MW
ping Units MW	76.06		EPFR for Bias Setting Post-Perturbation Average	120.0694	MW
Response MW	-4.20		EPFR for Bias Setting Delta	163.3292	MW
ieneration MW	15.00		Primary Frequency Response Delivery of Bias	82.89%	
n Adjustments	271.39				
Schedules MW	335.00		Pre-Perturbation BA Load	7650.604	MW
ming Load MW	-206.46		Post-Perturbation BA Load	7630.571	MW
ped Hydro MW	0.00		Pre to Post Perturbation BA Load Change	-20.032	MW
ping Units MW	78.64		Load Dampening Frequency Response	-12.633	MW/0.1 Hz
Response MW	11.66		Load Dampening % of Total BA Frequency Response	14.80%	
ieneration MW	0.00				
n Adjustments	218.84				
justments MW	-52.55				

Date:	Monday, October 12, 2009		
Time of T(0)	2:27:24		
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:06		
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0420		
Value B Post-Perturbation Average Frequency [T(+20 to T(+40)]	59.8873		
Pre to Post Perturbation Delta Frequency Actual	-0.155		
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.04		
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+40)]	3785.26		
Pre to Post Perturbation Interchange Delta MW Actual	140.22		
Net Total Adjustments	-54.57		
EPFR for FRO Pre-Perturbation Average	-33.60		
EPFR for FRO Post-Perturbation Average	90.18		
EPFR for FRO Delta	123.78		
EPFR for FRO Adjusted	69.21		
Pre JOU Dynamic Schedules MW	350.00		
Pre Non-Conforming Load MW	-165.48		
Pre Pumped Hydro MW	0.00		
Pre Ramping Units MW	76.06		
Pre Transferred Frequency Response MW	-4.20		
Pre Contingent BA Lost Generation MW	15.00		
Sum of Pre Perturbation Adjustments	271.39		
Post JOU Dynamic Schedules MW	335.00		
Post Non-Conforming Load MW	-208.64		
Post Pumped Hydro MW	0.00		
Post Ramping Units MW	79.18		
Post Transferred Frequency Response MW	11.27		
Post Contingent BA Lost Generation MW	0.00		
Sum of Post Perturbation Adjustments	216.82		
Net Total Adjustments MW	-54.57		

uation

mance for FRO	1.067	P.U.
djusted for FRO	1.481	P.U.

20 to 40 second Average Period Evaluation

Initial P.U. Performance for FRO	1.133	
Initial P.U. Performance Adjusted for FRO	1.574	

Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected Net Actual Interchange MW

T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW
T-72 sec	2:26:12				
T-70 sec	2:26:14				
T-68 sec	2:26:16				

								T-66 sec	2:26:18						
								T-64 sec	2:26:20						
								T-62 sec	2:26:22						
								T-60 sec	2:26:24						
								T-58 sec	2:26:26						
								T-56 sec	2:26:28						
								T-54 sec	2:26:30						
								T-52 sec	2:26:32						
								T-50 sec	2:26:34						
								T-48 sec	2:26:36						
								T-46 sec	2:26:38						
								T-44 sec	2:26:40						
								T-42 sec	2:26:42						
								T-40 sec	2:26:44						
								T-38 sec	2:26:46						
								T-36 sec	2:26:48						
								T-34 sec	2:26:50						
								T-32 sec	2:26:52						
								T-30 sec	2:26:54						
								T-28 sec	2:26:56						
								T-26 sec	2:26:58						
								T-24 sec	2:27:00						
								T-22 sec	2:27:02						
								T-20 sec	2:27:04						
								T-18 sec	2:27:06						
-165.476	0.000	76.063	10.000	15.000	-103.000	7650.604	-33.600	T-16 sec	2:27:08	60.042	3645.041	350.000	-165.476	0.000	
-165.476	0.000	76.063	10.000	15.000	-103.000	7650.604	-33.600	T-14 sec	2:27:10	60.042	3645.041	350.000	-165.476	0.000	
-165.476	0.000	76.063	10.000	15.000	-103.000	7650.604	-33.600	T-12 sec	2:27:12	60.042	3645.041	350.000	-165.476	0.000	
-165.476	0.000	76.063	10.000	15.000	-103.000	7650.604	-33.600	T-10 sec	2:27:14	60.042	3645.041	350.000	-165.476	0.000	
-165.476	0.000	76.063	10.000	15.000	-103.000	7650.604	-33.600	T-08 sec	2:27:16	60.042	3645.041	350.000	-165.476	0.000	
-165.476	0.000	76.063	10.000	15.000	-103.000	7650.604	-33.600	T-06 sec	2:27:18	60.042	3645.041	350.000	-165.476	0.000	
-165.476	0.000	76.063	10.000	15.000	-103.000	7650.604	-33.600	T-04 sec	2:27:20	60.042	3645.041	350.000	-165.476	0.000	
-165.476	0.000	76.063	10.000	15.000	-103.000	7650.604	-33.600	T-02 sec	2:27:22	60.042	3645.041	350.000	-165.476	0.000	
								T+0 sec	2:27:24						
								T+02 sec	2:27:26						
								T+04 sec	2:27:28						
								T+06 sec	2:27:30						
								T+08 sec	2:27:32						
								T+10 sec	2:27:34						
								T+12 sec	2:27:36						
								T+14 sec	2:27:38						
								T+16 sec	2:27:40						
-206.459	0.000	78.643	10.000	0.000	-103.000	7630.571	93.258	3719.353	T+18 sec	2:27:42					
-206.459	0.000	78.643	10.000	0.000	-103.000	7630.571	93.258	3719.353	T+20 sec	2:27:44	59.887	3785.264	335.000	-208.640	0.000
-206.459	0.000	78.643	10.000	0.000	-103.000	7630.571	93.258	3719.353	T+22 sec	2:27:46	59.887	3785.264	335.000	-208.640	0.000
-206.459	0.000	78.643	10.000	0.000	-103.000	7630.571	93.258	3719.353	T+24 sec	2:27:48	59.887	3785.264	335.000	-208.640	0.000

-206.459	0.000	78.643	10.000	0.000	-103.000	7630.571	93.258	3719.353	T+26 sec	2:27:50	59.887	3785.264	335.000	-208.640	0.000
-206.459	0.000	78.643	10.000	0.000	-103.000	7630.571	93.258	3719.353	T+28 sec	2:27:52	59.887	3785.264	335.000	-208.640	0.000
-206.459	0.000	78.643	10.000	0.000	-103.000	7630.571	93.258	3719.353	T+30 sec	2:27:54	59.887	3785.264	335.000	-208.640	0.000
									T+32 sec	2:27:56	59.887	3785.264	335.000	-208.640	0.000
									T+34 sec	2:27:58	59.887	3785.264	335.000	-208.640	0.000
									T+36 sec	2:28:00	59.887	3785.264	335.000	-208.640	0.000
									T+38 sec	2:28:02	59.887	3785.264	335.000	-208.640	0.000
									T+40 sec	2:28:04	59.887	3785.264	335.000	-208.640	0.000
									T+42 sec	2:28:06					
									T+44 sec	2:28:08					
									T+46 sec	2:28:10					
									T+48 sec	2:28:12					
									T+50 sec	2:28:14					
									T+52 sec	2:28:16					
									T+54 sec	2:28:18					
									T+56 sec	2:28:20					
									T+58 sec	2:28:22					
									T+60 sec	2:28:24					
									T+62 sec	2:28:26					
									T+64 sec	2:28:28					
									T+66 sec	2:28:30					
									T+68 sec	2:28:32					
									T+70 sec	2:28:34					
									T+72 sec	2:28:36					
									T+74 sec	2:28:38					
									T+76 sec	2:28:40					
									T+78 sec	2:28:42					
									T+80 sec	2:28:44					

Hz		Date:	Monday, October 12, 2009
Hz		Time of T(0)	2:27:24
Hz		Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:06
MW		Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0420 Hz
MW		Value B Post-Perturbation Average Frequency [T(+18 to T(+52)]	59.8876 Hz
MW		Pre to Post Perturbation Delta Frequency Actual	-0.154 Hz
MW		Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.04 MW
MW		Value B Post-Perturbation Average Interchange MW [T(+18 to T(+52)]	3787.53 MW
MW		Pre to Post Perturbation Interchange Delta MW Actual	142.49 MW
MW		Net Total Adjustments	-54.95 MW
MW		EPFR for FRO Pre-Perturbation Average	-33.60 MW
MW		EPFR for FRO Post-Perturbation Average	89.96 MW
MW		EPFR for FRO Delta	123.56 MW
MW		EPFR for FRO Adjusted	68.61 MW
MW	Pre-Perturbation Bias Setting -103.000 MW/0.1 Hz	Pre JOU Dynamic Schedules MW	350.00 MW
MW	Post-Perturbation Bias Setting -103.000 MW/0.1 Hz	Pre Non-Conforming Load MW	-165.48 MW
MW	EPFR for Bias Setting Pre-Perturbation Average -43.2598 MW	Pre Pumped Hydro MW	0.00 MW
MW	EPFR for Bias Setting Post-Perturbation Average 116.1096 MW	Pre Ramping Units MW	76.06 MW
MW	EPFR for Bias Setting Delta 159.3694 MW	Pre Transferred Frequency Response MW	-4.20 MW
MW	Primary Frequency Response Delivery of Bias 87.99%	Pre Contingent BA Lost Generation MW	15.00 MW
MW		Sum of Pre Perturbation Adjustments	271.39 MW
MW	Pre-Perturbation BA Load 7650.604 MW	Post JOU Dynamic Schedules MW	335.00 MW
MW	Post-Perturbation BA Load 7630.636 MW	Post Non-Conforming Load MW	-209.39 MW
MW	Pre to Post Perturbation BA Load Change -19.967 MW	Post Pumped Hydro MW	0.00 MW
MW	Load Dampening Frequency Response -12.905 MW/0.1 Hz	Post Ramping Units MW	79.58 MW
MW	Load Dampening % of Total BA Frequency Response 14.24%	Post Transferred Frequency Response MW	11.24 MW
MW		Post Contingent BA Lost Generation MW	0.00 MW
MW		Sum of Post Perturbation Adjustments	216.44 MW
MW		Net Total Adjustments MW	-54.95 MW

EPFR
EPFR
Pri
Load Dam

18 to 52 second Average Period Evaluation

P.U.		Initial P.U. Performance for FRO	1.153 P.U.
P.U.		Initial P.U. Performance Adjusted for FRO	1.598 P.U.

Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected Net Actual Interchange MW	T		Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz
							T-72 sec	2:26:12							
							T-70 sec	2:26:14							
							T-68 sec	2:26:16							

							T-66 sec	2:26:18						
							T-64 sec	2:26:20						
							T-62 sec	2:26:22						
							T-60 sec	2:26:24						
							T-58 sec	2:26:26						
							T-56 sec	2:26:28						
							T-54 sec	2:26:30						
							T-52 sec	2:26:32						
							T-50 sec	2:26:34						
							T-48 sec	2:26:36						
							T-46 sec	2:26:38						
							T-44 sec	2:26:40						
							T-42 sec	2:26:42						
							T-40 sec	2:26:44						
							T-38 sec	2:26:46						
							T-36 sec	2:26:48						
							T-34 sec	2:26:50						
							T-32 sec	2:26:52						
							T-30 sec	2:26:54						
							T-28 sec	2:26:56						
							T-26 sec	2:26:58						
							T-24 sec	2:27:00						
							T-22 sec	2:27:02						
							T-20 sec	2:27:04						
							T-18 sec	2:27:06						
76.063	10.000	15.000	-103.000	7650.604	-33.600		T-16 sec	2:27:08	60.042	3645.041	350.000	-165.476	0.000	76.063	10.000
76.063	10.000	15.000	-103.000	7650.604	-33.600		T-14 sec	2:27:10	60.042	3645.041	350.000	-165.476	0.000	76.063	10.000
76.063	10.000	15.000	-103.000	7650.604	-33.600		T-12 sec	2:27:12	60.042	3645.041	350.000	-165.476	0.000	76.063	10.000
76.063	10.000	15.000	-103.000	7650.604	-33.600		T-10 sec	2:27:14	60.042	3645.041	350.000	-165.476	0.000	76.063	10.000
76.063	10.000	15.000	-103.000	7650.604	-33.600		T-08 sec	2:27:16	60.042	3645.041	350.000	-165.476	0.000	76.063	10.000
76.063	10.000	15.000	-103.000	7650.604	-33.600		T-06 sec	2:27:18	60.042	3645.041	350.000	-165.476	0.000	76.063	10.000
76.063	10.000	15.000	-103.000	7650.604	-33.600		T-04 sec	2:27:20	60.042	3645.041	350.000	-165.476	0.000	76.063	10.000
76.063	10.000	15.000	-103.000	7650.604	-33.600		T-02 sec	2:27:22	60.042	3645.041	350.000	-165.476	0.000	76.063	10.000
							T+0 sec	2:27:24						
							T+02 sec	2:27:26						
							T+04 sec	2:27:28						
							T+06 sec	2:27:30						
							T+08 sec	2:27:32						
							T+10 sec	2:27:34						
							T+12 sec	2:27:36						
							T+14 sec	2:27:38						
							T+16 sec	2:27:40						
							T+18 sec	2:27:42	59.888	3787.534	335.000	-209.391	0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+20 sec	2:27:44	59.888	3787.534	335.000	-209.391	0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+22 sec	2:27:46	59.888	3787.534	335.000	-209.391	0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+24 sec	2:27:48	59.888	3787.534	335.000	-209.391	0.000	79.583	10.000

79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+26 sec	2:27:50	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+28 sec	2:27:52	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+30 sec	2:27:54	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+32 sec	2:27:56	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+34 sec	2:27:58	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+36 sec	2:28:00	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+38 sec	2:28:02	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
79.182	10.000	0.000	-103.000	7630.636	90.182	3714.252	T+40 sec	2:28:04	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
							T+42 sec	2:28:06	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
							T+44 sec	2:28:08	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
							T+46 sec	2:28:10	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
							T+48 sec	2:28:12	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
							T+50 sec	2:28:14	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
							T+52 sec	2:28:16	59.888	3787.534	335.000	-209.391		0.000	79.583	10.000
							T+54 sec	2:28:18								
							T+56 sec	2:28:20								
							T+58 sec	2:28:22								
							T+60 sec	2:28:24								
							T+62 sec	2:28:26								
							T+64 sec	2:28:28								
							T+66 sec	2:28:30								
							T+68 sec	2:28:32								
							T+70 sec	2:28:34								
							T+72 sec	2:28:36								
							T+74 sec	2:28:38								
							T+76 sec	2:28:40								
							T+78 sec	2:28:42								
							T+80 sec	2:28:44								

Date:	Monday, October 12, 2009	
Time of T(0)	2:27:24	
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:06	
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0420	Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.8880	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.154	Hz
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.04	MW
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	3788.79	MW
Pre to Post Perturbation Interchange Delta MW Actual	143.75	MW
Net Total Adjustments	-55.07	MW
EPFR for FRO Pre-Perturbation Average	-33.60	MW
EPFR for FRO Post-Perturbation Average	89.60	MW
EPFR for FRO Delta	123.20	MW
EPFR for FRO Adjusted	68.13	MW
Pre JOU Dynamic Schedules MW	350.00	MW
Pre Non-Conforming Load MW	-165.48	MW
Pre Pumped Hydro MW	0.00	MW
Pre Ramping Units MW	76.06	MW
Pre Transferred Frequency Response MW	-4.20	MW
Pre Contingent BA Lost Generation MW	15.00	MW
Sum of Pre Perturbation Adjustments	271.39	MW
Post JOU Dynamic Schedules MW	335.00	MW
Post Non-Conforming Load MW	-209.56	MW
Post Pumped Hydro MW	0.00	MW
Post Ramping Units MW	79.68	MW
Post Transferred Frequency Response MW	11.20	MW
Post Contingent BA Lost Generation MW	0.00	MW
Sum of Post Perturbation Adjustments	216.31	MW
Net Total Adjustments MW	-55.07	MW

Pre-Perturbation Bias Setting	-103.000	MW/0.1 Hz
Post-Perturbation Bias Setting	-103.000	MW/0.1 Hz
t for Bias Setting Pre-Perturbation Average	-43.2598	MW
for Bias Setting Post-Perturbation Average	115.8183	MW
EPFR for Bias Setting Delta	159.0781	MW
mary Frequency Response Delivery of Bias	89.57%	
Pre-Perturbation BA Load	7650.604	MW
Post-Perturbation BA Load	7631.500	MW
Pre to Post Perturbation BA Load Change	-19.104	MW
Load Dampening Frequency Response	-12.369	MW/0.1 Hz
npening % of Total BA Frequency Response	13.41%	

20 to 52 second Average Period Evaluation

Initial P.U. Performance for FRO	1.167	P.U.
Initial P.U. Performance Adjusted for FRO	1.614	P.U.

T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	Contingent BA Lost Generation MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected Net Actual Interchange MW
T-72 sec	2:26:12												
T-70 sec	2:26:14												
T-68 sec	2:26:16												

					T-66 sec	2:26:18								
					T-64 sec	2:26:20								
					T-62 sec	2:26:22								
					T-60 sec	2:26:24								
					T-58 sec	2:26:26								
					T-56 sec	2:26:28								
					T-54 sec	2:26:30								
					T-52 sec	2:26:32								
					T-50 sec	2:26:34								
					T-48 sec	2:26:36								
					T-46 sec	2:26:38								
					T-44 sec	2:26:40								
					T-42 sec	2:26:42								
					T-40 sec	2:26:44								
					T-38 sec	2:26:46								
					T-36 sec	2:26:48								
					T-34 sec	2:26:50								
					T-32 sec	2:26:52								
					T-30 sec	2:26:54								
					T-28 sec	2:26:56								
					T-26 sec	2:26:58								
					T-24 sec	2:27:00								
					T-22 sec	2:27:02								
					T-20 sec	2:27:04								
					T-18 sec	2:27:06								
15.000	-103.000	7650.604	-33.600		T-16 sec	2:27:08	60.042	3645.041	350.000	-165.476		0.000	76.063	10.000	15.000
15.000	-103.000	7650.604	-33.600		T-14 sec	2:27:10	60.042	3645.041	350.000	-165.476		0.000	76.063	10.000	15.000
15.000	-103.000	7650.604	-33.600		T-12 sec	2:27:12	60.042	3645.041	350.000	-165.476		0.000	76.063	10.000	15.000
15.000	-103.000	7650.604	-33.600		T-10 sec	2:27:14	60.042	3645.041	350.000	-165.476		0.000	76.063	10.000	15.000
15.000	-103.000	7650.604	-33.600		T-08 sec	2:27:16	60.042	3645.041	350.000	-165.476		0.000	76.063	10.000	15.000
15.000	-103.000	7650.604	-33.600		T-06 sec	2:27:18	60.042	3645.041	350.000	-165.476		0.000	76.063	10.000	15.000
15.000	-103.000	7650.604	-33.600		T-04 sec	2:27:20	60.042	3645.041	350.000	-165.476		0.000	76.063	10.000	15.000
15.000	-103.000	7650.604	-33.600		T-02 sec	2:27:22	60.042	3645.041	350.000	-165.476		0.000	76.063	10.000	15.000
					T+0 sec	2:27:24								
					T+02 sec	2:27:26								
					T+04 sec	2:27:28								
					T+06 sec	2:27:30								
					T+08 sec	2:27:32								
					T+10 sec	2:27:34								
					T+12 sec	2:27:36								
					T+14 sec	2:27:38								
					T+16 sec	2:27:40								
0.000	-103.000	7631.500	89.956	3713.648	T+18 sec	2:27:42								
0.000	-103.000	7631.500	89.956	3713.648	T+20 sec	2:27:44	59.888	3788.789	335.000	-209.563		0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+22 sec	2:27:46	59.888	3788.789	335.000	-209.563		0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+24 sec	2:27:48	59.888	3788.789	335.000	-209.563		0.000	79.676	10.000	0.000

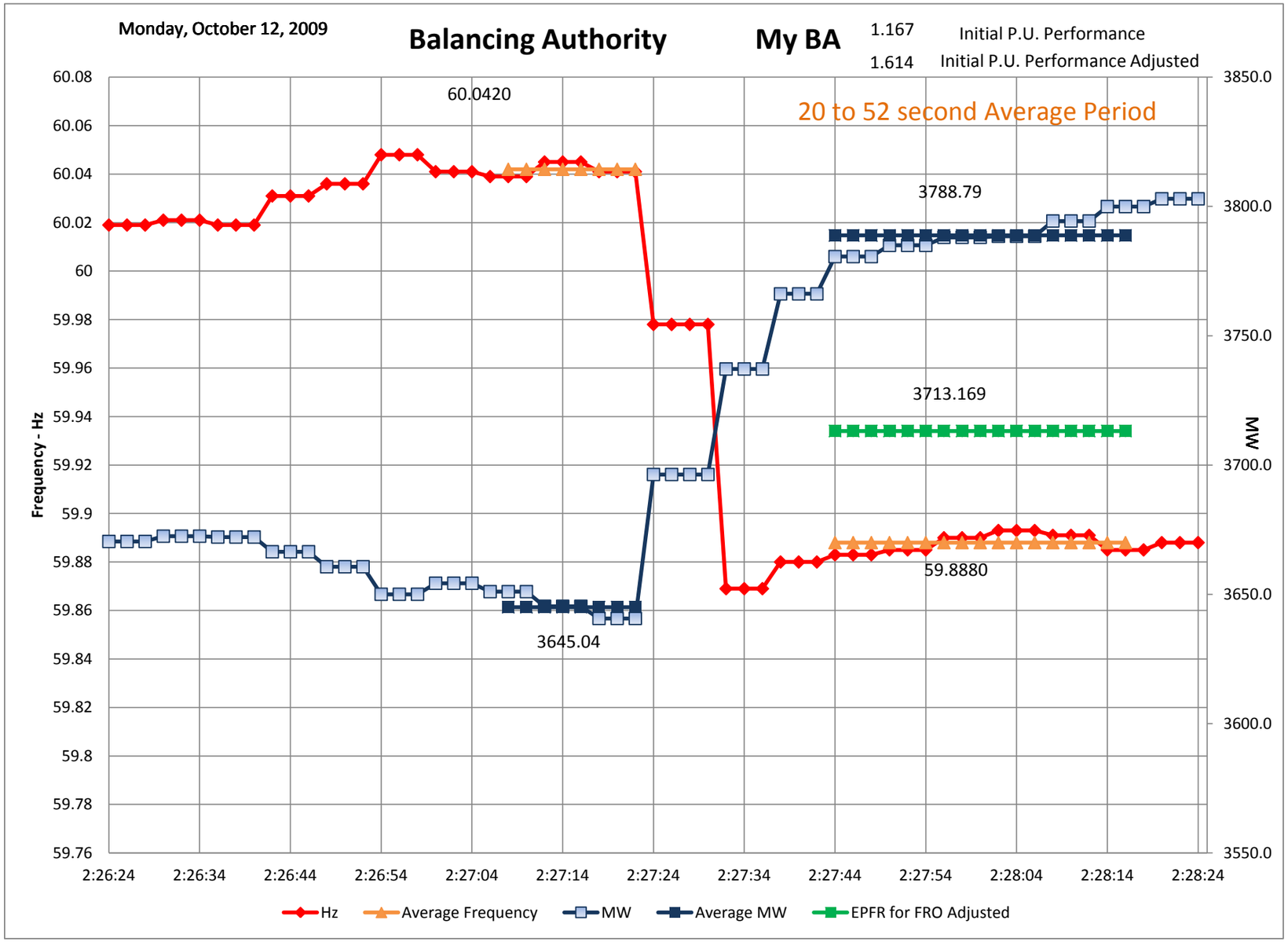
0.000	-103.000	7631.500	89.956	3713.648	T+26 sec	2:27:50	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+28 sec	2:27:52	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+30 sec	2:27:54	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+32 sec	2:27:56	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+34 sec	2:27:58	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+36 sec	2:28:00	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+38 sec	2:28:02	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+40 sec	2:28:04	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+42 sec	2:28:06	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+44 sec	2:28:08	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+46 sec	2:28:10	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+48 sec	2:28:12	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+50 sec	2:28:14	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
0.000	-103.000	7631.500	89.956	3713.648	T+52 sec	2:28:16	59.888	3788.789	335.000	-209.563	0.000	79.676	10.000	0.000
					T+54 sec	2:28:18								
					T+56 sec	2:28:20								
					T+58 sec	2:28:22								
					T+60 sec	2:28:24								
					T+62 sec	2:28:26								
					T+64 sec	2:28:28								
					T+66 sec	2:28:30								
					T+68 sec	2:28:32								
					T+70 sec	2:28:34								
					T+72 sec	2:28:36								
					T+74 sec	2:28:38								
					T+76 sec	2:28:40								
					T+78 sec	2:28:42								
					T+80 sec	2:28:44								

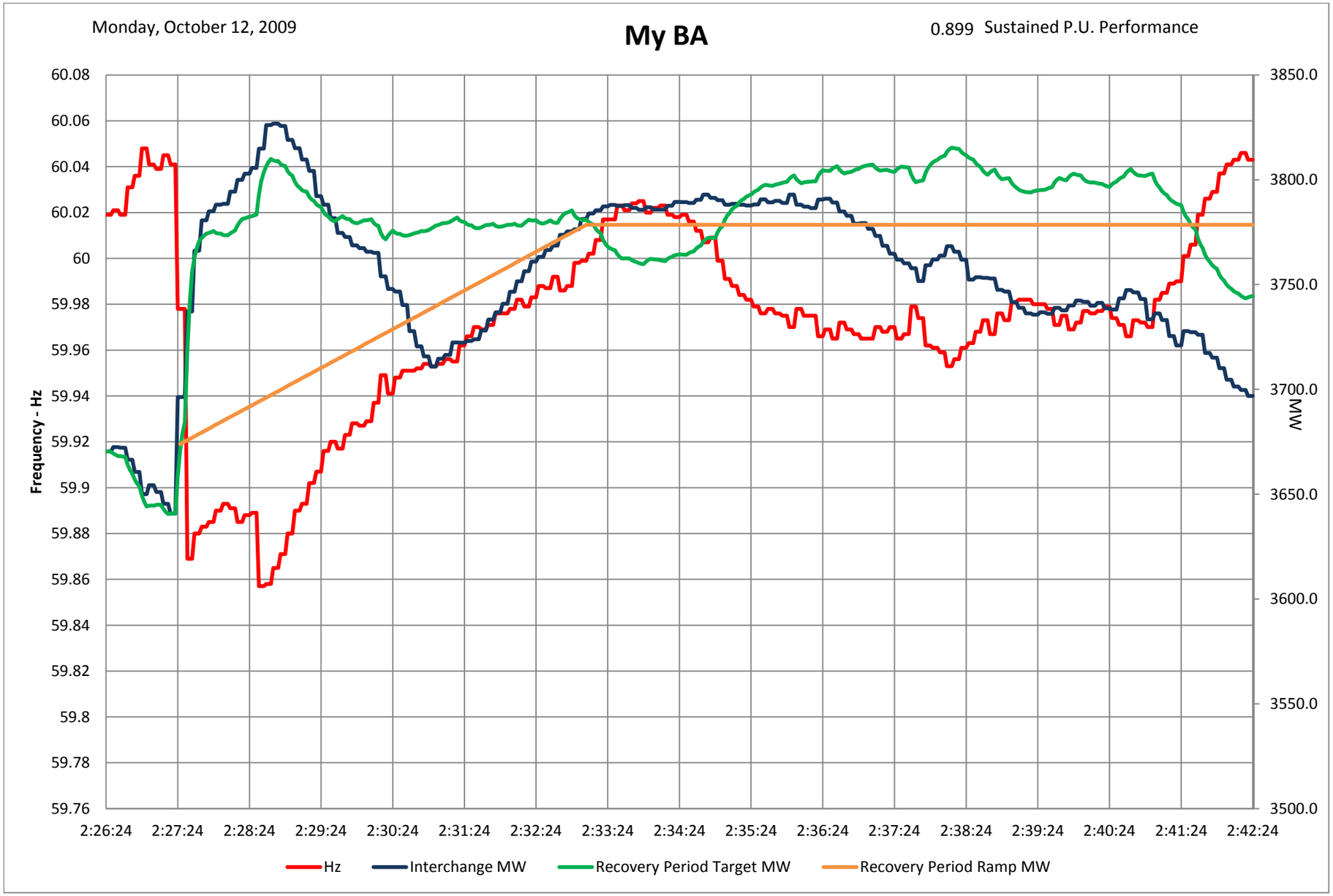
erturbation Bias Setting	-103.000	MW/0.1 Hz
erturbation Bias Setting	-103.000	MW/0.1 Hz
e-Perturbation Average	-43.2598	MW
;t-Perturbation Average	115.3607	MW
FR for Bias Setting Delta	158.6205	MW
esponse Delivery of Bias	90.62%	
e-Perturbation BA Load	7650.604	MW
;t-Perturbation BA Load	7631.529	MW
bation BA Load Change	-19.074	MW
ng Frequency Response	-12.386	MW/0.1 Hz
BA Frequency Response	13.27%	

BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected Net Actual Interchange MW

-103.000	7650.604	-33.600	
-103.000	7650.604	-33.600	
-103.000	7650.604	-33.600	
-103.000	7650.604	-33.600	
-103.000	7650.604	-33.600	
-103.000	7650.604	-33.600	
-103.000	7650.604	-33.600	
-103.000	7650.604	-33.600	
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169

-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169
-103.000	7631.529	89.601	3713.169


Monday, October 12, 2009
Balancing Authority
My BA
1.167 Initial P.U. Performance
1.614 Initial P.U. Performance Adjusted
60.0420
20 to 52 second Average Period
3788.79
3713.169
59.8880
3645.04
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
3850.0
3800.0
3750.0
3700.0
3650.0
3600.0
3550.0
2:26:24
2:26:34
2:26:44
2:26:54
2:27:04
2:27:14
2:27:24
2:27:34
2:27:44
2:27:54
2:28:04
2:28:14
2:28:24
Hz
Average Frequency
MW
Average MW
EPFR for FRO Adjusted


Monday, October 12, 2009
My BA
0.899 Sustained P.U. Performance
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
3850.0
3800.0
3750.0
3700.0
3650.0
3600.0
3550.0
3500.0
2:26:24
2:27:24
2:28:24
2:29:24
2:30:24
2:31:24
2:32:24
2:33:24
2:34:24
2:35:24
2:36:24
2:37:24
2:38:24
2:39:24
2:40:24
2:41:24
2:42:24
Hz
Interchange MW
Recovery Period Target MW
Recovery Period Ramp MW

Interconnection Performance

Date	A Point Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz
Monday, October 12, 2009	2:27:22	60.0410	60.0420	2:27:24	59.8690

Value B 12 to 24 sec Average Frequency	FR B 12 to 24 sec Average MW	Value B 18 to 30 sec Average Frequency	FR B 18 to 30 sec Average MW	Value B 20 to 40 sec Average Frequency	FR B 20 to 40 sec Average MW	Value B 18 to 52 sec Average Frequency	FR B 18 to 52 sec Average MW	Value B 20 to 52 sec Average Frequency	FR B 20 to 52 sec Average MW
59.8797144	-390.35188	59.8834278	-399.23186	59.8879994	-409.35384	59.887555	-410.1357	59.8879994	-411.27641

Value A Data — BA Performance

Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW
60.042	3645.04	350.00	-165.48	0.00	76.06	-4.20	15.00	-103	7650.604	-43.2598

Value B — 12 to 24 second Average Period Evaluation

Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW
59.879714	3768.23	335.00	-206.46	0.00	78.14	12.03

Value B 18 to 30 second Average Period Evaluation

Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.
0.00	1.355	0.949	0.899	-103	7631.714	123.8941	59.883428	3780.42	335.00	-206.46	0.00	78.64	11.66	0.00	1.481

Value B 20 to 40 second Average Period Evaluation

Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.
1.067	0.899	-103	7630.571	120.0694	59.887272	3785.26	335.00	-208.64	0.00	79.18	11.27	0.00	1.574	1.133	0.899

Value B

18 to 52 second Average Period Evaluation

Value B

BA Bias Setting MW	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz
-103	7630.636	116.1096	59.887555	3787.53	335.00	-209.39	0.00	79.58	11.24	0.00	1.598	1.153	0.899	-103	7631.5	115.8183	59.887999

20 to 52 second Average Period Evaluation

Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW
3788.79	335.00	-209.56	0.00	79.68	11.20	0.00	1.614	1.167	0.899	-103	7631.529	115.3607

Steps	**To be completed for each event evaluated.**
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order: Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Total Lost Generation: enter the MW data of the units that tripped as a single generator where the value typically goes to zero at t(0). Column D: not applicable Column E: Non Conforming Load Column F: Pumped Hydro Column G: not applicable Column H: not applicable Column I: not applicable Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D, E, F, G and H are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.
4	Data must be at 2 second sample rate for the full 25 minute minimum collection period that starts a minimum of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event. The spreadsheet will work with larger sample size data. If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.
5	Once data is in place in the "Data" worksheet, determine when the beginning of the event occurred. This is accomplished by knowing the UTC event time from the master event list. Convert the UTC event time to your PI data time and then scroll through the Data worksheet column B data of frequency and observe when frequency moves from the normal, pre-event frequency. This will usually be a single change in frequency of 0.008 to 0.010 Hz more or less. Note the row number in the worksheet that this change occurs. In this sample data spreadsheet this occurs in row 469 of the data.
6	Edit cell "C8" of the "Entry Data" worksheet, change the formula in the cell "C8" to reference the row number identified in step 5 above. In the sample data of this workbook this formula is: "=Data!A469"
7	Determine the end of the event to be evaluated. Use the same rules that are used for DCS only look at frequency instead of ACE. Scroll down the frequency data in column B of the "Data" worksheet until frequency reaches 60 Hz or the pre-disturbance value. Note the row number in the worksheet that this occurs. In this sample data spreadsheet this occurs in row 633.
8	Edit cell "C11" of the "Entry Data" worksheet, change the formula in the cell "C11" to reference the row number identified in step 7 above. In the sample data of this workbook this formula is: "=Data!A633"
9	In cell "R41" of the "Evaluation" spreadsheet, enter the MW value of the unit(s) that tripped (from the Master Event List). This is only necessary for the "Interconnection" evaluation if you're interested. It is not necessary to do this for the BA evaluation but it will provide a comparison of the BA frequency response as compared to the Interconnection frequency response.
10	Use the "copy" button provided to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data" of this workbook. Use PasteSpecial/Values when pasting the data into FRS Form 1 on the appropriate event row.

Steps	**To be completed once at the initial setup of the evaluation spreadsheet for your BA.**
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Entry Data" worksheet. For example: "NYISO".
B	Enter your Balancing Authorities Frequency Response Obligation in cell "B2" of the "Entry Data" worksheet. For example: -80 MW/0.1 Hz (This value could change annually)

Note: For ease of use, only the necessary worksheets are displayed. If you are interested in viewing graphs and other hidden worksheets, select the "tab" at the bottom, right click, select unhide and select the worksheet you wish to unhide.

mm/dd/yy hh:mm:ss Time (T)	Frequency Hz	Total Lost Generation MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	BA Bias Setting MW/0.1 Hz	BA Load MW	LaaR Tripped
07/18/11 20:35:00	60.0019989	593.3		0	0				-653	56914.73	0
07/18/11 20:35:02	60.0019989	593.3		0	0				-653	56928.6	
07/18/11 20:35:04	60.0009995	593.3		0	0				-653	56928.6	
07/18/11 20:35:06	60.0009995	593.3		0	0				-653	56928.6	
07/18/11 20:35:08	59.9990005	593.3		0	0				-653	56928.6	
07/18/11 20:35:10	59.9970016	593.3		0	0				-653	56928.6	
07/18/11 20:35:12	59.9959984	593.3		0	0				-653	56923.08	
07/18/11 20:35:14	59.9949989	593.3		0	0				-653	56923.08	
07/18/11 20:35:16	59.9939995	593.3		0	0				-653	56923.08	
07/18/11 20:35:18	59.993	593.3		0	0				-653	56923.08	
07/18/11 20:35:20	59.9910011	593.3		0	0				-653	56923.08	
07/18/11 20:35:22	59.9900017	593.3		0	0				-653	56937.99	
07/18/11 20:35:24	59.987999	593.3		0	0				-653	56937.99	
07/18/11 20:35:26	59.9850006	593.3		0	0				-653	56937.99	
07/18/11 20:35:28	59.9840012	593.3		0	0				-653	56937.99	
07/18/11 20:35:30	59.9840012	593.3		0	0				-653	56937.99	
07/18/11 20:35:32	59.9860001	593.3		0	0				-653	56932.41	
07/18/11 20:35:34	59.9860001	593.3		0	0				-653	56932.41	
07/18/11 20:35:36	59.9840012	593.3		0	0				-653	56932.41	
07/18/11 20:35:38	59.9830017	593.3		0	0				-653	56932.41	
07/18/11 20:35:40	59.9830017	593.3		0	0				-653	56932.41	
07/18/11 20:35:42	59.9840012	593.3		0	0				-653	56933.85	
07/18/11 20:35:44	59.9840012	593.3		0	0				-653	56933.85	
07/18/11 20:35:46	59.9840012	593.3		0	0				-653	56933.85	
07/18/11 20:35:48	59.9830017	593.3		0	0				-653	56933.85	
07/18/11 20:35:50	59.9840012	593.3		0	0				-653	56933.85	
07/18/11 20:35:52	59.9840012	593.3		0	0				-653	56933.48	
07/18/11 20:35:54	59.9840012	593.3		0	0				-653	56933.48	
07/18/11 20:35:56	59.9819984	593.3		0	0				-653	56933.48	
07/18/11 20:35:58	59.9799995	593.3		0	0				-653	56933.48	
07/18/11 20:36:00	59.9819984	593.3		0	0				-653	56933.48	
07/18/11 20:36:02	59.9830017	593.3		0	0				-653	56928.48	
07/18/11 20:36:04	59.9830017	593.3		0	0				-653	56928.48	
07/18/11 20:36:06	59.980999	593.3		0	0				-653	56928.48	
07/18/11 20:36:08	59.980999	593.3		0	0				-653	56928.48	
07/18/11 20:36:10	59.9799995	593.3		0	0				-653	56928.48	
07/18/11 20:36:12	59.9830017	593.3		0	0				-653	56933.7	
07/18/11 20:36:14	59.9840012	593.3		0	0				-653	56933.7	
07/18/11 20:36:16	59.9850006	593.3		0	0				-653	56933.7	
07/18/11 20:36:18	59.9869995	593.3		0	0				-653	56933.7	
07/18/11 20:36:20	59.9860001	593.3		0	0				-653	56933.7	
07/18/11 20:36:22	59.9850006	593.3		0	0				-653	56930.09	
07/18/11 20:36:24	59.9850006	593.3		0	0				-653	56930.09	
07/18/11 20:36:26	59.9860001	593.3		0	0				-653	56930.09	

07/18/11 20:36:28	59.9860001	593.3	0	0	-653	56930.09
07/18/11 20:36:30	59.9850006	593.3	0	0	-653	56930.09
07/18/11 20:36:32	59.9860001	593.3	0	0	-653	56944
07/18/11 20:36:34	59.9860001	593.3	0	0	-653	56944
07/18/11 20:36:36	59.9869995	593.3	0	0	-653	56944
07/18/11 20:36:38	59.9860001	593.3	0	0	-653	56944
07/18/11 20:36:40	59.9869995	593.3	0	0	-653	56944
07/18/11 20:36:42	59.9889984	593.3	0	0	-653	56934.53
07/18/11 20:36:44	59.9889984	593.3	0	0	-653	56934.53
07/18/11 20:36:46	59.9889984	593.3	0	0	-653	56934.53
07/18/11 20:36:48	59.9889984	593.3	0	0	-653	56934.53
07/18/11 20:36:50	59.9900017	593.3	0	0	-653	56934.53
07/18/11 20:36:52	59.9900017	593.3	0	0	-653	56942.72
07/18/11 20:36:54	59.9920006	593.3	0	0	-653	56942.72
07/18/11 20:36:56	59.9920006	593.3	0	0	-653	56942.72
07/18/11 20:36:58	59.993	593.3	0	0	-653	56942.72
07/18/11 20:37:00	59.9949989	593.3	0	0	-653	56942.72
07/18/11 20:37:02	59.9959984	593.3	0	0	-653	56939.76
07/18/11 20:37:04	59.9959984	593.3	0	0	-653	56939.76
07/18/11 20:37:06	59.9959984	593.3	0	0	-653	56939.76
07/18/11 20:37:08	59.9970016	593.3	0	0	-653	56939.76
07/18/11 20:37:10	59.9990005	593.3	0	0	-653	56939.76
07/18/11 20:37:12	59.9990005	593.3	0	0	-653	56933.93
07/18/11 20:37:14	60.0009995	593.3	0	0	-653	56933.93
07/18/11 20:37:16	60	593.3	0	0	-653	56933.93
07/18/11 20:37:18	59.9980011	593.3	0	0	-653	56933.93
07/18/11 20:37:20	59.9970016	593.3	0	0	-653	56933.93
07/18/11 20:37:22	59.9959984	593.3	0	0	-653	56945.98
07/18/11 20:37:24	59.9990005	593.3	0	0	-653	56945.98
07/18/11 20:37:26	60.0040016	593.3	0	0	-653	56945.98
07/18/11 20:37:28	60.0110016	593.3	0	0	-653	56945.98
07/18/11 20:37:30	60.0169983	593.3	0	0	-653	56945.98
07/18/11 20:37:32	60.0180016	593.3	0	0	-653	56940.86
07/18/11 20:37:34	60.0200005	593.3	0	0	-653	56940.86
07/18/11 20:37:36	60.0200005	593.3	0	0	-653	56940.86
07/18/11 20:37:38	60.0219994	593.3	0	0	-653	56940.86
07/18/11 20:37:40	60.0250015	593.3	0	0	-653	56940.86
07/18/11 20:37:42	60.0250015	593.3	0	0	-653	56916.58
07/18/11 20:37:44	60.0250015	593.3	0	0	-653	56916.58
07/18/11 20:37:46	60.0219994	593.3	0	0	-653	56916.58
07/18/11 20:37:48	60.0219994	593.3	0	0	-653	56916.58
07/18/11 20:37:50	60.0250015	593.3	0	0	-653	56916.58
07/18/11 20:37:52	60.026001	593.3	0	0	-653	56901.21
07/18/11 20:37:54	60.0289993	593.3	0	0	-653	56901.21
07/18/11 20:37:56	60.0299988	593.3	0	0	-653	56901.21
07/18/11 20:37:58	60.0279999	593.3	0	0	-653	56901.21
07/18/11 20:38:00	60.026001	593.3	0	0	-653	56901.21
07/18/11 20:38:02	60.026001	593.3	0	0	-653	56896.12
07/18/11 20:38:04	60.0180016	593.3	0	0	-653	56896.12

07/18/11 20:38:06	60.0139999	593.3	0	0	-653	56896.12
07/18/11 20:38:08	60.0099983	593.3	0	0	-653	56896.12
07/18/11 20:38:10	60.0079994	593.3	0	0	-653	56896.12
07/18/11 20:38:12	60.0079994	593.3	0	0	-653	56911.67
07/18/11 20:38:14	60.0050011	593.3	0	0	-653	56911.67
07/18/11 20:38:16	60.0029984	593.3	0	0	-653	56911.67
07/18/11 20:38:18	60.0009995	593.3	0	0	-653	56911.67
07/18/11 20:38:20	59.9980011	593.3	0	0	-653	56911.67
07/18/11 20:38:22	59.9959984	593.3	0	0	-653	56925.88
07/18/11 20:38:24	59.9939995	593.3	0	0	-653	56925.88
07/18/11 20:38:26	59.993	593.3	0	0	-653	56925.88
07/18/11 20:38:28	59.9939995	593.3	0	0	-653	56925.88
07/18/11 20:38:30	59.9939995	593.3	0	0	-653	56925.88
07/18/11 20:38:32	59.9910011	593.3	0	0	-653	56950.88
07/18/11 20:38:34	59.9920006	593.3	0	0	-653	56950.88
07/18/11 20:38:36	59.993	593.3	0	0	-653	56950.88
07/18/11 20:38:38	59.9939995	593.3	0	0	-653	56950.88
07/18/11 20:38:40	59.9939995	593.3	0	0	-653	56950.88
07/18/11 20:38:42	59.993	593.3	0	0	-653	56951.3
07/18/11 20:38:44	59.993	593.3	0	0	-653	56951.3
07/18/11 20:38:46	59.9920006	593.3	0	0	-653	56951.3
07/18/11 20:38:48	59.9889984	593.3	0	0	-653	56951.3
07/18/11 20:38:50	59.987999	593.3	0	0	-653	56951.3
07/18/11 20:38:52	59.9869995	593.3	0	0	-653	56958.96
07/18/11 20:38:54	59.987999	593.3	0	0	-653	56958.96
07/18/11 20:38:56	59.9889984	593.3	0	0	-653	56958.96
07/18/11 20:38:58	59.9889984	593.3	0	0	-653	56958.96
07/18/11 20:39:00	59.9900017	593.3	0	0	-653	56958.96
07/18/11 20:39:02	59.9900017	593.3	0	0	-653	56949.07
07/18/11 20:39:04	59.9900017	593.3	0	0	-653	56949.07
07/18/11 20:39:06	59.9900017	593.3	0	0	-653	56949.07
07/18/11 20:39:08	59.9900017	593.3	0	0	-653	56949.07
07/18/11 20:39:10	59.9920006	593.3	0	0	-653	56949.07
07/18/11 20:39:12	59.9920006	593.3	0	0	-653	56944.2
07/18/11 20:39:14	59.993	593.3	0	0	-653	56944.2
07/18/11 20:39:16	59.9910011	593.3	0	0	-653	56944.2
07/18/11 20:39:18	59.9860001	593.3	0	0	-653	56944.2
07/18/11 20:39:20	59.980999	593.3	0	0	-653	56944.2
07/18/11 20:39:22	59.9770012	593.3	0	0	-653	56951.1
07/18/11 20:39:24	59.9729996	593.3	0	0	-653	56951.1
07/18/11 20:39:26	59.9700012	593.3	0	0	-653	56951.1
07/18/11 20:39:28	59.9679985	593.3	0	0	-653	56951.1
07/18/11 20:39:30	59.9690018	593.3	0	0	-653	56951.1
07/18/11 20:39:32	59.9710007	593.3	0	0	-653	56961.13
07/18/11 20:39:34	59.9720001	593.3	0	0	-653	56961.13
07/18/11 20:39:36	59.9710007	593.3	0	0	-653	56961.13
07/18/11 20:39:38	59.9720001	593.3	0	0	-653	56961.13
07/18/11 20:39:40	59.9720001	593.3	0	0	-653	56961.13
07/18/11 20:39:42	59.9720001	593.3	0	0	-653	56978.73

07/18/11 20:39:44	59.9710007	593.3	0	0	-653	56978.73
07/18/11 20:39:46	59.9700012	593.3	0	0	-653	56978.73
07/18/11 20:39:48	59.9710007	593.3	0	0	-653	56978.73
07/18/11 20:39:50	59.9729996	593.3	0	0	-653	56978.73
07/18/11 20:39:52	59.9760017	593.3	0	0	-653	56988.21
07/18/11 20:39:54	59.973999	593.3	0	0	-653	56988.21
07/18/11 20:39:56	59.9729996	593.3	0	0	-653	56988.21
07/18/11 20:39:58	59.9720001	593.3	0	0	-653	56988.21
07/18/11 20:40:00	59.973999	593.3	0	0	-653	56988.21
07/18/11 20:40:02	59.9760017	593.3	0	0	-653	56975.85
07/18/11 20:40:04	59.9760017	593.3	0	0	-653	56975.85
07/18/11 20:40:06	59.9749985	593.3	0	0	-653	56975.85
07/18/11 20:40:08	59.9760017	593.3	0	0	-653	56975.85
07/18/11 20:40:10	59.9770012	593.3	0	0	-653	56975.85
07/18/11 20:40:12	59.9760017	593.3	0	0	-653	57000.34
07/18/11 20:40:14	59.9770012	593.3	0	0	-653	57000.34
07/18/11 20:40:16	59.9790001	593.3	0	0	-653	57000.34
07/18/11 20:40:18	59.9819984	593.3	0	0	-653	57000.34
07/18/11 20:40:20	59.9830017	593.3	0	0	-653	57000.34
07/18/11 20:40:22	59.9850006	593.3	0	0	-653	57017.81
07/18/11 20:40:24	59.9819984	593.3	0	0	-653	57017.81
07/18/11 20:40:26	59.980999	593.3	0	0	-653	57017.81
07/18/11 20:40:28	59.9790001	593.3	0	0	-653	57017.81
07/18/11 20:40:30	59.9780006	593.3	0	0	-653	57017.81
07/18/11 20:40:32	59.9799995	593.3	0	0	-653	57007.31
07/18/11 20:40:34	59.9790001	593.3	0	0	-653	57007.31
07/18/11 20:40:36	59.9799995	593.3	0	0	-653	57007.31
07/18/11 20:40:38	59.9799995	593.3	0	0	-653	57007.31
07/18/11 20:40:40	59.9819984	593.3	0	0	-653	57007.31
07/18/11 20:40:42	59.9840012	593.3	0	0	-653	56999.67
07/18/11 20:40:44	59.9869995	593.3	0	0	-653	56999.67
07/18/11 20:40:46	59.9910011	593.3	0	0	-653	56999.67
07/18/11 20:40:48	59.9910011	593.3	0	0	-653	56999.67
07/18/11 20:40:50	59.9900017	593.3	0	0	-653	56999.67
07/18/11 20:40:52	59.9900017	593.3	0	0	-653	57028.63
07/18/11 20:40:54	59.9910011	593.3	0	0	-653	57028.63
07/18/11 20:40:56	59.9939995	593.3	0	0	-653	57028.63
07/18/11 20:40:58	59.9949989	593.3	0	0	-653	57028.63
07/18/11 20:41:00	59.9959984	593.3	0	0	-653	57028.63
07/18/11 20:41:02	59.9970016	593.3	0	0	-653	57023.53
07/18/11 20:41:04	59.9970016	593.3	0	0	-653	57023.53
07/18/11 20:41:06	59.9990005	593.3	0	0	-653	57023.53
07/18/11 20:41:08	59.9980011	593.3	0	0	-653	57023.53
07/18/11 20:41:10	59.9990005	593.3	0	0	-653	57023.53
07/18/11 20:41:12	59.9980011	593.3	0	0	-653	57028.72
07/18/11 20:41:14	59.9970016	593.3	0	0	-653	57028.72
07/18/11 20:41:16	59.9949989	593.3	0	0	-653	57028.72
07/18/11 20:41:18	59.993	593.3	0	0	-653	57028.72
07/18/11 20:41:20	59.9920006	593.3	0	0	-653	57028.72

07/18/11 20:41:22	59.9920006	593.3	0	0	-653	57056.74
07/18/11 20:41:24	59.9939995	593.3	0	0	-653	57056.74
07/18/11 20:41:26	59.9980011	593.3	0	0	-653	57056.74
07/18/11 20:41:28	59.9990005	593.3	0	0	-653	57056.74
07/18/11 20:41:30	59.9990005	593.3	0	0	-653	57056.74
07/18/11 20:41:32	60.0040016	593.3	0	0	-653	57053.91
07/18/11 20:41:34	60.007	593.3	0	0	-653	57053.91
07/18/11 20:41:36	60.0079994	593.3	0	0	-653	57053.91
07/18/11 20:41:38	60.0060005	593.3	0	0	-653	57053.91
07/18/11 20:41:40	60.0050011	593.3	0	0	-653	57053.91
07/18/11 20:41:42	60.0029984	593.3	0	0	-653	57044.42
07/18/11 20:41:44	60.0040016	593.3	0	0	-653	57044.42
07/18/11 20:41:46	60.0040016	593.3	0	0	-653	57044.42
07/18/11 20:41:48	60.0050011	593.3	0	0	-653	57044.42
07/18/11 20:41:50	60.0040016	593.3	0	0	-653	57044.42
07/18/11 20:41:52	60.0050011	593.3	0	0	-653	57048.84
07/18/11 20:41:54	60.0050011	593.3	0	0	-653	57048.84
07/18/11 20:41:56	60.0060005	593.3	0	0	-653	57048.84
07/18/11 20:41:58	60.0089989	593.3	0	0	-653	57048.84
07/18/11 20:42:00	60.0110016	593.3	0	0	-653	57048.84
07/18/11 20:42:02	60.0149994	593.3	0	0	-653	57062
07/18/11 20:42:04	60.0169983	593.3	0	0	-653	57062
07/18/11 20:42:06	60.0169983	593.3	0	0	-653	57062
07/18/11 20:42:08	60.0159988	593.3	0	0	-653	57062
07/18/11 20:42:10	60.019001	593.3	0	0	-653	57062
07/18/11 20:42:12	60.0219994	593.3	0	0	-653	57048.32
07/18/11 20:42:14	60.0239983	593.3	0	0	-653	57048.32
07/18/11 20:42:16	60.0229988	593.3	0	0	-653	57048.32
07/18/11 20:42:18	60.0219994	593.3	0	0	-653	57048.32
07/18/11 20:42:20	60.0219994	593.3	0	0	-653	57048.32
07/18/11 20:42:22	60.0209999	593.3	0	0	-653	57042.8
07/18/11 20:42:24	60.0209999	593.3	0	0	-653	57042.8
07/18/11 20:42:26	60.0200005	593.3	0	0	-653	57042.8
07/18/11 20:42:28	60.0229988	593.3	0	0	-653	57042.8
07/18/11 20:42:30	60.0200005	593.3	0	0	-653	57042.8
07/18/11 20:42:32	60.0200005	593.3	0	0	-653	57059.87
07/18/11 20:42:34	60.0219994	593.3	0	0	-653	57059.87
07/18/11 20:42:36	60.0239983	593.3	0	0	-653	57059.87
07/18/11 20:42:38	60.0209999	593.3	0	0	-653	57059.87
07/18/11 20:42:40	60.019001	593.3	0	0	-653	57059.87
07/18/11 20:42:42	60.0149994	593.3	0	0	-653	57044.11
07/18/11 20:42:44	60.0139999	593.3	0	0	-653	57044.11
07/18/11 20:42:46	60.012001	593.3	0	0	-653	57044.11
07/18/11 20:42:48	60.0130005	593.3	0	0	-653	57044.11
07/18/11 20:42:50	60.0110016	593.3	0	0	-653	57044.11
07/18/11 20:42:52	60.0110016	593.3	0	0	-653	57044.17
07/18/11 20:42:54	60.012001	593.3	0	0	-653	57044.17
07/18/11 20:42:56	60.012001	593.3	0	0	-653	57044.17
07/18/11 20:42:58	60.0130005	593.3	0	0	-653	57044.17

07/18/11 20:43:00	60.0130005	593.3	0	0	-653	57044.17
07/18/11 20:43:02	60.012001	593.3	0	0	-653	57047.32
07/18/11 20:43:04	60.012001	593.3	0	0	-653	57047.32
07/18/11 20:43:06	60.0110016	593.3	0	0	-653	57047.32
07/18/11 20:43:08	60.0099983	593.3	0	0	-653	57047.32
07/18/11 20:43:10	60.0110016	593.3	0	0	-653	57047.32
07/18/11 20:43:12	60.0099983	593.3	0	0	-653	57027.43
07/18/11 20:43:14	60.012001	593.3	0	0	-653	57027.43
07/18/11 20:43:16	60.0130005	593.3	0	0	-653	57027.43
07/18/11 20:43:18	60.0149994	593.3	0	0	-653	57027.43
07/18/11 20:43:20	60.0159988	593.3	0	0	-653	57027.43
07/18/11 20:43:22	60.0159988	593.3	0	0	-653	57048.26
07/18/11 20:43:24	60.0159988	593.3	0	0	-653	57048.26
07/18/11 20:43:26	60.0180016	593.3	0	0	-653	57048.26
07/18/11 20:43:28	60.0180016	593.3	0	0	-653	57048.26
07/18/11 20:43:30	60.0169983	593.3	0	0	-653	57048.26
07/18/11 20:43:32	60.0180016	593.3	0	0	-653	57063.55
07/18/11 20:43:34	60.0180016	593.3	0	0	-653	57063.55
07/18/11 20:43:36	60.0159988	593.3	0	0	-653	57063.55
07/18/11 20:43:38	60.0169983	593.3	0	0	-653	57063.55
07/18/11 20:43:40	60.0169983	593.3	0	0	-653	57063.55
07/18/11 20:43:42	60.019001	593.3	0	0	-653	57060.49
07/18/11 20:43:44	60.0180016	593.3	0	0	-653	57060.49
07/18/11 20:43:46	60.0139999	593.3	0	0	-653	57060.49
07/18/11 20:43:48	60.0139999	593.3	0	0	-653	57060.49
07/18/11 20:43:50	60.0110016	593.3	0	0	-653	57060.49
07/18/11 20:43:52	60.0089989	593.3	0	0	-653	57064.85
07/18/11 20:43:54	60.0079994	593.3	0	0	-653	57064.85
07/18/11 20:43:56	60.0079994	593.3	0	0	-653	57064.85
07/18/11 20:43:58	60.0079994	593.3	0	0	-653	57064.85
07/18/11 20:44:00	60.0079994	593.3	0	0	-653	57064.85
07/18/11 20:44:02	60.0089989	593.3	0	0	-653	57063.68
07/18/11 20:44:04	60.012001	593.3	0	0	-653	57063.68
07/18/11 20:44:06	60.012001	593.3	0	0	-653	57063.68
07/18/11 20:44:08	60.0099983	593.3	0	0	-653	57063.68
07/18/11 20:44:10	60.0079994	593.3	0	0	-653	57063.68
07/18/11 20:44:12	60.0089989	593.3	0	0	-653	57056.04
07/18/11 20:44:14	60.0110016	593.3	0	0	-653	57056.04
07/18/11 20:44:16	60.0139999	593.3	0	0	-653	57056.04
07/18/11 20:44:18	60.0139999	593.3	0	0	-653	57056.04
07/18/11 20:44:20	60.0139999	593.3	0	0	-653	57056.04
07/18/11 20:44:22	60.0130005	593.3	0	0	-653	57060.19
07/18/11 20:44:24	60.012001	593.3	0	0	-653	57060.19
07/18/11 20:44:26	60.012001	593.3	0	0	-653	57060.19
07/18/11 20:44:28	60.0130005	593.3	0	0	-653	57060.19
07/18/11 20:44:30	60.0139999	593.3	0	0	-653	57060.19
07/18/11 20:44:32	60.0149994	593.3	0	0	-653	57047.78
07/18/11 20:44:34	60.0139999	593.3	0	0	-653	57047.78
07/18/11 20:44:36	60.0159988	593.3	0	0	-653	57047.78

07/18/11 20:44:38	60.0180016	593.3	0	0	-653	57047.78
07/18/11 20:44:40	60.0169983	593.3	0	0	-653	57047.78
07/18/11 20:44:42	60.0180016	593.3	0	0	-653	57053.33
07/18/11 20:44:44	60.019001	593.3	0	0	-653	57053.33
07/18/11 20:44:46	60.019001	593.3	0	0	-653	57053.33
07/18/11 20:44:48	60.0180016	593.3	0	0	-653	57053.33
07/18/11 20:44:50	60.0139999	593.3	0	0	-653	57053.33
07/18/11 20:44:52	60.012001	593.3	0	0	-653	57045.49
07/18/11 20:44:54	60.0060005	593.3	0	0	-653	57045.49
07/18/11 20:44:56	60.0050011	593.3	0	0	-653	57045.49
07/18/11 20:44:58	60.0040016	593.3	0	0	-653	57045.49
07/18/11 20:45:00	60.0040016	593.3	0	0	-653	57045.49
07/18/11 20:45:02	60.0040016	593.3	0	0	-653	57051.96
07/18/11 20:45:04	60.0050011	593.3	0	0	-653	57051.96
07/18/11 20:45:06	60.0050011	593.3	0	0	-653	57051.96
07/18/11 20:45:08	60.007	593.3	0	0	-653	57051.96
07/18/11 20:45:10	60.0089989	593.3	0	0	-653	57051.96
07/18/11 20:45:12	60.0079994	593.3	0	0	-653	57058.94
07/18/11 20:45:14	60.0079994	593.3	0	0	-653	57058.94
07/18/11 20:45:16	60.007	593.3	0	0	-653	57058.94
07/18/11 20:45:18	60.007	593.3	0	0	-653	57058.94
07/18/11 20:45:20	60.0060005	593.3	0	0	-653	57058.94
07/18/11 20:45:22	60.0040016	593.3	0	0	-653	57042.65
07/18/11 20:45:24	60.0029984	593.3	0	0	-653	57042.65
07/18/11 20:45:26	60.0009995	593.3	0	0	-653	57042.65
07/18/11 20:45:28	60.0009995	593.3	0	0	-653	57042.65
07/18/11 20:45:30	60.0029984	593.3	0	0	-653	57042.65
07/18/11 20:45:32	60.0060005	593.3	0	0	-653	57068.24
07/18/11 20:45:34	60.0089989	593.3	0	0	-653	57068.24
07/18/11 20:45:36	60.0089989	593.3	0	0	-653	57068.24
07/18/11 20:45:38	60.0099983	593.3	0	0	-653	57068.24
07/18/11 20:45:40	60.0110016	593.3	0	0	-653	57068.24
07/18/11 20:45:42	60.0079994	593.3	0	0	-653	57050.98
07/18/11 20:45:44	60.0060005	593.3	0	0	-653	57050.98
07/18/11 20:45:46	60.0029984	593.3	0	0	-653	57050.98
07/18/11 20:45:48	60.0009995	593.3	0	0	-653	57050.98
07/18/11 20:45:50	59.9990005	593.3	0	0	-653	57050.98
07/18/11 20:45:52	60	593.3	0	0	-653	57062.43
07/18/11 20:45:54	60.0019989	593.3	0	0	-653	57062.43
07/18/11 20:45:56	60.0040016	593.3	0	0	-653	57062.43
07/18/11 20:45:58	60.0060005	593.3	0	0	-653	57062.43
07/18/11 20:46:00	60.0060005	593.3	0	0	-653	57062.43
07/18/11 20:46:02	60.0079994	593.3	0	0	-653	57071.05
07/18/11 20:46:04	60.0079994	593.3	0	0	-653	57071.05
07/18/11 20:46:06	60.0079994	593.3	0	0	-653	57071.05
07/18/11 20:46:08	60.0050011	593.3	0	0	-653	57071.05
07/18/11 20:46:10	60	593.3	0	0	-653	57071.05
07/18/11 20:46:12	59.9970016	593.3	0	0	-653	57054.96
07/18/11 20:46:14	59.9980011	593.3	0	0	-653	57054.96

07/18/11 20:46:16	59.9980011	593.3	0	0	-653	57054.96
07/18/11 20:46:18	59.9990005	593.3	0	0	-653	57054.96
07/18/11 20:46:20	60.0019989	593.3	0	0	-653	57054.96
07/18/11 20:46:22	60.0040016	593.3	0	0	-653	57041.59
07/18/11 20:46:24	60.0040016	593.3	0	0	-653	57041.59
07/18/11 20:46:26	60.0060005	593.3	0	0	-653	57041.59
07/18/11 20:46:28	60.007	593.3	0	0	-653	57041.59
07/18/11 20:46:30	60.0060005	593.3	0	0	-653	57041.59
07/18/11 20:46:32	60.0060005	593.3	0	0	-653	57062.77
07/18/11 20:46:34	60.0060005	593.3	0	0	-653	57062.77
07/18/11 20:46:36	60.0079994	593.3	0	0	-653	57062.77
07/18/11 20:46:38	60.007	593.3	0	0	-653	57062.77
07/18/11 20:46:40	60.007	593.3	0	0	-653	57062.77
07/18/11 20:46:42	60.0079994	593.3	0	0	-653	57072
07/18/11 20:46:44	60.0099983	593.3	0	0	-653	57072
07/18/11 20:46:46	60.0130005	593.3	0	0	-653	57072
07/18/11 20:46:48	60.012001	593.3	0	0	-653	57072
07/18/11 20:46:50	60.0130005	593.3	0	0	-653	57072
07/18/11 20:46:52	60.0130005	593.3	0	0	-653	57053.75
07/18/11 20:46:54	60.012001	593.3	0	0	-653	57053.75
07/18/11 20:46:56	60.012001	593.3	0	0	-653	57053.75
07/18/11 20:46:58	60.0089989	593.3	0	0	-653	57053.75
07/18/11 20:47:00	60.0079994	593.3	0	0	-653	57053.75
07/18/11 20:47:02	60.007	593.3	0	0	-653	57041.91
07/18/11 20:47:04	60.007	593.3	0	0	-653	57041.91
07/18/11 20:47:06	60.0079994	593.3	0	0	-653	57041.91
07/18/11 20:47:08	60.0099983	593.3	0	0	-653	57041.91
07/18/11 20:47:10	60.0110016	593.3	0	0	-653	57041.91
07/18/11 20:47:12	60.0110016	593.3	0	0	-653	57054.95
07/18/11 20:47:14	60.0110016	593.3	0	0	-653	57054.95
07/18/11 20:47:16	60.0099983	593.3	0	0	-653	57054.95
07/18/11 20:47:18	60.0099983	593.3	0	0	-653	57054.95
07/18/11 20:47:20	60.0110016	593.3	0	0	-653	57054.95
07/18/11 20:47:22	60.0110016	593.3	0	0	-653	57061.43
07/18/11 20:47:24	60.0110016	593.3	0	0	-653	57061.43
07/18/11 20:47:26	60.012001	593.3	0	0	-653	57061.43
07/18/11 20:47:28	60.0139999	593.3	0	0	-653	57061.43
07/18/11 20:47:30	60.0159988	593.3	0	0	-653	57061.43
07/18/11 20:47:32	60.0169983	593.3	0	0	-653	57058.57
07/18/11 20:47:34	60.0200005	593.3	0	0	-653	57058.57
07/18/11 20:47:36	60.0200005	593.3	0	0	-653	57058.57
07/18/11 20:47:38	60.0200005	593.3	0	0	-653	57058.57
07/18/11 20:47:40	60.0219994	593.3	0	0	-653	57058.57
07/18/11 20:47:42	60.0219994	593.3	0	0	-653	57063.98
07/18/11 20:47:44	60.0209999	593.3	0	0	-653	57063.98
07/18/11 20:47:46	60.0200005	593.3	0	0	-653	57063.98
07/18/11 20:47:48	60.0209999	593.3	0	0	-653	57063.98
07/18/11 20:47:50	60.0219994	593.3	0	0	-653	57063.98
07/18/11 20:47:52	60.0219994	593.3	0	0	-653	57057.75

07/18/11 20:47:54	60.0180016	593.3	0	0	-653	57057.75
07/18/11 20:47:56	60.0159988	593.3	0	0	-653	57057.75
07/18/11 20:47:58	60.0149994	593.3	0	0	-653	57057.75
07/18/11 20:48:00	60.0149994	593.3	0	0	-653	57057.75
07/18/11 20:48:02	60.0159988	593.3	0	0	-653	57075.8
07/18/11 20:48:04	60.0149994	593.3	0	0	-653	57075.8
07/18/11 20:48:06	60.0159988	593.3	0	0	-653	57075.8
07/18/11 20:48:08	60.0169983	593.3	0	0	-653	57075.8
07/18/11 20:48:10	60.019001	593.3	0	0	-653	57075.8
07/18/11 20:48:12	60.019001	593.3	0	0	-653	57052.68
07/18/11 20:48:14	60.0180016	593.3	0	0	-653	57052.68
07/18/11 20:48:16	60.0180016	593.3	0	0	-653	57052.68
07/18/11 20:48:18	60.0180016	593.3	0	0	-653	57052.68
07/18/11 20:48:20	60.0169983	593.3	0	0	-653	57052.68
07/18/11 20:48:22	60.0159988	593.3	0	0	-653	57049.95
07/18/11 20:48:24	60.0139999	593.3	0	0	-653	57049.95
07/18/11 20:48:26	60.0139999	593.3	0	0	-653	57049.95
07/18/11 20:48:28	60.0130005	593.3	0	0	-653	57049.95
07/18/11 20:48:30	60.0099983	593.3	0	0	-653	57049.95
07/18/11 20:48:32	60.0079994	593.3	0	0	-653	57072.5
07/18/11 20:48:34	60.007	593.3	0	0	-653	57072.5
07/18/11 20:48:36	60.0079994	593.3	0	0	-653	57072.5
07/18/11 20:48:38	60.0089989	593.3	0	0	-653	57072.5
07/18/11 20:48:40	60.0110016	593.3	0	0	-653	57072.5
07/18/11 20:48:42	60.012001	593.3	0	0	-653	57075.62
07/18/11 20:48:44	60.0159988	593.3	0	0	-653	57075.62
07/18/11 20:48:46	60.0180016	593.3	0	0	-653	57075.62
07/18/11 20:48:48	60.0180016	593.3	0	0	-653	57075.62
07/18/11 20:48:50	60.0159988	593.3	0	0	-653	57075.62
07/18/11 20:48:52	60.0139999	593.3	0	0	-653	57081.02
07/18/11 20:48:54	60.0130005	593.3	0	0	-653	57081.02
07/18/11 20:48:56	60.012001	593.3	0	0	-653	57081.02
07/18/11 20:48:58	60.012001	593.3	0	0	-653	57081.02
07/18/11 20:49:00	60.0130005	593.3	0	0	-653	57081.02
07/18/11 20:49:02	60.0130005	593.3	0	0	-653	57074.86
07/18/11 20:49:04	60.0139999	593.3	0	0	-653	57074.86
07/18/11 20:49:06	60.0159988	593.3	0	0	-653	57074.86
07/18/11 20:49:08	60.0180016	593.3	0	0	-653	57074.86
07/18/11 20:49:10	60.0200005	593.3	0	0	-653	57074.86
07/18/11 20:49:12	60.0200005	593.3	0	0	-653	57065.55
07/18/11 20:49:14	60.0209999	593.3	0	0	-653	57065.55
07/18/11 20:49:16	60.0209999	593.3	0	0	-653	57065.55
07/18/11 20:49:18	60.0200005	593.3	0	0	-653	57065.55
07/18/11 20:49:20	60.0180016	593.3	0	0	-653	57065.55
07/18/11 20:49:22	60.0180016	593.3	0	0	-653	57058.09
07/18/11 20:49:24	60.0159988	593.3	0	0	-653	57058.09
07/18/11 20:49:26	60.0139999	593.3	0	0	-653	57058.09
07/18/11 20:49:28	60.012001	593.3	0	0	-653	57058.09
07/18/11 20:49:30	60.0099983	593.3	0	0	-653	57058.09

07/18/11 20:49:32	60.0099983	593.3	0	0	-653	57042.5
07/18/11 20:49:34	60.0110016	593.3	0	0	-653	57042.5
07/18/11 20:49:36	60.0110016	593.3	0	0	-653	57042.5
07/18/11 20:49:38	60.0099983	593.3	0	0	-653	57042.5
07/18/11 20:49:40	60.0110016	593.3	0	0	-653	57042.5
07/18/11 20:49:42	60.0110016	593.3	0	0	-653	57050.12
07/18/11 20:49:44	60.012001	593.3	0	0	-653	57050.12
07/18/11 20:49:46	60.012001	593.3	0	0	-653	57050.12
07/18/11 20:49:48	60.0110016	585.6283569	0	0	-653	57057.21
07/18/11 20:49:50	60.012001	585.6283569	0	0	-653	57057.21
07/18/11 20:49:52	60.0130005	586.1430054	0	0	-653	57051.74
07/18/11 20:49:54	60.0149994	586.1430054	0	0	-653	57051.74
07/18/11 20:49:56	60.0159988	586.7954102	0	0	-653	57051.74
07/18/11 20:49:58	60.0149994	586.7954102	0	0	-653	57051.74
07/18/11 20:50:00	60.0139999	585.9466553	0	0	-653	57037.88
07/18/11 20:50:02	60.0130005	585.9466553	0	0	-653	57037.88
07/18/11 20:50:04	60.012001	585.6723022	0	0	-653	57050.43
07/18/11 20:50:06	60.012001	585.6723022	0	0	-653	57050.43
07/18/11 20:50:08	60.012001	585.116272	0	0	-653	57029.92
07/18/11 20:50:10	60.0130005	585.116272	0	0	-653	57029.92
07/18/11 20:50:12	60.0149994	584.6550293	0	0	-653	57033.71
07/18/11 20:50:14	60.0169983	584.6550293	0	0	-653	57033.71
07/18/11 20:50:16	60.0169983	585.307312	0	0	-653	57035.56
07/18/11 20:50:18	60.0139999	585.307312	0	0	-653	57035.56
07/18/11 20:50:20	60.0149994	585.2108765	0	0	-653	57020.6
07/18/11 20:50:22	60.0130005	585.2108765	0	0	-653	57020.6
07/18/11 20:50:24	60.012001	585.918396	0	0	-653	57030.37
07/18/11 20:50:26	60.0110016	585.918396	0	0	-653	57030.37
07/18/11 20:50:28	60.0079994	593.2776489	0	0	-653	57039.15
07/18/11 20:50:30	60.0079994	593.2776489	0	0	-653	57039.15
07/18/11 20:50:32	60.007	602.7012329	0	0	-653	57042.2
07/18/11 20:50:34	60.007	602.7012329	0	0	-653	57042.2
07/18/11 20:50:36	60.007	602.7012329	0	0	-653	57089.3
07/18/11 20:50:38	60.007	602.7012329	0	0	-653	57089.3
07/18/11 20:50:40	59.9889984	0	0	0	-653	56704.13
07/18/11 20:50:42	59.9179993	0	0	0	-653	56704.13
07/18/11 20:50:44	59.8800011	0	0	0	-653	56763.97
07/18/11 20:50:46	59.8720016	0	0	0	-653	56763.97
07/18/11 20:50:48	59.8660011	0	0	0	-653	56811.2
07/18/11 20:50:50	59.8670006	0	0	0	-653	56811.2
07/18/11 20:50:52	59.868	0	0	0	-653	56864.96
07/18/11 20:50:54	59.8740005	0	0	0	-653	56864.96
07/18/11 20:50:56	59.8759995	0	0	0	-653	56863.43
07/18/11 20:50:58	59.8779984	0	0	0	-653	56863.43
07/18/11 20:51:00	59.8800011	0	0	0	-653	56867.51
07/18/11 20:51:02	59.8829994	0	0	0	-653	56867.51
07/18/11 20:51:04	59.8810005	0	0	0	-653	56878.36
07/18/11 20:51:06	59.8800011	0	0	0	-653	56878.36
07/18/11 20:51:08	59.8810005	0	0	0	-653	56886.32

07/18/11 20:51:10	59.8810005	0	0	0	-653	56886.32
07/18/11 20:51:12	59.8800011	0	0	0	-653	56893.13
07/18/11 20:51:14	59.8779984	0	0	0	-653	56893.13
07/18/11 20:51:16	59.8800011	0	0	0	-653	56875.62
07/18/11 20:51:18	59.8800011	0	0	0	-653	56875.62
07/18/11 20:51:20	59.8800011	0	0	0	-653	56890.82
07/18/11 20:51:22	59.882	0	0	0	-653	56890.82
07/18/11 20:51:24	59.8829994	0	0	0	-653	56891.07
07/18/11 20:51:26	59.882	0	0	0	-653	56891.07
07/18/11 20:51:28	59.8829994	0	0	0	-653	56899.47
07/18/11 20:51:30	59.8800011	0	0	0	-653	56899.47
07/18/11 20:51:32	59.8810005	0	0	0	-653	56874.9
07/18/11 20:51:34	59.8839989	0	0	0	-653	56874.9
07/18/11 20:51:36	59.8919983	0	0	0	-653	56854.81
07/18/11 20:51:38	59.894001	0	0	0	-653	56854.81
07/18/11 20:51:40	59.8959999	0	0	0	-653	56837.21
07/18/11 20:51:42	59.9000015	0	0	0	-653	56837.21
07/18/11 20:51:44	59.9020004	0	0	0	-653	56827.59
07/18/11 20:51:46	59.9039993	0	0	0	-653	56827.59
07/18/11 20:51:48	59.9029999	0	0	0	-653	56841.84
07/18/11 20:51:50	59.9020004	0	0	0	-653	56841.84
07/18/11 20:51:52	59.9029999	0	0	0	-653	56835.3
07/18/11 20:51:54	59.9020004	0	0	0	-653	56835.3
07/18/11 20:51:56	59.901001	0	0	0	-653	56837.3
07/18/11 20:51:58	59.9000015	0	0	0	-653	56837.3
07/18/11 20:52:00	59.901001	0	0	0	-653	56854.15
07/18/11 20:52:02	59.9039993	0	0	0	-653	56854.15
07/18/11 20:52:04	59.9070015	0	0	0	-653	56861.54
07/18/11 20:52:06	59.9099998	0	0	0	-653	56861.54
07/18/11 20:52:08	59.9129982	0	0	0	-653	56861.64
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07/18/11 20:52:12	59.9160004	0	0	0	-653	56866.16
07/18/11 20:52:14	59.9189987	0	0	0	-653	56866.16
07/18/11 20:52:16	59.9220009	0	0	0	-653	56869.21
07/18/11 20:52:18	59.9239998	0	0	0	-653	56869.21
07/18/11 20:52:20	59.9239998	0	0	0	-653	56876.27
07/18/11 20:52:22	59.9239998	0	0	0	-653	56876.27
07/18/11 20:52:24	59.9249992	0	0	0	-653	56881.39
07/18/11 20:52:26	59.9280014	0	0	0	-653	56881.39
07/18/11 20:52:28	59.9290009	0	0	0	-653	56889.59
07/18/11 20:52:30	59.9319992	0	0	0	-653	56889.59
07/18/11 20:52:32	59.9339981	0	0	0	-653	56893.89
07/18/11 20:52:34	59.9350014	0	0	0	-653	56900.44
07/18/11 20:52:36	59.9350014	0	0	0	-653	56900.44
07/18/11 20:52:38	59.9350014	0	0	0	-653	56900.44
07/18/11 20:52:40	59.9350014	0	0	0	-653	56887.58
07/18/11 20:52:42	59.9339981	0	0	0	-653	56887.58
07/18/11 20:52:44	59.9350014	0	0	0	-653	56901.59
07/18/11 20:52:46	59.9379997	0	0	0	-653	56901.59

07/18/11 20:52:48	59.9410019	0	0	0	-653	56915.66
07/18/11 20:52:50	59.9430008	0	0	0	-653	56915.66
07/18/11 20:52:52	59.9480019	0	0	0	-653	56912.21
07/18/11 20:52:54	59.9510002	0	0	0	-653	56912.21
07/18/11 20:52:56	59.9510002	0	0	0	-653	56914.31
07/18/11 20:52:58	59.9529991	0	0	0	-653	56914.31
07/18/11 20:53:00	59.9560013	0	0	0	-653	56907.54
07/18/11 20:53:02	59.9580002	0	0	0	-653	56907.54
07/18/11 20:53:04	59.9580002	0	0	0	-653	56897.04
07/18/11 20:53:06	59.9589996	0	0	0	-653	56897.04
07/18/11 20:53:08	59.9580002	0	0	0	-653	56902.03
07/18/11 20:53:10	59.9580002	0	0	0	-653	56902.03
07/18/11 20:53:12	59.9580002	0	0	0	-653	56903.03
07/18/11 20:53:14	59.9599991	0	0	0	-653	56903.03
07/18/11 20:53:16	59.9620018	0	0	0	-653	56917.74
07/18/11 20:53:18	59.9650002	0	0	0	-653	56917.74
07/18/11 20:53:20	59.9669991	0	0	0	-653	56900.81
07/18/11 20:53:22	59.9700012	0	0	0	-653	56900.81
07/18/11 20:53:24	59.9710007	0	0	0	-653	56914.8
07/18/11 20:53:26	59.9729996	0	0	0	-653	56914.8
07/18/11 20:53:28	59.9710007	0	0	0	-653	56922.52
07/18/11 20:53:30	59.9710007	0	0	0	-653	56922.52
07/18/11 20:53:32	59.9720001	0	0	0	-653	56932.45
07/18/11 20:53:34	59.973999	0	0	0	-653	56932.45
07/18/11 20:53:36	59.9749985	0	0	0	-653	56920.23
07/18/11 20:53:38	59.9770012	0	0	0	-653	56920.23
07/18/11 20:53:40	59.9790001	0	0	0	-653	56912.88
07/18/11 20:53:42	59.980999	0	0	0	-653	56912.88
07/18/11 20:53:44	59.9819984	0	0	0	-653	56905.22
07/18/11 20:53:46	59.9840012	0	0	0	-653	56905.22
07/18/11 20:53:48	59.9860001	0	0	0	-653	56915.62
07/18/11 20:53:50	59.9889984	0	0	0	-653	56915.62
07/18/11 20:53:52	59.9910011	0	0	0	-653	56923.03
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07/18/11 20:53:56	59.9959984	0	0	0	-653	56932.03
07/18/11 20:53:58	59.9990005	0	0	0	-653	56932.03
07/18/11 20:54:00	60.0019989	0	0	0	-653	56926.22
07/18/11 20:54:02	60.0050011	0	0	0	-653	56926.22
07/18/11 20:54:04	60.0050011	0	0	0	-653	56930.33
07/18/11 20:54:06	60.0089989	0	0	0	-653	56930.33
07/18/11 20:54:08	60.0099983	0	0	0	-653	56935.11
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07/18/11 20:54:12	60.012001	0	0	0	-653	56938.24
07/18/11 20:54:14	60.0110016	0	0	0	-653	56938.24
07/18/11 20:54:16	60.0130005	0	0	0	-653	56947.14
07/18/11 20:54:18	60.0139999	0	0	0	-653	56947.14
07/18/11 20:54:20	60.0169983	0	0	0	-653	56946.19
07/18/11 20:54:22	60.0209999	0	0	0	-653	56946.19
07/18/11 20:54:24	60.0229988	0	0	0	-653	56937.3

07/18/11 20:54:26	60.0239983	0	0	0	-653	56937.3
07/18/11 20:54:28	60.0250015	0	0	0	-653	56931.41
07/18/11 20:54:30	60.026001	0	0	0	-653	56931.41
07/18/11 20:54:32	60.026001	0	0	0	-653	56924.84
07/18/11 20:54:34	60.0279999	0	0	0	-653	56924.84
07/18/11 20:54:36	60.0289993	0	0	0	-653	56933.16
07/18/11 20:54:38	60.0289993	0	0	0	-653	56933.16
07/18/11 20:54:40	60.0299988	0	0	0	-653	56935.62
07/18/11 20:54:42	60.0320015	0	0	0	-653	56935.62
07/18/11 20:54:44	60.0330009	0	0	0	-653	56957.32
07/18/11 20:54:46	60.0330009	0	0	0	-653	56957.32
07/18/11 20:54:48	60.0309982	0	0	0	-653	56954.23
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07/18/11 20:54:54	60.0309982	0	0	0	-653	56956.64
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07/18/11 20:54:58	60.0320015	0	0	0	-653	56956.6
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07/18/11 20:55:04	60.0330009	0	0	0	-653	56943.18
07/18/11 20:55:06	60.0320015	0	0	0	-653	56943.18
07/18/11 20:55:08	60.0299988	0	0	0	-653	56939.07
07/18/11 20:55:10	60.0330009	0	0	0	-653	56939.07
07/18/11 20:55:12	60.0340004	0	0	0	-653	56942.44
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07/18/11 20:55:22	60.0460014	0	0	0	-653	56907.9
07/18/11 20:55:24	60.0519981	0	0	0	-653	56897.8
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07/18/11 20:55:28	60.0499992	0	0	0	-653	56864.89
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07/18/11 20:55:56	60.0449982	0	0	0	-653	56838.2
07/18/11 20:55:58	60.0449982	0	0	0	-653	56838.2
07/18/11 20:56:00	60.0460014	0	0	0	-653	56838.88
07/18/11 20:56:02	60.0460014	0	0	0	-653	56838.88

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07/18/11 20:56:32	60.0489998	0	0	0	-653	56814.38
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07/18/11 20:56:36	60.0499992	0	0	0	-653	56817.16
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07/18/11 20:56:44	60.0439987	0	0	0	-653	56807.83
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07/18/11 20:57:28	60.0390015	0	0	0	-653	56892.39
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07/18/11 20:57:32	60.0379982	0	0	0	-653	56875.33
07/18/11 20:57:34	60.0369987	0	0	0	-653	56874.01
07/18/11 20:57:36	60.0349998	0	0	0	-653	56874.01
07/18/11 20:57:38	60.0340004	0	0	0	-653	56874.01
07/18/11 20:57:40	60.0340004	0	0	0	-653	56881

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07/18/11 20:57:44	60.0359993	0	0	0	-653	56887.45
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07/18/11 20:57:50	60.0330009	0	0	0	-653	56882.08
07/18/11 20:57:52	60.0340004	0	0	0	-653	56879.11
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07/18/11 20:58:16	60.0279999	0	0	0	-653	56868.5
07/18/11 20:58:18	60.026001	0	0	0	-653	56868.5
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07/18/11 20:58:32	60.0369987	0	0	0	-653	56863.48
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07/18/11 20:59:06	60.0340004	0	0	0	-653	56839.96
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07/18/11 20:59:14	60.0289993	0	0	0	-653	56854.9
07/18/11 20:59:16	60.0270004	0	0	0	-653	56846
07/18/11 20:59:18	60.0250015	0	0	0	-653	56846

07/18/11 20:59:20	60.0250015	0	0	0	-653	56833.07
07/18/11 20:59:22	60.026001	0	0	0	-653	56833.07
07/18/11 20:59:24	60.026001	0	0	0	-653	56827.28
07/18/11 20:59:26	60.0250015	0	0	0	-653	56827.28
07/18/11 20:59:28	60.026001	0	0	0	-653	56829.42
07/18/11 20:59:30	60.0270004	0	0	0	-653	56829.42
07/18/11 20:59:32	60.0270004	0	0	0	-653	56846.66
07/18/11 20:59:34	60.0279999	0	0	0	-653	56846.66
07/18/11 20:59:36	60.0299988	0	0	0	-653	56840.57
07/18/11 20:59:38	60.0289993	0	0	0	-653	56840.57
07/18/11 20:59:40	60.0299988	0	0	0	-653	56831.91
07/18/11 20:59:42	60.0279999	0	0	0	-653	56831.91
07/18/11 20:59:44	60.026001	0	0	0	-653	56833.35
07/18/11 20:59:46	60.0270004	0	0	0	-653	56833.35
07/18/11 20:59:48	60.0289993	0	0	0	-653	56833.63
07/18/11 20:59:50	60.0299988	0	0	0	-653	56833.63
07/18/11 20:59:52	60.0320015	0	0	0	-653	56828
07/18/11 20:59:54	60.0289993	0	0	0	-653	56828
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07/18/11 20:59:58	60.0320015	0	0	0	-653	56828
07/18/11 21:00:00	60.0330009	0	0	0	-653	56833.8
07/18/11 21:00:02	60.0330009	0	0	0	-653	56833.8
07/18/11 21:00:04	60.0320015	0	0	0	-653	56806.86
07/18/11 21:00:06	60.0299988	0	0	0	-653	56806.86
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07/18/11 21:00:10	60.0330009	0	0	0	-653	56813.18
07/18/11 21:00:12	60.0349998	0	0	0	-653	56804.27
07/18/11 21:00:14	60.0349998	0	0	0	-653	56804.27
07/18/11 21:00:16	60.0309982	0	0	0	-653	56787.34
07/18/11 21:00:18	60.0320015	0	0	0	-653	56787.34
07/18/11 21:00:20	60.0289993	0	0	0	-653	56786.84
07/18/11 21:00:22	60.0270004	0	0	0	-653	56786.84
07/18/11 21:00:24	60.026001	0	0	0	-653	56773.49
07/18/11 21:00:26	60.0270004	0	0	0	-653	56773.49
07/18/11 21:00:28	60.0270004	0	0	0	-653	56759.37
07/18/11 21:00:30	60.026001	0	0	0	-653	56759.37
07/18/11 21:00:32	60.026001	0	0	0	-653	56742.34
07/18/11 21:00:34	60.0279999	0	0	0	-653	56742.34
07/18/11 21:00:36	60.0279999	0	0	0	-653	56734.98
07/18/11 21:00:38	60.0270004	0	0	0	-653	56734.98
07/18/11 21:00:40	60.026001	0	0	0	-653	56750.62
07/18/11 21:00:42	60.0270004	0	0	0	-653	56750.62
07/18/11 21:00:44	60.0279999	0	0	0	-653	56746.89
07/18/11 21:00:46	60.0270004	0	0	0	-653	56746.89
07/18/11 21:00:48	60.0270004	0	0	0	-653	56753.28
07/18/11 21:00:50	60.0270004	0	0	0	-653	56753.28
07/18/11 21:00:52	60.0270004	0	0	0	-653	56749.96
07/18/11 21:00:54	60.0250015	0	0	0	-653	56749.96
07/18/11 21:00:56	60.0239983	0	0	0	-653	56728.95

07/18/11 21:00:58	60.0239983	0	0	0	-653	56728.95
07/18/11 21:01:00	60.0239983	0	0	0	-653	56723.32
07/18/11 21:01:02	60.0250015	0	0	0	-653	56723.32
07/18/11 21:01:04	60.0250015	0	0	0	-653	56715.22
07/18/11 21:01:06	60.026001	0	0	0	-653	56715.22
07/18/11 21:01:08	60.0250015	0	0	0	-653	56724.1
07/18/11 21:01:10	60.0229988	0	0	0	-653	56724.1
07/18/11 21:01:12	60.0219994	0	0	0	-653	56718.91
07/18/11 21:01:14	60.0209999	0	0	0	-653	56718.91
07/18/11 21:01:16	60.0200005	0	0	0	-653	56704.99
07/18/11 21:01:18	60.0180016	0	0	0	-653	56704.99
07/18/11 21:01:20	60.0149994	0	0	0	-653	56708.48
07/18/11 21:01:22	60.0130005	0	0	0	-653	56708.48
07/18/11 21:01:24	60.0130005	0	0	0	-653	56730.45
07/18/11 21:01:26	60.0130005	0	0	0	-653	56730.45
07/18/11 21:01:28	60.0139999	0	0	0	-653	56720.16
07/18/11 21:01:30	60.0139999	0	0	0	-653	56720.16
07/18/11 21:01:32	60.0149994	0	0	0	-653	56711.63
07/18/11 21:01:34	60.0169983	0	0	0	-653	56711.63
07/18/11 21:01:36	60.0159988	0	0	0	-653	56708.66
07/18/11 21:01:38	60.0159988	0	0	0	-653	56708.66
07/18/11 21:01:40	60.0159988	0	0	0	-653	56706.61
07/18/11 21:01:42	60.0149994	0	0	0	-653	56706.61
07/18/11 21:01:44	60.0139999	0	0	0	-653	56716.55
07/18/11 21:01:46	60.0130005	0	0	0	-653	56716.55
07/18/11 21:01:48	60.0139999	0	0	0	-653	56705.83
07/18/11 21:01:50	60.0180016	0	0	0	-653	56705.83
07/18/11 21:01:52	60.0180016	0	0	0	-653	56696.39
07/18/11 21:01:54	60.0180016	0	0	0	-653	56696.39
07/18/11 21:01:56	60.0159988	0	0	0	-653	56670.62
07/18/11 21:01:58	60.0169983	0	0	0	-653	56670.62
07/18/11 21:02:00	60.0250015	0	0	0	-653	56642.69
07/18/11 21:02:02	60.0299988	0	0	0	-653	56642.69
07/18/11 21:02:04	60.0320015	0	0	0	-653	56644.32
07/18/11 21:02:06	60.0340004	0	0	0	-653	56644.32
07/18/11 21:02:08	60.0330009	0	0	0	-653	56636.41
07/18/11 21:02:10	60.0330009	0	0	0	-653	56636.41
07/18/11 21:02:12	60.0330009	0	0	0	-653	56630.75
07/18/11 21:02:14	60.0330009	0	0	0	-653	56630.75
07/18/11 21:02:16	60.0340004	0	0	0	-653	56620.91
07/18/11 21:02:18	60.0369987	0	0	0	-653	56620.91
07/18/11 21:02:20	60.0359993	0	0	0	-653	56619
07/18/11 21:02:22	60.0340004	0	0	0	-653	56619
07/18/11 21:02:24	60.0299988	0	0	0	-653	56610.45
07/18/11 21:02:26	60.0320015	0	0	0	-653	56610.45
07/18/11 21:02:28	60.0309982	0	0	0	-653	56598.06
07/18/11 21:02:30	60.0320015	0	0	0	-653	56598.06
07/18/11 21:02:32	60.0309982	0	0	0	-653	56587.05
07/18/11 21:02:34	60.0289993	0	0	0	-653	56589.89

07/18/11 21:02:36	60.0270004	0	0	0	-653	56589.89
07/18/11 21:02:38	60.0270004	0	0	0	-653	56589.89
07/18/11 21:02:40	60.0229988	0	0	0	-653	56581.13
07/18/11 21:02:42	60.0219994	0	0	0	-653	56581.13
07/18/11 21:02:44	60.0200005	0	0	0	-653	56587.69
07/18/11 21:02:46	60.0180016	0	0	0	-653	56587.69
07/18/11 21:02:48	60.019001	0	0	0	-653	56605.2
07/18/11 21:02:50	60.0180016	0	0	0	-653	56605.2
07/18/11 21:02:52	60.019001	0	0	0	-653	56592.78
07/18/11 21:02:54	60.019001	0	0	0	-653	56592.78
07/18/11 21:02:56	60.0169983	0	0	0	-653	56586.05
07/18/11 21:02:58	60.0159988	0	0	0	-653	56586.05
07/18/11 21:03:00	60.0169983	0	0	0	-653	56581.38
07/18/11 21:03:02	60.0149994	0	0	0	-653	56581.38
07/18/11 21:03:04	60.0139999	0	0	0	-653	56576.92
07/18/11 21:03:06	60.012001	0	0	0	-653	56576.92
07/18/11 21:03:08	60.0110016	0	0	0	-653	56570.9
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07/18/11 21:03:12	60.0110016	0	0	0	-653	56585.3
07/18/11 21:03:14	60.0130005	0	0	0	-653	56585.3
07/18/11 21:03:16	60.0130005	0	0	0	-653	56579.29
07/18/11 21:03:18	60.012001	0	0	0	-653	56579.29
07/18/11 21:03:20	60.012001	0	0	0	-653	56575.29
07/18/11 21:03:22	60.012001	0	0	0	-653	56575.29
07/18/11 21:03:24	60.0110016	0	0	0	-653	56567.7
07/18/11 21:03:26	60.007	0	0	0	-653	56567.7
07/18/11 21:03:28	60.0040016	0	0	0	-653	56566.86
07/18/11 21:03:30	60.0009995	0	0	0	-653	56566.86
07/18/11 21:03:32	59.9980011	0	0	0	-653	56567.8
07/18/11 21:03:34	59.9980011	0	0	0	-653	56567.8
07/18/11 21:03:36	59.9990005	0	0	0	-653	56565.92
07/18/11 21:03:38	60.0009995	0	0	0	-653	56565.92
07/18/11 21:03:40	60.0019989	0	0	0	-653	56570
07/18/11 21:03:42	60.0040016	0	0	0	-653	56570
07/18/11 21:03:44	60.0060005	0	0	0	-653	56565.58
07/18/11 21:03:46	60.0060005	0	0	0	-653	56565.58
07/18/11 21:03:48	60.0060005	0	0	0	-653	56557.96
07/18/11 21:03:50	60.0050011	0	0	0	-653	56557.96
07/18/11 21:03:52	60.0050011	0	0	0	-653	56538.89
07/18/11 21:03:54	60.0050011	0	0	0	-653	56538.89
07/18/11 21:03:56	60.0050011	0	0	0	-653	56537.92
07/18/11 21:03:58	60.0050011	0	0	0	-653	56537.92
07/18/11 21:04:00	60.0040016	0	0	0	-653	56544.36
07/18/11 21:04:02	60.0040016	0	0	0	-653	56544.36
07/18/11 21:04:04	60.0050011	0	0	0	-653	56542.68
07/18/11 21:04:06	60.0050011	0	0	0	-653	56542.68
07/18/11 21:04:08	60.0050011	0	0	0	-653	56554.31
07/18/11 21:04:10	60.0019989	0	0	0	-653	56554.31
07/18/11 21:04:12	59.9990005	0	0	0	-653	56543.29

07/18/11 21:04:14	59.9959984	0	0	0	-653	56543.29
07/18/11 21:04:16	59.9980011	0	0	0	-653	56531.34
07/18/11 21:04:18	59.9990005	0	0	0	-653	56531.34
07/18/11 21:04:20	60.0009995	0	0	0	-653	56542.45
07/18/11 21:04:22	59.9990005	0	0	0	-653	56542.45
07/18/11 21:04:24	59.9980011	0	0	0	-653	56546.61
07/18/11 21:04:26	59.9980011	0	0	0	-653	56546.61
07/18/11 21:04:28	59.9980011	0	0	0	-653	56538.92
07/18/11 21:04:30	59.9970016	0	0	0	-653	56538.92
07/18/11 21:04:32	59.9959984	0	0	0	-653	56548.07
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07/18/11 21:04:38	59.993	0	0	0	-653	56542.02
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07/18/11 21:04:50	59.993	0	0	0	-653	56528.46
07/18/11 21:04:52	59.9900017	0	0	0	-653	56519.61
07/18/11 21:04:54	59.987999	0	0	0	-653	56519.61
07/18/11 21:04:56	59.9869995	0	0	0	-653	56512.2
07/18/11 21:04:58	59.9869995	0	0	0	-653	56512.2
07/18/11 21:05:00	59.9889984	0	0	0	-653	56514.52
07/18/11 21:05:02	59.9910011	0	0	0	-653	56514.52
07/18/11 21:05:04	59.993	0	0	0	-653	56508.47
07/18/11 21:05:06	59.9959984	0	0	0	-653	56508.47
07/18/11 21:05:08	59.9970016	0	0	0	-653	56512.15
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07/18/11 21:05:14	59.993	0	0	0	-653	56508.86
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07/18/11 21:05:18	59.9900017	0	0	0	-653	56503.34
07/18/11 21:05:20	59.9889984	0	0	0	-653	56510.09
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07/18/11 21:05:26	59.9850006	0	0	0	-653	56514.67
07/18/11 21:05:28	59.9850006	0	0	0	-653	56501.9
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07/18/11 21:05:32	59.9850006	0	0	0	-653	56510.46
07/18/11 21:05:34	59.9830017	0	0	0	-653	56510.46
07/18/11 21:05:36	59.9830017	0	0	0	-653	56504.74
07/18/11 21:05:38	59.980999	0	0	0	-653	56504.74
07/18/11 21:05:40	59.9799995	0	0	0	-653	56502.2
07/18/11 21:05:42	59.9790001	0	0	0	-653	56502.2
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07/18/11 21:05:48	59.9799995	0	0	0	-653	56500.1
07/18/11 21:05:50	59.9780006	0	0	0	-653	56500.1

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07/18/11 21:05:54	59.9770012	0	0	0	-653	56492.3
07/18/11 21:05:56	59.9790001	0	0	0	-653	56483.54
07/18/11 21:05:58	59.9790001	0	0	0	-653	56483.54
07/18/11 21:06:00	59.980999	0	0	0	-653	56486.4
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07/18/11 21:06:10	59.9889984	0	0	0	-653	56489.48
07/18/11 21:06:12	59.9889984	0	0	0	-653	56476.55
07/18/11 21:06:14	59.9900017	0	0	0	-653	56476.55
07/18/11 21:06:16	59.9910011	0	0	0	-653	56484.84
07/18/11 21:06:18	59.9900017	0	0	0	-653	56484.84
07/18/11 21:06:20	59.9900017	0	0	0	-653	56494.26
07/18/11 21:06:22	59.987999	0	0	0	-653	56494.26
07/18/11 21:06:24	59.9869995	0	0	0	-653	56478.49
07/18/11 21:06:26	59.9830017	0	0	0	-653	56478.49
07/18/11 21:06:28	59.9819984	0	0	0	-653	56501.87
07/18/11 21:06:30	59.9819984	0	0	0	-653	56501.87
07/18/11 21:06:32	59.9819984	0	0	0	-653	56491.51
07/18/11 21:06:34	59.9830017	0	0	0	-653	56491.51
07/18/11 21:06:36	59.9840012	0	0	0	-653	56480.03
07/18/11 21:06:38	59.9850006	0	0	0	-653	56480.03
07/18/11 21:06:40	59.9850006	0	0	0	-653	56464.71
07/18/11 21:06:42	59.9830017	0	0	0	-653	56464.71
07/18/11 21:06:44	59.987999	0	0	0	-653	56462.37
07/18/11 21:06:46	59.9939995	0	0	0	-653	56462.37
07/18/11 21:06:48	59.9980011	0	0	0	-653	56457.73
07/18/11 21:06:50	59.9990005	0	0	0	-653	56457.73
07/18/11 21:06:52	60	0	0	0	-653	56446.26
07/18/11 21:06:54	60	0	0	0	-653	56446.26
07/18/11 21:06:56	60.0009995	0	0	0	-653	56446.1
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07/18/11 21:07:00	60.0019989	0	0	0	-653	56440.1
07/18/11 21:07:02	60.0029984	0	0	0	-653	56440.1
07/18/11 21:07:04	60.0040016	0	0	0	-653	56440.59
07/18/11 21:07:06	60.0060005	0	0	0	-653	56440.59
07/18/11 21:07:08	60.007	0	0	0	-653	56443.3
07/18/11 21:07:10	60.007	0	0	0	-653	56443.3
07/18/11 21:07:12	60.0079994	0	0	0	-653	56446.27
07/18/11 21:07:14	60.0099983	0	0	0	-653	56446.27
07/18/11 21:07:16	60.0079994	0	0	0	-653	56442.77
07/18/11 21:07:18	60.0089989	0	0	0	-653	56442.77
07/18/11 21:07:20	60.0099983	0	0	0	-653	56442.02
07/18/11 21:07:22	60.0110016	0	0	0	-653	56442.02
07/18/11 21:07:24	60.0130005	0	0	0	-653	56445.78
07/18/11 21:07:26	60.0159988	0	0	0	-653	56445.78
07/18/11 21:07:28	60.0159988	0	0	0	-653	56438.68

07/18/11 21:07:30	60.0159988	0	0	0	-653	56438.68
07/18/11 21:07:32	60.0110016	0	0	0	-653	56446.48
07/18/11 21:07:34	60.007	0	0	0	-653	56438.85
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07/18/11 21:07:38	60.0029984	0	0	0	-653	56438.85
07/18/11 21:07:40	60.0029984	0	0	0	-653	56433.16
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07/18/11 21:07:44	60.0079994	0	0	0	-653	56423.06
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07/18/11 21:07:50	60.0139999	0	0	0	-653	56413.65
07/18/11 21:07:52	60.0139999	0	0	0	-653	56422.53
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07/18/11 21:08:00	60.007	0	0	0	-653	56407.22
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07/18/11 21:08:04	60.0019989	0	0	0	-653	56415.69
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07/18/11 21:08:08	59.9959984	0	0	0	-653	56420.6
07/18/11 21:08:10	59.9939995	0	0	0	-653	56420.6
07/18/11 21:08:12	59.9939995	0	0	0	-653	56412.14
07/18/11 21:08:14	59.9939995	0	0	0	-653	56412.14
07/18/11 21:08:16	59.9949989	0	0	0	-653	56439.41
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07/18/11 21:08:20	59.987999	0	0	0	-653	56449.05
07/18/11 21:08:22	59.9819984	0	0	0	-653	56449.05
07/18/11 21:08:24	59.9729996	0	0	0	-653	56441.32
07/18/11 21:08:26	59.9729996	0	0	0	-653	56441.32
07/18/11 21:08:28	59.9720001	0	0	0	-653	56451.41
07/18/11 21:08:30	59.9710007	0	0	0	-653	56451.41
07/18/11 21:08:32	59.9720001	0	0	0	-653	56449.05
07/18/11 21:08:34	59.9700012	0	0	0	-653	56449.05
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07/18/11 21:08:40	59.9720001	0	0	0	-653	56448.8
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07/18/11 21:08:44	59.973999	0	0	0	-653	56431.23
07/18/11 21:08:46	59.973999	0	0	0	-653	56431.23
07/18/11 21:08:48	59.973999	0	0	0	-653	56428.9
07/18/11 21:08:50	59.9729996	0	0	0	-653	56428.9
07/18/11 21:08:52	59.9729996	0	0	0	-653	56428.16
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07/18/11 21:08:56	59.9720001	0	0	0	-653	56438.3
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07/18/11 21:09:00	59.9729996	0	0	0	-653	56429.57
07/18/11 21:09:02	59.9720001	0	0	0	-653	56429.57
07/18/11 21:09:04	59.9720001	0	0	0	-653	56421.97
07/18/11 21:09:06	59.9710007	0	0	0	-653	56421.97

07/18/11 21:09:08	59.9720001	0	0	0	-653	56422.48
07/18/11 21:09:10	59.9720001	0	0	0	-653	56422.48
07/18/11 21:09:12	59.9720001	0	0	0	-653	56424.6
07/18/11 21:09:14	59.9729996	0	0	0	-653	56424.6
07/18/11 21:09:16	59.973999	0	0	0	-653	56430.37
07/18/11 21:09:18	59.973999	0	0	0	-653	56430.37
07/18/11 21:09:20	59.973999	0	0	0	-653	56421.03
07/18/11 21:09:22	59.973999	0	0	0	-653	56421.03
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07/18/11 21:09:30	59.9770012	0	0	0	-653	56412.87
07/18/11 21:09:32	59.9780006	0	0	0	-653	56428.91
07/18/11 21:09:34	59.9780006	0	0	0	-653	56428.91
07/18/11 21:09:36	59.9770012	0	0	0	-653	56424.23
07/18/11 21:09:38	59.9770012	0	0	0	-653	56424.23
07/18/11 21:09:40	59.9760017	0	0	0	-653	56408.42
07/18/11 21:09:42	59.973999	0	0	0	-653	56408.42
07/18/11 21:09:44	59.973999	0	0	0	-653	56418.11
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07/18/11 21:09:48	59.973999	0	0	0	-653	56407.98
07/18/11 21:09:50	59.973999	0	0	0	-653	56407.98
07/18/11 21:09:52	59.9729996	0	0	0	-653	56398.21
07/18/11 21:09:54	59.9729996	0	0	0	-653	56398.21
07/18/11 21:09:56	59.9729996	0	0	0	-653	56398.21
07/18/11 21:09:58	59.9729996	0	0	0	-653	56398.21
07/18/11 21:10:00	59.9710007	0	0	0	-653	56400.08
07/18/11 21:10:02	59.9700012	0	0	0	-653	56400.08
07/18/11 21:10:04	59.9700012	0	0	0	-653	56416.78
07/18/11 21:10:06	59.9700012	0	0	0	-653	56416.78
07/18/11 21:10:08	59.9710007	0	0	0	-653	56410.82
07/18/11 21:10:10	59.9710007	0	0	0	-653	56410.82
07/18/11 21:10:12	59.9710007	0	0	0	-653	56407.11
07/18/11 21:10:14	59.9700012	0	0	0	-653	56407.11
07/18/11 21:10:16	59.9720001	0	0	0	-653	56412.56
07/18/11 21:10:18	59.9749985	0	0	0	-653	56412.56
07/18/11 21:10:20	59.9749985	0	0	0	-653	56412.43
07/18/11 21:10:22	59.9770012	0	0	0	-653	56412.43
07/18/11 21:10:24	59.9770012	0	0	0	-653	56424.64
07/18/11 21:10:26	59.9770012	0	0	0	-653	56424.64
07/18/11 21:10:28	59.9780006	0	0	0	-653	56411.08
07/18/11 21:10:30	59.9799995	0	0	0	-653	56411.08
07/18/11 21:10:32	59.9830017	0	0	0	-653	56410.07
07/18/11 21:10:34	59.9840012	0	0	0	-653	56410.07
07/18/11 21:10:36	59.9850006	0	0	0	-653	56415.18
07/18/11 21:10:38	59.9869995	0	0	0	-653	56415.18
07/18/11 21:10:40	59.987999	0	0	0	-653	56434.01
07/18/11 21:10:42	59.987999	0	0	0	-653	56434.01
07/18/11 21:10:44	59.987999	0	0	0	-653	56433.76

07/18/11 21:10:46	59.987999	0	0	0	-653	56433.76
07/18/11 21:10:48	59.9889984	0	0	0	-653	56427.4
07/18/11 21:10:50	59.9869995	0	0	0	-653	56427.4
07/18/11 21:10:52	59.9850006	0	0	0	-653	56430.27
07/18/11 21:10:54	59.9850006	0	0	0	-653	56430.27
07/18/11 21:10:56	59.9850006	0	0	0	-653	56417.96
07/18/11 21:10:58	59.9850006	0	0	0	-653	56417.96
07/18/11 21:11:00	59.9850006	0	0	0	-653	56422.76
07/18/11 21:11:02	59.9860001	0	0	0	-653	56422.76
07/18/11 21:11:04	59.9869995	0	0	0	-653	56420.98
07/18/11 21:11:06	59.9889984	0	0	0	-653	56420.98
07/18/11 21:11:08	59.9920006	0	0	0	-653	56411.35
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07/18/11 21:11:12	59.9920006	0	0	0	-653	56412.68
07/18/11 21:11:14	59.9910011	0	0	0	-653	56412.68
07/18/11 21:11:16	59.993	0	0	0	-653	56421.7
07/18/11 21:11:18	59.9939995	0	0	0	-653	56421.7
07/18/11 21:11:20	59.9959984	0	0	0	-653	56425.16
07/18/11 21:11:22	59.9970016	0	0	0	-653	56425.16
07/18/11 21:11:24	59.9959984	0	0	0	-653	56438.14
07/18/11 21:11:26	59.9949989	0	0	0	-653	56438.14
07/18/11 21:11:28	59.9970016	0	0	0	-653	56433.16
07/18/11 21:11:30	59.9970016	0	0	0	-653	56433.16
07/18/11 21:11:32	59.9970016	0	0	0	-653	56425.07
07/18/11 21:11:34	59.9990005	0	0	0	-653	56425.07
07/18/11 21:11:36	60.0040016	0	0	0	-653	56410.61
07/18/11 21:11:38	60.0159988	0	0	0	-653	56410.61
07/18/11 21:11:40	60.0229988	0	0	0	-653	56384.75
07/18/11 21:11:42	60.0279999	0	0	0	-653	56384.75
07/18/11 21:11:44	60.0289993	0	0	0	-653	56377.32
07/18/11 21:11:46	60.0270004	0	0	0	-653	56377.32
07/18/11 21:11:48	60.026001	0	0	0	-653	56362.61
07/18/11 21:11:50	60.0279999	0	0	0	-653	56362.61
07/18/11 21:11:52	60.0289993	0	0	0	-653	56354.32
07/18/11 21:11:54	60.0299988	0	0	0	-653	56354.32
07/18/11 21:11:56	60.0299988	0	0	0	-653	56355.96
07/18/11 21:11:58	60.0299988	0	0	0	-653	56355.96
07/18/11 21:12:00	60.0320015	0	0	0	-653	56348.51
07/18/11 21:12:02	60.0330009	0	0	0	-653	56348.51
07/18/11 21:12:04	60.0330009	0	0	0	-653	56349.23
07/18/11 21:12:06	60.0320015	0	0	0	-653	56349.23
07/18/11 21:12:08	60.0299988	0	0	0	-653	56357.15
07/18/11 21:12:10	60.0279999	0	0	0	-653	56357.15
07/18/11 21:12:12	60.026001	0	0	0	-653	56349.07
07/18/11 21:12:14	60.0250015	0	0	0	-653	56349.07
07/18/11 21:12:16	60.0239983	0	0	0	-653	56361.33
07/18/11 21:12:18	60.0239983	0	0	0	-653	56361.33
07/18/11 21:12:20	60.026001	0	0	0	-653	56355.59
07/18/11 21:12:22	60.0250015	0	0	0	-653	56355.59

07/18/11 21:12:24	60.0250015	0	0	0	-653	56349.07
07/18/11 21:12:26	60.0219994	0	0	0	-653	56349.07
07/18/11 21:12:28	60.0200005	0	0	0	-653	56354.7
07/18/11 21:12:30	60.019001	0	0	0	-653	56354.7
07/18/11 21:12:32	60.0180016	0	0	0	-653	56353.69
07/18/11 21:12:34	60.0180016	0	0	0	-653	56345.6
07/18/11 21:12:36	60.0180016	0	0	0	-653	56345.6
07/18/11 21:12:38	60.0169983	0	0	0	-653	56345.6
07/18/11 21:12:40	60.0180016	0	0	0	-653	56338.04
07/18/11 21:12:42	60.019001	0	0	0	-653	56338.04
07/18/11 21:12:44	60.019001	0	0	0	-653	56325.32
07/18/11 21:12:46	60.0200005	0	0	0	-653	56325.32
07/18/11 21:12:48	60.0200005	0	0	0	-653	56325.12
07/18/11 21:12:50	60.0209999	0	0	0	-653	56325.12
07/18/11 21:12:52	60.0219994	0	0	0	-653	56331.52
07/18/11 21:12:54	60.0229988	0	0	0	-653	56331.52
07/18/11 21:12:56	60.0229988	0	0	0	-653	56329.43
07/18/11 21:12:58	60.0219994	0	0	0	-653	56329.43
07/18/11 21:13:00	60.0219994	0	0	0	-653	56318.63
07/18/11 21:13:02	60.0219994	0	0	0	-653	56318.63
07/18/11 21:13:04	60.0219994	0	0	0	-653	56316.55
07/18/11 21:13:06	60.0209999	0	0	0	-653	56316.55
07/18/11 21:13:08	60.0209999	0	0	0	-653	56309.1
07/18/11 21:13:10	60.0219994	0	0	0	-653	56309.1
07/18/11 21:13:12	60.0209999	0	0	0	-653	56298.35
07/18/11 21:13:14	60.0200005	0	0	0	-653	56298.35
07/18/11 21:13:16	60.019001	0	0	0	-653	56312.53
07/18/11 21:13:18	60.0200005	0	0	0	-653	56312.53
07/18/11 21:13:20	60.019001	0	0	0	-653	56307.93
07/18/11 21:13:22	60.0180016	0	0	0	-653	56307.93
07/18/11 21:13:24	60.0180016	0	0	0	-653	56288.67
07/18/11 21:13:26	60.019001	0	0	0	-653	56288.67
07/18/11 21:13:28	60.019001	0	0	0	-653	56283.19
07/18/11 21:13:30	60.0159988	0	0	0	-653	56283.19
07/18/11 21:13:32	60.0130005	0	0	0	-653	56283.82
07/18/11 21:13:34	60.0130005	0	0	0	-653	56283.82
07/18/11 21:13:36	60.0159988	0	0	0	-653	56307.8
07/18/11 21:13:38	60.0180016	0	0	0	-653	56307.8
07/18/11 21:13:40	60.0180016	0	0	0	-653	56294.97
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07/18/11 21:13:44	60.0149994	0	0	0	-653	56300.18
07/18/11 21:13:46	60.0149994	0	0	0	-653	56300.18
07/18/11 21:13:48	60.0110016	0	0	0	-653	56295.84
07/18/11 21:13:50	60.0050011	0	0	0	-653	56295.84
07/18/11 21:13:52	59.9990005	0	0	0	-653	56295.2
07/18/11 21:13:54	59.9949989	0	0	0	-653	56295.2
07/18/11 21:13:56	59.9949989	0	0	0	-653	56328.64
07/18/11 21:13:58	59.9959984	0	0	0	-653	56328.64
07/18/11 21:14:00	59.9980011	0	0	0	-653	56337.04

07/18/11 21:14:02	59.9959984	0	0	0	-653	56337.04
07/18/11 21:14:04	59.9939995	0	0	0	-653	56326.35
07/18/11 21:14:06	59.993	0	0	0	-653	56326.35
07/18/11 21:14:08	59.993	0	0	0	-653	56318.79
07/18/11 21:14:10	59.993	0	0	0	-653	56318.79
07/18/11 21:14:12	59.9939995	0	0	0	-653	56303.38
07/18/11 21:14:14	59.9949989	0	0	0	-653	56303.38
07/18/11 21:14:16	59.9949989	0	0	0	-653	56294.88
07/18/11 21:14:18	59.9949989	0	0	0	-653	56294.88
07/18/11 21:14:20	59.9949989	0	0	0	-653	56303.64
07/18/11 21:14:22	59.9939995	0	0	0	-653	56303.64
07/18/11 21:14:24	59.993	0	0	0	-653	56295.32
07/18/11 21:14:26	59.9939995	0	0	0	-653	56295.32
07/18/11 21:14:28	59.9959984	0	0	0	-653	56298.27
07/18/11 21:14:30	59.9980011	0	0	0	-653	56298.27
07/18/11 21:14:32	59.9980011	0	0	0	-653	56290.24
07/18/11 21:14:34	59.9959984	0	0	0	-653	56290.24
07/18/11 21:14:36	59.9980011	0	0	0	-653	56287.61
07/18/11 21:14:38	59.9970016	0	0	0	-653	56287.61
07/18/11 21:14:40	59.9949989	0	0	0	-653	56293.02
07/18/11 21:14:42	59.9939995	0	0	0	-653	56293.02
07/18/11 21:14:44	59.9920006	0	0	0	-653	56283.21
07/18/11 21:14:46	59.9920006	0	0	0	-653	56283.21
07/18/11 21:14:48	59.9920006	0	0	0	-653	56295.32
07/18/11 21:14:50	59.9900017	0	0	0	-653	56295.32
07/18/11 21:14:52	59.9889984	0	0	0	-653	56287.61
07/18/11 21:14:54	59.9869995	0	0	0	-653	56287.61
07/18/11 21:14:56	59.9850006	0	0	0	-653	56287.61
07/18/11 21:14:58	59.9850006	0	0	0	-653	56287.61
07/18/11 21:15:00	59.9860001	0	0	0	-653	56287.61
07/18/11 21:15:02	59.9860001	0	0	0	-653	56283.21
07/18/11 21:15:04	59.987999	0	0	0	-653	56283.21
07/18/11 21:15:06	59.9850006	0	0	0	-653	56283.21
07/18/11 21:15:08	59.9850006	0	0	0	-653	56283.21
07/18/11 21:15:10	59.9860001	0	0	0	-653	56278.5
07/18/11 21:15:12	59.9860001	0	0	0	-653	56278.5
07/18/11 21:15:14	59.9860001	0	0	0	-653	56278.5
07/18/11 21:15:16	59.9830017	0	0	0	-653	56278.5
07/18/11 21:15:18	59.9830017	0	0	0	-653	56278.5
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07/18/11 21:15:22	59.9860001	0	0	0	-653	56262.51
07/18/11 21:15:24	59.987999	0	0	0	-653	56262.51
07/18/11 21:15:26	59.9900017	0	0	0	-653	56262.51
07/18/11 21:15:28	59.9900017	0	0	0	-653	56262.51
07/18/11 21:15:30	59.9910011	0	0	0	-653	56262.51
07/18/11 21:15:32	59.9920006	0	0	0	-653	56287.75
07/18/11 21:15:34	59.993	0	0	0	-653	56287.75
07/18/11 21:15:36	59.9939995	0	0	0	-653	56287.75
07/18/11 21:15:38	59.9970016	0	0	0	-653	56287.75

07/18/11 21:15:40	59.9980011	0	0	0	-653	56287.75
07/18/11 21:15:42	59.9990005	0	0	0	-653	56271.19
07/18/11 21:15:44	59.9980011	0	0	0	-653	56271.19
07/18/11 21:15:46	59.9980011	0	0	0	-653	56271.19
07/18/11 21:15:48	59.9990005	0	0	0	-653	56271.19
07/18/11 21:15:50	60.0019989	0	0	0	-653	56271.19
07/18/11 21:15:52	60.0050011	0	0	0	-653	56261.12
07/18/11 21:15:54	60.0050011	0	0	0	-653	56261.12
07/18/11 21:15:56	60.0079994	0	0	0	-653	56261.12
07/18/11 21:15:58	60.0089989	0	0	0	-653	56261.12
07/18/11 21:16:00	60.0099983	0	0	0	-653	56261.12
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07/18/11 21:16:06	60.0089989	0	0	0	-653	56275.96
07/18/11 21:16:08	60.0089989	0	0	0	-653	56275.96
07/18/11 21:16:10	60.0110016	0	0	0	-653	56275.96
07/18/11 21:16:12	60.012001	0	0	0	-653	56310.49
07/18/11 21:16:14	60.0130005	0	0	0	-653	56310.49
07/18/11 21:16:16	60.0159988	0	0	0	-653	56310.49
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07/18/11 21:16:20	60.0200005	0	0	0	-653	56310.49
07/18/11 21:16:22	60.0219994	0	0	0	-653	56278.79
07/18/11 21:16:24	60.0200005	0	0	0	-653	56278.79
07/18/11 21:16:26	60.019001	0	0	0	-653	56278.79
07/18/11 21:16:28	60.019001	0	0	0	-653	56278.79
07/18/11 21:16:30	60.019001	0	0	0	-653	56278.79
07/18/11 21:16:32	60.0180016	0	0	0	-653	56275.11
07/18/11 21:16:34	60.0169983	0	0	0	-653	56275.11
07/18/11 21:16:36	60.0169983	0	0	0	-653	56275.11
07/18/11 21:16:38	60.0169983	0	0	0	-653	56275.11
07/18/11 21:16:40	60.0159988	0	0	0	-653	56275.11
07/18/11 21:16:42	60.0159988	0	0	0	-653	56272.93
07/18/11 21:16:44	60.0180016	0	0	0	-653	56272.93
07/18/11 21:16:46	60.019001	0	0	0	-653	56272.93
07/18/11 21:16:48	60.0200005	0	0	0	-653	56272.93
07/18/11 21:16:50	60.0209999	0	0	0	-653	56272.93
07/18/11 21:16:52	60.0200005	0	0	0	-653	56255.99
07/18/11 21:16:54	60.0169983	0	0	0	-653	56255.99
07/18/11 21:16:56	60.0169983	0	0	0	-653	56255.99
07/18/11 21:16:58	60.0169983	0	0	0	-653	56255.99
07/18/11 21:17:00	60.012001	0	0	0	-653	56255.99
07/18/11 21:17:02	60.0089989	0	0	0	-653	56254.07
07/18/11 21:17:04	60.0050011	0	0	0	-653	56254.07
07/18/11 21:17:06	60.0040016	0	0	0	-653	56254.07
07/18/11 21:17:08	60.0029984	0	0	0	-653	56254.07
07/18/11 21:17:10	60.0029984	0	0	0	-653	56254.07
07/18/11 21:17:12	60.0029984	0	0	0	-653	56263.52
07/18/11 21:17:14	60.0050011	0	0	0	-653	56263.52
07/18/11 21:17:16	60.0050011	0	0	0	-653	56263.52

07/18/11 21:17:18	60.0060005	0	0	0	-653	56263.52
07/18/11 21:17:20	60.0019989	0	0	0	-653	56263.52
07/18/11 21:17:22	59.9990005	0	0	0	-653	56275.39
07/18/11 21:17:24	59.9980011	0	0	0	-653	56275.39
07/18/11 21:17:26	59.9949989	0	0	0	-653	56275.39
07/18/11 21:17:28	59.9910011	0	0	0	-653	56275.39
07/18/11 21:17:30	59.9900017	0	0	0	-653	56275.39
07/18/11 21:17:32	59.9889984	0	0	0	-653	56286.62
07/18/11 21:17:34	59.9910011	0	0	0	-653	56286.62
07/18/11 21:17:36	59.9910011	0	0	0	-653	56286.62
07/18/11 21:17:38	59.9900017	0	0	0	-653	56286.62
07/18/11 21:17:40	59.9920006	0	0	0	-653	56286.62
07/18/11 21:17:42	59.9939995	0	0	0	-653	56275.45
07/18/11 21:17:44	59.9949989	0	0	0	-653	56275.45
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07/18/11 21:17:48	59.993	0	0	0	-653	56275.45
07/18/11 21:17:50	59.9949989	0	0	0	-653	56275.45
07/18/11 21:17:52	59.9959984	0	0	0	-653	56259.86
07/18/11 21:17:54	59.9990005	0	0	0	-653	56259.86
07/18/11 21:17:56	60.0040016	0	0	0	-653	56259.86
07/18/11 21:17:58	60.0060005	0	0	0	-653	56259.86
07/18/11 21:18:00	60.007	0	0	0	-653	56259.86
07/18/11 21:18:02	60.0079994	0	0	0	-653	56247.24
07/18/11 21:18:04	60.0089989	0	0	0	-653	56247.24
07/18/11 21:18:06	60.0110016	0	0	0	-653	56247.24
07/18/11 21:18:08	60.012001	0	0	0	-653	56247.24
07/18/11 21:18:10	60.0139999	0	0	0	-653	56247.24
07/18/11 21:18:12	60.0149994	0	0	0	-653	56253.61
07/18/11 21:18:14	60.0159988	0	0	0	-653	56253.61
07/18/11 21:18:16	60.0149994	0	0	0	-653	56253.61
07/18/11 21:18:18	60.0130005	0	0	0	-653	56253.61
07/18/11 21:18:20	60.012001	0	0	0	-653	56253.61
07/18/11 21:18:22	60.0110016	0	0	0	-653	56237
07/18/11 21:18:24	60.0089989	0	0	0	-653	56237
07/18/11 21:18:26	60.0099983	0	0	0	-653	56237
07/18/11 21:18:28	60.0099983	0	0	0	-653	56237
07/18/11 21:18:30	60.012001	0	0	0	-653	56237
07/18/11 21:18:32	60.0099983	0	0	0	-653	56245.64
07/18/11 21:18:34	60.0099983	0	0	0	-653	56245.64
07/18/11 21:18:36	60.0099983	0	0	0	-653	56245.64
07/18/11 21:18:38	60.012001	0	0	0	-653	56245.64
07/18/11 21:18:40	60.0139999	0	0	0	-653	56245.64
07/18/11 21:18:42	60.0149994	0	0	0	-653	56234.72
07/18/11 21:18:44	60.0149994	0	0	0	-653	56234.72
07/18/11 21:18:46	60.0139999	0	0	0	-653	56234.72
07/18/11 21:18:48	60.0159988	0	0	0	-653	56234.72
07/18/11 21:18:50	60.0169983	0	0	0	-653	56234.72
07/18/11 21:18:52	60.0180016	0	0	0	-653	56222.8
07/18/11 21:18:54	60.0180016	0	0	0	-653	56222.8

07/18/11 21:18:56	60.0159988	0	0	0	-653	56222.8
07/18/11 21:18:58	60.0169983	0	0	0	-653	56222.8
07/18/11 21:19:00	60.0159988	0	0	0	-653	56222.8
07/18/11 21:19:02	60.0139999	0	0	0	-653	56205.51
07/18/11 21:19:04	60.0110016	0	0	0	-653	56205.51
07/18/11 21:19:06	60.0079994	0	0	0	-653	56205.51
07/18/11 21:19:08	60.0040016	0	0	0	-653	56205.51
07/18/11 21:19:10	60.0029984	0	0	0	-653	56205.51
07/18/11 21:19:12	60.0029984	0	0	0	-653	56216.17
07/18/11 21:19:14	60.0050011	0	0	0	-653	56216.17
07/18/11 21:19:16	60.0050011	0	0	0	-653	56216.17
07/18/11 21:19:18	60.0040016	0	0	0	-653	56216.17
07/18/11 21:19:20	60.0060005	0	0	0	-653	56216.17
07/18/11 21:19:22	60.0060005	0	0	0	-653	56203.93
07/18/11 21:19:24	60.0079994	0	0	0	-653	56203.93
07/18/11 21:19:26	60.0099983	0	0	0	-653	56203.93
07/18/11 21:19:28	60.0110016	0	0	0	-653	56203.93
07/18/11 21:19:30	60.012001	0	0	0	-653	56203.93
07/18/11 21:19:32	60.0099983	0	0	0	-653	56200.13
07/18/11 21:19:34	60.0060005	0	0	0	-653	56200.13
07/18/11 21:19:36	60.0060005	0	0	0	-653	56200.13
07/18/11 21:19:38	60.0029984	0	0	0	-653	56200.13
07/18/11 21:19:40	60.0019989	0	0	0	-653	56200.13
07/18/11 21:19:42	60.0009995	0	0	0	-653	56181.92
07/18/11 21:19:44	60.0040016	0	0	0	-653	56181.92
07/18/11 21:19:46	60.0060005	0	0	0	-653	56181.92
07/18/11 21:19:48	60.007	0	0	0	-653	56181.92
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07/18/11 21:19:52	60.0130005	0	0	0	-653	56187.34
07/18/11 21:19:54	60.0139999	0	0	0	-653	56187.34
07/18/11 21:19:56	60.0159988	0	0	0	-653	56187.34
07/18/11 21:19:58	60.019001	0	0	0	-653	56187.34
07/18/11 21:20:00	60.019001	0	0	0	-653	56187.34
07/18/11 21:20:02	60.026001	0	0	0	-653	56197.92
07/18/11 21:20:04	60.0299988	0	0	0	-653	56197.92
07/18/11 21:20:06	60.0299988	0	0	0	-653	56197.92
07/18/11 21:20:08	60.0289993	0	0	0	-653	56197.92
07/18/11 21:20:10	60.0279999	0	0	0	-653	56197.92
07/18/11 21:20:12	60.026001	0	0	0	-653	56200.23
07/18/11 21:20:14	60.0270004	0	0	0	-653	56200.23
07/18/11 21:20:16	60.0309982	0	0	0	-653	56200.23
07/18/11 21:20:18	60.0320015	0	0	0	-653	56200.23
07/18/11 21:20:20	60.0320015	0	0	0	-653	56200.23
07/18/11 21:20:22	60.0320015	0	0	0	-653	56147.08
07/18/11 21:20:24	60.0279999	0	0	0	-653	56147.08
07/18/11 21:20:26	60.0270004	0	0	0	-653	56147.08
07/18/11 21:20:28	60.026001	0	0	0	-653	56147.08
07/18/11 21:20:30	60.026001	0	0	0	-653	56147.08
07/18/11 21:20:32	60.026001	0	0	0	-653	56110.36

07/18/11 21:20:34	60.0270004	0	0	0	-653	56110.36
07/18/11 21:20:36	60.0270004	0	0	0	-653	56110.36
07/18/11 21:20:38	60.0289993	0	0	0	-653	56110.36
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07/18/11 21:20:44	60.0250015	0	0	0	-653	56114
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07/18/11 21:20:50	60.0209999	0	0	0	-653	56114
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07/18/11 21:20:56	60.019001	0	0	0	-653	56075.31
07/18/11 21:20:58	60.0169983	0	0	0	-653	56075.31
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07/18/11 21:21:08	60.0159988	0	0	0	-653	56090.18
07/18/11 21:21:10	60.0169983	0	0	0	-653	56090.18
07/18/11 21:21:12	60.0159988	0	0	0	-653	56087.05
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07/18/11 21:21:22	60.007	0	0	0	-653	56077.73
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07/18/11 21:21:32	60.0060005	0	0	0	-653	56077.31
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07/18/11 21:21:36	60.007	0	0	0	-653	56077.31
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07/18/11 21:21:40	60.0050011	0	0	0	-653	56077.31
07/18/11 21:21:42	60.0079994	0	0	0	-653	56076.29
07/18/11 21:21:44	60.0089989	0	0	0	-653	56076.29
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07/18/11 21:21:52	60.0149994	0	0	0	-653	56056.73
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07/18/11 21:21:58	60.0149994	0	0	0	-653	56056.73
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07/18/11 21:22:02	60.0200005	0	0	0	-653	56049.55
07/18/11 21:22:04	60.0209999	0	0	0	-653	56049.55
07/18/11 21:22:06	60.0200005	0	0	0	-653	56049.55
07/18/11 21:22:08	60.0149994	0	0	0	-653	56049.55
07/18/11 21:22:10	60.0139999	0	0	0	-653	56049.55

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07/18/11 21:22:22	60.0250015	0	0	0	-653	56044.84
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07/18/11 21:22:34	60.0219994	0	0	0	-653	56023.8
07/18/11 21:22:36	60.0229988	0	0	0	-653	56023.8
07/18/11 21:22:38	60.0219994	0	0	0	-653	56023.8
07/18/11 21:22:40	60.0200005	0	0	0	-653	56023.8
07/18/11 21:22:42	60.0219994	0	0	0	-653	55979.94
07/18/11 21:22:44	60.0229988	0	0	0	-653	55979.94
07/18/11 21:22:46	60.0239983	0	0	0	-653	55979.94
07/18/11 21:22:48	60.0219994	0	0	0	-653	55979.94
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07/18/11 21:23:16	60.0130005	0	0	0	-653	55953.24
07/18/11 21:23:18	60.007	0	0	0	-653	55953.24
07/18/11 21:23:20	60.0060005	0	0	0	-653	55953.24
07/18/11 21:23:22	60.0060005	0	0	0	-653	55940.86
07/18/11 21:23:24	60.0050011	0	0	0	-653	55940.86
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07/18/11 21:23:30	60.0029984	0	0	0	-653	55940.86
07/18/11 21:23:32	60.0040016	0	0	0	-653	55935.25
07/18/11 21:23:34	60.0019989	0	0	0	-653	55935.25
07/18/11 21:23:36	60.0029984	0	0	0	-653	55935.25
07/18/11 21:23:38	60.0050011	0	0	0	-653	55935.25
07/18/11 21:23:40	60.007	0	0	0	-653	55935.25
07/18/11 21:23:42	60.0079994	0	0	0	-653	55918.13
07/18/11 21:23:44	60.0079994	0	0	0	-653	55918.13
07/18/11 21:23:46	60.0060005	0	0	0	-653	55918.13
07/18/11 21:23:48	60.0019989	0	0	0	-653	55918.13

07/18/11 21:23:50	60.0009995	0	0	0	-653	55918.13
07/18/11 21:23:52	59.9980011	0	0	0	-653	55900.63
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07/18/11 21:24:00	59.9949989	0	0	0	-653	55900.63
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07/18/11 21:24:04	59.9949989	0	0	0	-653	55903.3
07/18/11 21:24:06	59.9949989	0	0	0	-653	55903.3
07/18/11 21:24:08	59.9920006	0	0	0	-653	55903.3
07/18/11 21:24:10	59.9910011	0	0	0	-653	55903.3
07/18/11 21:24:12	59.9910011	0	0	0	-653	55871.44
07/18/11 21:24:14	59.9900017	0	0	0	-653	55871.44
07/18/11 21:24:16	59.9869995	0	0	0	-653	55871.44
07/18/11 21:24:18	59.9850006	0	0	0	-653	55871.44
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07/18/11 21:24:24	59.9790001	0	0	0	-653	55884.49
07/18/11 21:24:26	59.9770012	0	0	0	-653	55884.49
07/18/11 21:24:28	59.9770012	0	0	0	-653	55884.49
07/18/11 21:24:30	59.9780006	0	0	0	-653	55884.49
07/18/11 21:24:32	59.9790001	0	0	0	-653	55860.13
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07/18/11 21:24:42	59.9749985	0	0	0	-653	55848.38
07/18/11 21:24:44	59.973999	0	0	0	-653	55848.38
07/18/11 21:24:46	59.9710007	0	0	0	-653	55848.38
07/18/11 21:24:48	59.9729996	0	0	0	-653	55848.38
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07/18/11 21:25:10	59.9729996	0	0	0	-653	55877.86
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07/18/11 21:25:14	59.9729996	0	0	0	-653	55871.46
07/18/11 21:25:16	59.9790001	0	0	0	-653	55871.46
07/18/11 21:25:18	59.9799995	0	0	0	-653	55871.46
07/18/11 21:25:20	59.9790001	0	0	0	-653	55871.46
07/18/11 21:25:22	59.9780006	0	0	0	-653	55864.73
07/18/11 21:25:24	59.9729996	0	0	0	-653	55864.73
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07/18/11 21:25:28	59.9710007	0	0	0	-653	55864.73
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07/18/11 21:25:32	59.9690018	0	0	0	-653	55853.1
07/18/11 21:25:34	59.9720001	0	0	0	-653	55853.1
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07/18/11 21:25:44	59.9780006	0	0	0	-653	55855.3
07/18/11 21:25:46	59.9780006	0	0	0	-653	55855.3
07/18/11 21:25:48	59.9780006	0	0	0	-653	55855.3
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07/18/11 21:25:56	59.9760017	0	0	0	-653	55868.67
07/18/11 21:25:58	59.9770012	0	0	0	-653	55868.67
07/18/11 21:26:00	59.9780006	0	0	0	-653	55868.67
07/18/11 21:26:02	59.980999	0	0	0	-653	55869.83
07/18/11 21:26:04	59.9830017	0	0	0	-653	55869.83
07/18/11 21:26:06	59.9840012	0	0	0	-653	55869.83
07/18/11 21:26:08	59.9900017	0	0	0	-653	55869.83
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07/18/11 21:26:12	60.0019989	0	0	0	-653	55854.58
07/18/11 21:26:14	60.0009995	0	0	0	-653	55854.58
07/18/11 21:26:16	59.9990005	0	0	0	-653	55854.58
07/18/11 21:26:18	59.9990005	0	0	0	-653	55854.58
07/18/11 21:26:20	59.9970016	0	0	0	-653	55854.58
07/18/11 21:26:22	59.9949989	0	0	0	-653	55854.92
07/18/11 21:26:24	59.9959984	0	0	0	-653	55854.92
07/18/11 21:26:26	59.9990005	0	0	0	-653	55854.92
07/18/11 21:26:28	60.0029984	0	0	0	-653	55854.92
07/18/11 21:26:30	60.0040016	0	0	0	-653	55854.92
07/18/11 21:26:32	60.0050011	0	0	0	-653	55820.89
07/18/11 21:26:34	60.0040016	0	0	0	-653	55820.89
07/18/11 21:26:36	60.0029984	0	0	0	-653	55820.89
07/18/11 21:26:38	60.0050011	0	0	0	-653	55820.89
07/18/11 21:26:40	60.0029984	0	0	0	-653	55820.89
07/18/11 21:26:42	60.0009995	0	0	0	-653	55845.93
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07/18/11 21:26:46	60.0040016	0	0	0	-653	55845.93
07/18/11 21:26:48	60.0060005	0	0	0	-653	55845.93
07/18/11 21:26:50	60.0060005	0	0	0	-653	55845.93
07/18/11 21:26:52	60.0040016	0	0	0	-653	55841.34
07/18/11 21:26:54	60.0019989	0	0	0	-653	55841.34
07/18/11 21:26:56	60	0	0	0	-653	55841.34
07/18/11 21:26:58	60.0009995	0	0	0	-653	55841.34
07/18/11 21:27:00	60.0009995	0	0	0	-653	55841.34
07/18/11 21:27:02	60.0019989	0	0	0	-653	55830.95
07/18/11 21:27:04	60.0029984	0	0	0	-653	55830.95

07/18/11 21:27:06	60.0040016	0	0	0	-653	55830.95
07/18/11 21:27:08	60.007	0	0	0	-653	55830.95
07/18/11 21:27:10	60.0079994	0	0	0	-653	55830.95
07/18/11 21:27:12	60.0099983	0	0	0	-653	55816.52
07/18/11 21:27:14	60.0099983	0	0	0	-653	55816.52
07/18/11 21:27:16	60.0099983	0	0	0	-653	55816.52
07/18/11 21:27:18	60.0110016	0	0	0	-653	55816.52
07/18/11 21:27:20	60.0130005	0	0	0	-653	55816.52
07/18/11 21:27:22	60.0149994	0	0	0	-653	55811.95
07/18/11 21:27:24	60.0169983	0	0	0	-653	55811.95
07/18/11 21:27:26	60.019001	0	0	0	-653	55811.95
07/18/11 21:27:28	60.019001	0	0	0	-653	55811.95
07/18/11 21:27:30	60.0159988	0	0	0	-653	55811.95
07/18/11 21:27:32	60.0139999	0	0	0	-653	55818.78
07/18/11 21:27:34	60.0139999	0	0	0	-653	55818.78
07/18/11 21:27:36	60.0130005	0	0	0	-653	55818.78
07/18/11 21:27:38	60.0110016	0	0	0	-653	55818.78
07/18/11 21:27:40	60.0110016	0	0	0	-653	55818.78
07/18/11 21:27:42	60.012001	0	0	0	-653	55815.84
07/18/11 21:27:44	60.0130005	0	0	0	-653	55815.84
07/18/11 21:27:46	60.0149994	0	0	0	-653	55815.84
07/18/11 21:27:48	60.0149994	0	0	0	-653	55815.84
07/18/11 21:27:50	60.0130005	0	0	0	-653	55815.84
07/18/11 21:27:52	60.0130005	0	0	0	-653	55787.84
07/18/11 21:27:54	60.012001	0	0	0	-653	55787.84
07/18/11 21:27:56	60.0089989	0	0	0	-653	55787.84
07/18/11 21:27:58	60.0079994	0	0	0	-653	55787.84
07/18/11 21:28:00	60.007	0	0	0	-653	55787.84
07/18/11 21:28:02	60.007	0	0	0	-653	55782.08
07/18/11 21:28:04	60.0079994	0	0	0	-653	55782.08
07/18/11 21:28:06	60.0110016	0	0	0	-653	55782.08
07/18/11 21:28:08	60.0110016	0	0	0	-653	55782.08
07/18/11 21:28:10	60.0099983	0	0	0	-653	55782.08
07/18/11 21:28:12	60.0099983	0	0	0	-653	55755.67
07/18/11 21:28:14	60.0079994	0	0	0	-653	55755.67
07/18/11 21:28:16	60.0060005	0	0	0	-653	55755.67
07/18/11 21:28:18	60.0050011	0	0	0	-653	55755.67
07/18/11 21:28:20	60.0029984	0	0	0	-653	55755.67
07/18/11 21:28:22	60	0	0	0	-653	55761.66
07/18/11 21:28:24	59.9980011	0	0	0	-653	55761.66
07/18/11 21:28:26	60	0	0	0	-653	55761.66
07/18/11 21:28:28	59.9990005	0	0	0	-653	55761.66
07/18/11 21:28:30	59.9959984	0	0	0	-653	55761.66
07/18/11 21:28:32	59.987999	0	0	0	-653	55733.11
07/18/11 21:28:34	59.9840012	0	0	0	-653	55733.11
07/18/11 21:28:36	59.9780006	0	0	0	-653	55733.11
07/18/11 21:28:38	59.9760017	0	0	0	-653	55733.11
07/18/11 21:28:40	59.973999	0	0	0	-653	55733.11
07/18/11 21:28:42	59.973999	0	0	0	-653	55732.93

07/18/11 21:28:44	59.9760017	0	0	0	-653	55732.93
07/18/11 21:28:46	59.973999	0	0	0	-653	55732.93
07/18/11 21:28:48	59.9799995	0	0	0	-653	55732.93
07/18/11 21:28:50	59.9860001	0	0	0	-653	55732.93
07/18/11 21:28:52	59.9889984	0	0	0	-653	55742.22
07/18/11 21:28:54	59.9889984	0	0	0	-653	55742.22
07/18/11 21:28:56	59.987999	0	0	0	-653	55742.22
07/18/11 21:28:58	59.987999	0	0	0	-653	55742.22
07/18/11 21:29:00	59.9830017	0	0	0	-653	55742.22
07/18/11 21:29:02	59.9799995	0	0	0	-653	55721.28
07/18/11 21:29:04	59.9819984	0	0	0	-653	55721.28
07/18/11 21:29:06	59.9840012	0	0	0	-653	55721.28
07/18/11 21:29:08	59.9840012	0	0	0	-653	55721.28
07/18/11 21:29:10	59.980999	0	0	0	-653	55721.28
07/18/11 21:29:12	59.9799995	0	0	0	-653	55691.09
07/18/11 21:29:14	59.9790001	0	0	0	-653	55691.09
07/18/11 21:29:16	59.980999	0	0	0	-653	55691.09
07/18/11 21:29:18	59.9830017	0	0	0	-653	55691.09
07/18/11 21:29:20	59.9819984	0	0	0	-653	55691.09
07/18/11 21:29:22	59.980999	0	0	0	-653	55699.67
07/18/11 21:29:24	59.9850006	0	0	0	-653	55699.67
07/18/11 21:29:26	59.9920006	0	0	0	-653	55699.67
07/18/11 21:29:28	59.9920006	0	0	0	-653	55699.67
07/18/11 21:29:30	59.9889984	0	0	0	-653	55699.67
07/18/11 21:29:32	59.9860001	0	0	0	-653	55679.72
07/18/11 21:29:34	59.9860001	0	0	0	-653	55679.72
07/18/11 21:29:36	59.9850006	0	0	0	-653	55679.72
07/18/11 21:29:38	59.9840012	0	0	0	-653	55679.72
07/18/11 21:29:40	59.9830017	0	0	0	-653	55679.72
07/18/11 21:29:42	59.9869995	0	0	0	-653	55654.98
07/18/11 21:29:44	59.987999	0	0	0	-653	55654.98
07/18/11 21:29:46	59.987999	0	0	0	-653	55654.98
07/18/11 21:29:48	59.9869995	0	0	0	-653	55654.98
07/18/11 21:29:50	59.9850006	0	0	0	-653	55654.98
07/18/11 21:29:52	59.9860001	0	0	0	-653	55649.36
07/18/11 21:29:54	59.9860001	0	0	0	-653	55649.36
07/18/11 21:29:56	59.9900017	0	0	0	-653	55649.36
07/18/11 21:29:58	59.9910011	0	0	0	-653	55649.36
07/18/11 21:30:00	59.9910011	0	0	0	-653	55649.36
07/18/11 21:30:02	59.9910011	0	0	0	-653	55652
07/18/11 21:30:04	59.9920006	0	0	0	-653	55652
07/18/11 21:30:06	59.9980011	0	0	0	-653	55652
07/18/11 21:30:08	60.0009995	0	0	0	-653	55652
07/18/11 21:30:10	60.0019989	0	0	0	-653	55656.61
07/18/11 21:30:12	60.0009995	0	0	0	-653	55656.61
07/18/11 21:30:14	60.0009995	0	0	0	-653	55656.61
07/18/11 21:30:16	60.0009995	0	0	0	-653	55656.61
07/18/11 21:30:18	60.0009995	0	0	0	-653	55656.61
07/18/11 21:30:20	60.0009995	0	0	0	-653	55656.61

07/18/11 21:30:22	60	0	0	0	-653	55639.16
07/18/11 21:30:24	60	0	0	0	-653	55639.16
07/18/11 21:30:26	59.9980011	0	0	0	-653	55639.16
07/18/11 21:30:28	59.9980011	0	0	0	-653	55639.16
07/18/11 21:30:30	59.9980011	0	0	0	-653	55639.16
07/18/11 21:30:32	60.0130005	0	0	0	-653	55612.98
07/18/11 21:30:34	60.0130005	0	0	0	-653	55612.98
07/18/11 21:30:36	60.0219994	0	0	0	-653	55612.98
07/18/11 21:30:38	60.0209999	0	0	0	-653	55612.98
07/18/11 21:30:40	60.0209999	0	0	0	-653	55612.98
07/18/11 21:30:42	60.012001	0	0	0	-653	55610.47
07/18/11 21:30:44	60.012001	0	0	0	-653	55610.47
07/18/11 21:30:46	60.0130005	0	0	0	-653	55610.47
07/18/11 21:30:48	60.0169983	0	0	0	-653	55610.47
07/18/11 21:30:50	60.0169983	0	0	0	-653	55610.47
07/18/11 21:30:52	60.0180016	0	0	0	-653	55625.66
07/18/11 21:30:54	60.0200005	0	0	0	-653	55625.66
07/18/11 21:30:56	60.0219994	0	0	0	-653	55625.66
07/18/11 21:30:58	60.0229988	0	0	0		55625.66
07/18/11 21:31:00	60.0229988	0	0	0		55625.66
07/18/11 21:31:02	60.0229988	0	0	0		55610.65
07/18/11 21:31:04	60.0219994	0	0	0		55610.65
07/18/11 21:31:06	60.0219994	0	0	0		55610.65
07/18/11 21:31:08	60.019001	0	0	0		55610.65
07/18/11 21:31:10	60.0180016	0	0	0		55610.65
07/18/11 21:31:12	60.0169983	0	0	0		55615.12
07/18/11 21:31:14	60.0149994	0	0	0		55615.12
07/18/11 21:31:16	60.0159988	0	0	0		55615.12
07/18/11 21:31:18	60.0169983	0	0	0		55615.12
07/18/11 21:31:20	60.0180016	0	0	0		55615.12
07/18/11 21:31:22	60.0200005	0	0	0		55608.63
07/18/11 21:31:24	60.0209999	0	0	0		55608.63
07/18/11 21:31:26	60.0200005	0	0	0		55608.63
07/18/11 21:31:28	60.0180016	0	0	0		55608.63
07/18/11 21:31:30	60.0159988	0	0	0		55608.63
07/18/11 21:31:32	60.0159988	0	0	0		55575.73
07/18/11 21:31:34	60.0200005	0	0	0		55575.73
07/18/11 21:31:36	60.0219994	0	0	0		55575.73
07/18/11 21:31:38	60.0209999	0	0	0		55575.73
07/18/11 21:31:40	60.0200005	0	0	0		55575.73
07/18/11 21:31:42	60.019001	0	0	0		55553.67
07/18/11 21:31:44	60.019001	0	0	0		55553.67
07/18/11 21:31:46	60.0180016	0	0	0		55553.67
07/18/11 21:31:48	60.0149994	0	0	0		55553.67
07/18/11 21:31:50	60.0200005	0	0	0		55553.67
07/18/11 21:31:52	60.0200005	0	0	0		55547.63
07/18/11 21:31:54	60.019001	0	0	0		55547.63
07/18/11 21:31:56	60.0169983	0	0	0		55547.63
07/18/11 21:31:58	60.0159988	0	0	0		55547.63

07/18/11 21:32:00	60.0169983	0	0	0	55547.63
07/18/11 21:32:02	60.0149994	0	0	0	55537.41
07/18/11 21:32:04	60.012001	0	0	0	55537.41
07/18/11 21:32:06	60.0110016	0	0	0	55537.41
07/18/11 21:32:08	60.0089989	0	0	0	55537.41
07/18/11 21:32:10	60.0079994	0	0	0	55537.41
07/18/11 21:32:12	60.0089989	0	0	0	55530.02
07/18/11 21:32:14	60.0099983	0	0	0	55530.02
07/18/11 21:32:16	60.0089989	0	0	0	55530.02
07/18/11 21:32:18	60.0079994	0	0	0	55530.02
07/18/11 21:32:20	60.007	0	0	0	55530.02
07/18/11 21:32:22	60.0060005	0	0	0	55517.34
07/18/11 21:32:24	60.0040016	0	0	0	55517.34
07/18/11 21:32:26	60.0050011	0	0	0	55517.34
07/18/11 21:32:28	60.0050011	0	0	0	55517.34
07/18/11 21:32:30	60.0060005	0	0	0	55517.34
07/18/11 21:32:32	60.007	0	0	0	55523.41
07/18/11 21:32:34	60.007	0	0	0	55523.41
07/18/11 21:32:36	60.0089989	0	0	0	55523.41
07/18/11 21:32:38	60.012001	0	0	0	55523.41
07/18/11 21:32:40	60.0149994	0	0	0	55523.41
07/18/11 21:32:42	60.0159988	0	0	0	55494.25
07/18/11 21:32:44	60.0159988	0	0	0	55494.25
07/18/11 21:32:46	60.0159988	0	0	0	55494.25
07/18/11 21:32:48	60.0169983	0	0	0	55494.25
07/18/11 21:32:50	60.019001	0	0	0	55494.25
07/18/11 21:32:52	60.0180016	0	0	0	55513.87
07/18/11 21:32:54	60.0149994	0	0	0	55513.87
07/18/11 21:32:56	60.012001	0	0	0	55513.87
07/18/11 21:32:58	60.0130005	0	0	0	55513.87
07/18/11 21:33:00	60.0149994	0	0	0	55513.87
07/18/11 21:33:02	60.0149994	0	0	0	55492.56
07/18/11 21:33:04	60.0149994	0	0	0	55492.56
07/18/11 21:33:06	60.0139999	0	0	0	55492.56
07/18/11 21:33:08	60.0139999	0	0	0	55492.56
07/18/11 21:33:10	60.0149994	0	0	0	55492.56
07/18/11 21:33:12	60.0139999	0	0	0	55486.4
07/18/11 21:33:14	60.0139999	0	0	0	55486.4
07/18/11 21:33:16	60.0130005	0	0	0	55486.4
07/18/11 21:33:18	60.0130005	0	0	0	55486.4
07/18/11 21:33:20	60.012001	0	0	0	55486.4
07/18/11 21:33:22	60.0110016	0	0	0	55473.25
07/18/11 21:33:24	60.012001	0	0	0	55473.25
07/18/11 21:33:26	60.0130005	0	0	0	55473.25
07/18/11 21:33:28	60.0130005	0	0	0	55473.25
07/18/11 21:33:30	60.0130005	0	0	0	55473.25
07/18/11 21:33:32	60.0130005	0	0	0	55456.91
07/18/11 21:33:34	60.012001	0	0	0	55456.91
07/18/11 21:33:36	60.0139999	0	0	0	55456.91

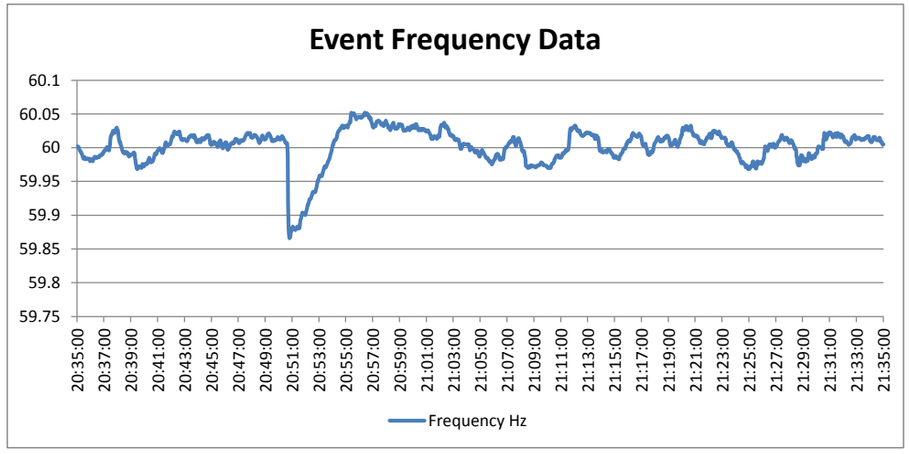
07/18/11 21:33:38	60.0130005	0	0	0	55456.91
07/18/11 21:33:40	60.0139999	0	0	0	55456.91
07/18/11 21:33:42	60.0149994	0	0	0	55459.34
07/18/11 21:33:44	60.0159988	0	0	0	55459.34
07/18/11 21:33:46	60.0159988	0	0	0	55459.34
07/18/11 21:33:48	60.0169983	0	0	0	55459.34
07/18/11 21:33:50	60.0169983	0	0	0	55459.34
07/18/11 21:33:52	60.0159988	0	0	0	55426.86
07/18/11 21:33:54	60.0169983	0	0	0	55426.86
07/18/11 21:33:56	60.0139999	0	0	0	55426.86
07/18/11 21:33:58	60.0110016	0	0	0	55426.86
07/18/11 21:34:00	60.0110016	0	0	0	55426.86
07/18/11 21:34:02	60.0089989	0	0	0	55430.13
07/18/11 21:34:04	60.0089989	0	0	0	55430.13
07/18/11 21:34:06	60.0079994	0	0	0	55430.13
07/18/11 21:34:08	60.0079994	0	0	0	55430.13
07/18/11 21:34:10	60.0099983	0	0	0	55430.13
07/18/11 21:34:12	60.0110016	0	0	0	55394.64
07/18/11 21:34:14	60.0130005	0	0	0	55394.64
07/18/11 21:34:16	60.0159988	0	0	0	55394.64
07/18/11 21:34:18	60.0159988	0	0	0	55394.64
07/18/11 21:34:20	60.0149994	0	0	0	55394.64
07/18/11 21:34:22	60.0159988	0	0	0	55386.95
07/18/11 21:34:24	60.0139999	0	0	0	55386.95
07/18/11 21:34:26	60.0130005	0	0	0	55386.95
07/18/11 21:34:28	60.0110016	0	0	0	55386.95
07/18/11 21:34:30	60.0110016	0	0	0	55386.95
07/18/11 21:34:32	60.0110016	0	0	0	55390.64
07/18/11 21:34:34	60.012001	0	0	0	55390.64
07/18/11 21:34:36	60.0110016	0	0	0	55390.64
07/18/11 21:34:38	60.012001	0	0	0	55390.64
07/18/11 21:34:40	60.0130005	0	0	0	55390.64
07/18/11 21:34:42	60.0149994	0	0	0	55376.88
07/18/11 21:34:44	60.0139999	0	0	0	55376.88
07/18/11 21:34:46	60.0130005	0	0	0	55376.88
07/18/11 21:34:48	60.0089989	0	0	0	55376.88
07/18/11 21:34:50	60.0079994	0	0	0	55376.88
07/18/11 21:34:52	60.0079994	0	0	0	55370.14
07/18/11 21:34:54	60.0079994	0	0	0	55370.14
07/18/11 21:34:56	60.0050011	0	0	0	55370.14
07/18/11 21:34:58	60.0040016	0	0	0	55370.14
07/18/11 21:35:00	60.0050011	0	0	0	55370.14

Balancing Authority Name:	ERCOT
Balancing Authority Frequency Response Obligation (FRO from FRS Form 1)	-286

Note: See "Instruction" tab for more detailed instructions.

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.	
Step 2.	Determine Time of T(0) and edit formula in cell "C8" to reference the correct row of the "Data" worksheet. T(0) is the first change in frequency of about 0.010 Hz (10 mHz) which should be the first scan of frequency data of the event.	20:50:40
Step 3.	Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	20:54:00
Step 4.	Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet.	

Copy Data for Pasting into Form 1



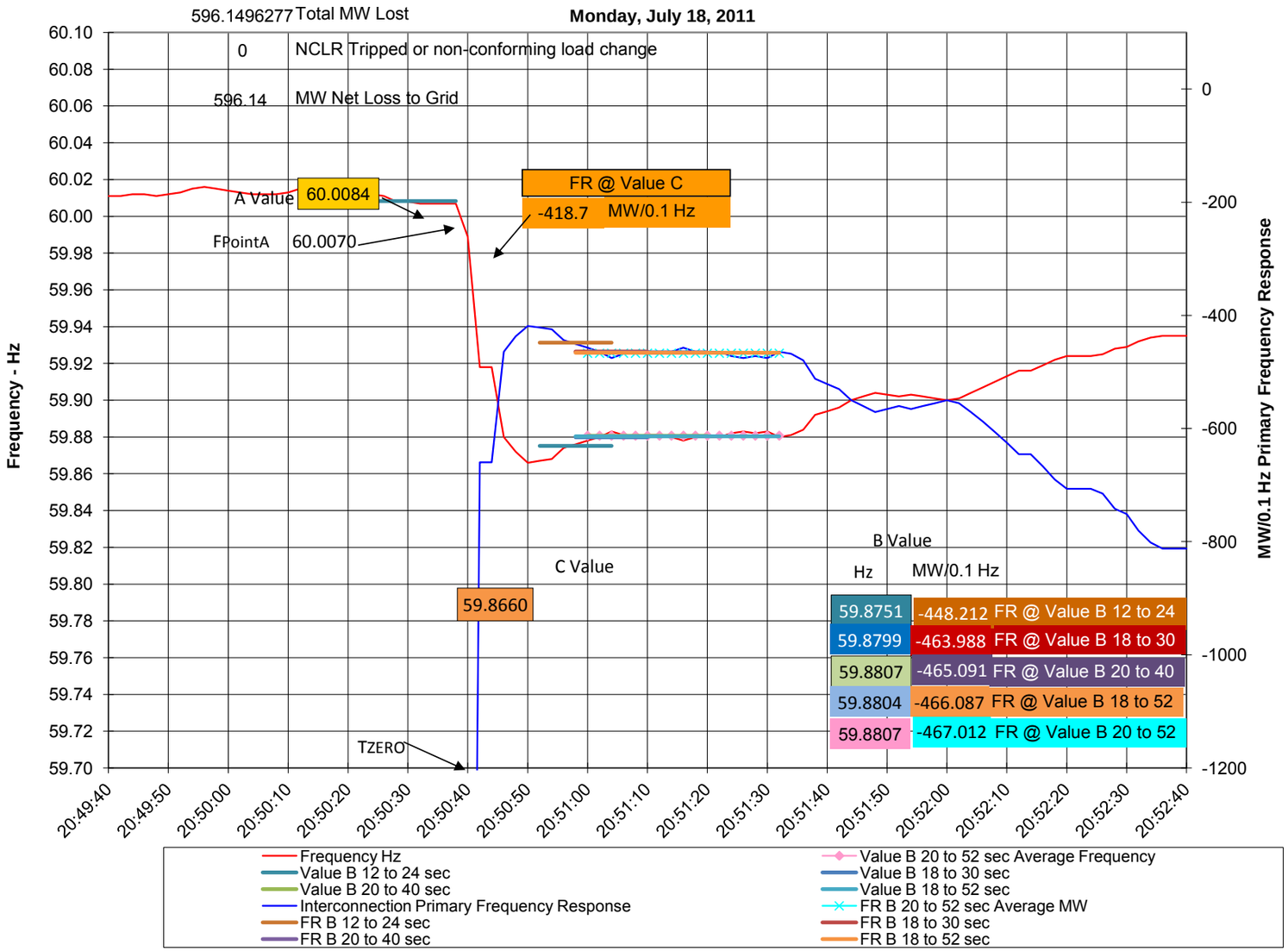
Step 5. Paste data into FRS Form 1 in the appropriate row on the "BA Event Data" worksheet.

Step 6. Save this workbook using the following file name format:MyBA_yymmdd_hhmm_FRS_Form2.xlsm

11/07/18 Date yymmdd

20:50 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic



IPFR = Interconnection Primary Frequency Response

scan rate	2 seconds	Date:	Monday, July 18, 2011		
		Time of T(0)	20:50:40		
		Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	20:54:00		
		Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0084	Hz	
		Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.8807	Hz	
		Pre to Post Perturbation Delta Frequency Actual	-0.128	Hz	
		Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	596.15	MW	
		Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	0.00	MW	
		Pre to Post Perturbation Interchange Delta MW Actual	-596.15	MW	
		Initial Performance Ramp Magnitude Adjustment	5.55	MW	
		EPFR Pre-Perturbation Average	-23.95	MW	
		EPFR Post-Perturbation Average	341.18	MW	
		EPFR Delta	365.13	MW	
EPFR = Expected Primary Frequency Response		EPFR(Final)	370.68	MW	

Balancing Authority	ERCOT		
Grid Nominal Frequency	60.000	Hz	
Capacity @ Droop for Minimum Performance	8580.0	MW	
Droop Setting	5.00%	3.00000	Hz
Deadband Setting	0.000	Hz	
Hz Span	3.00000	Hz	
Frequency Response Obligation (FRO)	-286	MW/0.1 Hz	
TC (frequency response filter constant)	1	Time Constant for delayed delivery of PFR during Sustained Measure	

Low Hz	Delta Hz Event
0.00	Actual Interchange MW Average during frequency recovery period
521.77	Target Interchange MW Average during frequency recovery period
312.99	Interchange Average Ramp MW during frequency recovery period
602.70	Actual MW @ T(-4)
-625.58	Starting and Ending Difference in Interchange MW during frequency recovery pe
0:03:20	Event Duration (h:mm:ss)
Yes	Target MW Average minus MW @ T(-4) less than zero
544.65	Interchange Target Relative Average Change - MW (Low Frequency Event)
22.88	Interchange Actual Relative Average Change - MW (Low Frequency Event)
Yes	Interchange Actual Average minus MW @ T(-4) less than zero
No	Interchange Average MW minus MW @ T(-4) greater than zero
No	Interchange Target MW Average minus MW @ T(-4) greater than zero
-80.93	Interchange Target Relative Average Change - MW (High Frequency Event)
-602.70	Interchange Actual Relative Average Change - MW (High Frequency Event)
Down	Ramp Direction during frequency recovery period

Initial Response P.U. Performance 1.651 P.U.

No Evaluation P.U. Sustianed Response P.U. Performance

	T	Frequency Hz	Total Generation Lost MW	Value B 20 to 52 sec Average Frequency	Average MW	FRO (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW	Generator Trip MW
T-72 sec	20:49:28	60.012	593.300			-34.323	-34.323								
T-70 sec	20:49:30	60.01	593.300			-28.595	-28.595								
T-68 sec	20:49:32	60.01	593.300			-28.595	-28.595								596.150

T-66 sec	20:49:34	60.011	593.300			-31.465	-31.465											
T-64 sec	20:49:36	60.011	593.300			-31.465	-31.465											
T-62 sec	20:49:38	60.01	593.300			-28.595	-28.595											
T-60 sec	20:49:40	60.011	593.300			-31.465	-31.465		-0.070	593.300								
T-58 sec	20:49:42	60.011	593.300			-31.465	-31.465		-0.070	593.230								
T-56 sec	20:49:44	60.012	593.300			-34.323	-34.323		-0.070	590.301								
T-54 sec	20:49:46	60.012	593.300			-34.323	-34.323		-0.070	590.230								
T-52 sec	20:49:48	60.011	585.628			-31.465	-31.465		-0.070	593.018								
T-50 sec	20:49:50	60.012	585.628			-34.323	-34.323		-0.070	590.089								
T-48 sec	20:49:52	60.013	586.143			-37.181	-37.181		-0.070	587.160								
T-46 sec	20:49:54	60.015	586.143			-42.898	-42.898		-0.070	581.373								
T-44 sec	20:49:56	60.016	586.795			-45.757	-45.757		-0.070	578.444								
T-42 sec	20:49:58	60.015	586.795			-42.898	-42.898		-0.070	581.232								
T-40 sec	20:50:00	60.014	585.947			-40.040	-40.040		-0.070	584.020								
T-38 sec	20:50:02	60.013	585.947			-37.181	-37.181		-0.070	586.808								
T-36 sec	20:50:04	60.012	585.672			-34.323	-34.323		-0.070	589.596								
T-34 sec	20:50:06	60.012	585.672			-34.323	-34.323		-0.070	589.526								
T-32 sec	20:50:08	60.012	585.116			-34.323	-34.323		-0.070	589.455								
T-30 sec	20:50:10	60.013	585.116			-37.181	-37.181		-0.070	586.526								
T-28 sec	20:50:12	60.015	584.655			-42.898	-42.898		-0.070	580.739								
T-26 sec	20:50:14	60.017	584.655			-48.615	-48.615		-0.070	574.952								
T-24 sec	20:50:16	60.017	585.307			-48.615	-48.615		-0.070	574.881								
T-22 sec	20:50:18	60.014	585.307			-40.040	-40.040		-0.070	583.386								
T-20 sec	20:50:20	60.015	585.211			-42.898	-42.898		-0.070	580.457								
T-18 sec	20:50:22	60.013	585.211			-37.181	-37.181		-0.070	586.103								
T-16 sec	20:50:24	60.012	585.918	60.008	596.150	-34.323	-34.323		-0.070	588.891								
T-14 sec	20:50:26	60.011	585.918	60.008	596.150	-31.465	-31.465		-0.070	591.679								
T-12 sec	20:50:28	60.008	593.278	60.008	596.150	-22.878	-22.878		-0.070	600.195								
T-10 sec	20:50:30	60.008	593.278	60.008	596.150	-22.878	-22.878		-0.070	600.125								
T-08 sec	20:50:32	60.007	602.701	60.008	596.150	-20.020	-20.020		-0.070	602.913								
T-06 sec	20:50:34	60.007	602.701	60.008	596.150	-20.020	-20.020		-0.070	602.842								
T-04 sec	20:50:36	60.007	602.701	60.008	596.150	-20.020	-20.020		-0.070	602.772								
T-02 sec	20:50:38	60.007	602.701	60.008	596.150	-20.020	-20.020		-0.070	602.701								
T+0 sec	20:50:40	59.989	0.000			31.465	31.465		0.000	654.186								596.1496
T+02 sec	20:50:42	59.918	0.000			234.522	234.522		-6.256	850.987	0.000	752.587	622.651	622.651	596.1496			
T+04 sec	20:50:44	59.918	0.000			234.522	234.522		-6.256	844.732	0.000	783.302	616.395	619.523	596.1496			
T+06 sec	20:50:46	59.88	0.000			343.197	343.197		-6.256	947.151	0.000	824.264	610.139	616.395	596.1496			
T+08 sec	20:50:48	59.872	0.000			366.075	366.075		-6.256	963.773	0.000	852.166	603.883	613.267	596.1496			
T+10 sec	20:50:50	59.866	0.000			383.237	383.237		-6.256	974.679	0.000	872.585	597.628	610.139	596.1496			
T+12 sec	20:50:52	59.867	0.000			380.378	380.378		-6.256	965.565	0.000	885.868	591.372	607.011	596.1496			
T+14 sec	20:50:54	59.868	0.000			377.520	377.520		-6.256	956.451	0.000	894.690	585.116	603.883	596.1496			
T+16 sec	20:50:56	59.874	0.000			360.358	360.358		-6.256	933.034	0.000	898.951	578.860	600.756	596.1496			
T+18 sec	20:50:58	59.876	0.000			354.642	354.642		-6.256	921.061	0.000	901.162	572.605	597.628	596.1496			
T+20 sec	20:51:00	59.878	0.000	59.881	0.000	348.925	348.925	966.830	-6.256	909.088	0.000	901.882	566.349	594.500	596.1496			
T+22 sec	20:51:02	59.88	0.000	59.881	0.000	343.197	343.197	966.830	-6.256	897.105	0.000	901.484	560.093	591.372	596.1496			
T+24 sec	20:51:04	59.883	0.000	59.881	0.000	334.622	334.622	966.830	-6.256	882.274	0.000	900.007	553.837	588.244	596.1496			

T+26 sec	20:51:06	59.881	0.000	59.881	0.000	340.339	340.339	966.830	-6.256	881.735	0.000	898.701	547.582	585.116	596.1496
T+28 sec	20:51:08	59.88	0.000	59.881	0.000	343.197	343.197	966.830	-6.256	878.338	0.000	897.344	541.326	581.988	596.1496
T+30 sec	20:51:10	59.881	0.000	59.881	0.000	340.339	340.339	966.830	-6.256	869.223	0.000	895.586	535.070	578.860	596.1496
T+32 sec	20:51:12	59.881	0.000	59.881	0.000	340.339	340.339	966.830	-6.256	862.968	0.000	893.668	528.814	575.733	596.1496
T+34 sec	20:51:14	59.88	0.000	59.881	0.000	343.197	343.197	966.830	-6.256	859.570	0.000	891.773	522.559	572.605	596.1496
T+36 sec	20:51:16	59.878	0.000	59.881	0.000	348.925	348.925	966.830	-6.256	859.042	0.000	890.051	516.303	569.477	596.1496
T+38 sec	20:51:18	59.88	0.000	59.881	0.000	343.197	343.197	966.830	-6.256	847.059	0.000	887.901	510.047	566.349	596.1496
T+40 sec	20:51:20	59.88	0.000	59.881	0.000	343.197	343.197	966.830	-6.256	840.803	0.000	885.658	503.791	563.221	596.1496
T+42 sec	20:51:22	59.88	0.000	59.881	0.000	343.197	343.197	966.830	-6.256	834.547	0.000	883.335	497.536	560.093	596.1496
T+44 sec	20:51:24	59.882	0.000	59.881	0.000	337.480	337.480	966.830	-6.256	822.575	0.000	880.693	491.280	556.965	596.1496
T+46 sec	20:51:26	59.883	0.000	59.881	0.000	334.622	334.622	966.830	-6.256	813.460	0.000	877.892	485.024	553.837	596.1496
T+48 sec	20:51:28	59.882	0.000	59.881	0.000	337.480	337.480	966.830	-6.256	810.063	0.000	875.179	478.768	550.709	596.1496
T+50 sec	20:51:30	59.883	0.000	59.881	0.000	334.622	334.622	966.830	-6.256	800.949	0.000	872.324	472.513	547.582	596.1496
T+52 sec	20:51:32	59.88	0.000	59.881	0.000	343.197	343.197	966.830	-6.256	803.268	0.000	869.766	466.257	544.454	596.1496
T+54 sec	20:51:34	59.881	0.000			340.339	340.339		-6.256	794.154	0.000	867.066	460.001	541.326	596.1496
T+56 sec	20:51:36	59.884	0.000			331.763	331.763		-6.256	779.323	0.000	864.040	453.745	538.198	596.1496
T+58 sec	20:51:38	59.892	0.000			308.885	308.885		-6.256	750.189	0.000	860.245	447.490	535.070	596.1496
T+60 sec	20:51:40	59.894	0.000			303.157	303.157		-6.256	738.206	0.000	856.308	441.234	531.942	596.1496
T+62 sec	20:51:42	59.896	0.000			297.440	297.440		-6.256	726.233	0.000	852.243	434.978	528.814	596.1496
T+64 sec	20:51:44	59.9	0.000			285.996	285.996		-6.256	708.533	0.000	847.889	428.722	525.686	596.1496
T+66 sec	20:51:46	59.902	0.000			280.279	280.279		-6.256	696.560	0.000	843.438	422.467	522.559	596.1496
T+68 sec	20:51:48	59.904	0.000			274.562	274.562		-6.256	684.587	0.000	838.899	416.211	519.431	596.1496
T+70 sec	20:51:50	59.903	0.000			277.420	277.420		-6.256	681.190	0.000	834.518	409.955	516.303	596.1496
T+72 sec	20:51:52	59.902	0.000			280.279	280.279		-6.256	677.793	0.000	830.283	403.699	513.175	596.1496
T+74 sec	20:51:54	59.903	0.000			277.420	277.420		-6.256	668.679	0.000	826.030	397.443	510.047	596.1496
T+76 sec	20:51:56	59.902	0.000			280.279	280.279		-6.256	665.281	0.000	821.908	391.188	506.919	596.1496
T+78 sec	20:51:58	59.901	0.000			283.137	283.137		-6.256	661.884	0.000	817.907	384.932	503.791	596.1496
T+80 sec	20:52:00	59.9	0.000			285.996	285.996		-6.256	658.487	0.000	814.019	378.676	500.663	596.1496
	20:52:02	59.901	0.000			283.137	283.137		-6.256	649.372	0.000	810.099	372.420	497.536	596.1496
	20:52:04	59.904	0.000			274.562	274.562		-6.256	634.541	0.000	806.016	366.165	494.408	596.1496
	20:52:06	59.907	0.000			265.976	265.976		-6.256	619.699	0.000	801.782	359.909	491.280	596.1496
	20:52:08	59.91	0.000			257.400	257.400		-6.256	604.868	0.000	797.406	353.653	488.152	596.1496
	20:52:10	59.913	0.000			248.825	248.825		-6.256	590.037	0.000	792.898	347.397	485.024	596.1496
	20:52:12	59.916	0.000			240.239	240.239		-6.256	575.195	0.000	788.266	341.142	481.896	596.1496
	20:52:14	59.916	0.000			240.239	240.239		-6.256	568.940	0.000	783.697	334.886	478.768	596.1496
	20:52:16	59.919	0.000			231.664	231.664		-6.256	554.109	0.000	779.011	328.630	475.640	596.1496
	20:52:18	59.922	0.000			223.077	223.077		-6.256	539.267	0.000	774.216	322.374	472.513	596.1496
	20:52:20	59.924	0.000			217.361	217.361		-6.256	527.294	0.000	769.375	316.119	469.385	596.1496
	20:52:22	59.924	0.000			217.361	217.361		-6.256	521.038	0.000	764.599	309.863	466.257	596.1496
	20:52:24	59.924	0.000			217.361	217.361		-6.256	514.782	0.000	759.885	303.607	463.129	596.1496
	20:52:26	59.925	0.000			214.502	214.502		-6.256	505.668	0.000	755.178	297.351	460.001	596.1496
	20:52:28	59.928	0.000			205.916	205.916		-6.256	490.826	0.000	750.371	291.096	456.873	596.1496
	20:52:30	59.929	0.000			203.058	203.058		-6.256	481.712	0.000	745.574	284.840	453.745	596.1496
	20:52:32	59.932	0.000			194.482	194.482		-6.256	466.881	0.000	740.684	278.584	450.617	596.1496
	20:52:34	59.934	0.000			188.765	188.765		-6.256	454.908	0.000	735.757	272.328	447.490	596.1496

20:52:36	59.935	0.000	185.896	185.896	-6.256	445.783	0.000	730.842	266.073	444.362	596.1496
20:52:38	59.935	0.000	185.896	185.896	-6.256	439.528	0.000	725.987	259.817	441.234	596.1496
20:52:40	59.935	0.000	185.896	185.896	-6.256	433.272	0.000	721.189	253.561	438.106	596.1496
20:52:42	59.935	0.000	185.896	185.896	-6.256	427.016	0.000	716.444	247.305	434.978	596.1496
20:52:44	59.934	0.000	188.765	188.765	-6.256	423.630	0.000	711.796	241.050	431.850	596.1496
20:52:46	59.935	0.000	185.896	185.896	-6.256	414.505	0.000	707.151	234.794	428.722	596.1496
20:52:48	59.938	0.000	177.321	177.321	-6.256	399.674	0.000	702.420	228.538	425.594	596.1496
20:52:50	59.941	0.000	168.735	168.735	-6.256	384.832	0.000	697.609	222.282	422.467	596.1496
20:52:52	59.943	0.000	163.018	163.018	-6.256	372.859	0.000	692.762	216.027	419.339	596.1496
20:52:54	59.948	0.000	148.715	148.715	-6.256	352.300	0.000	687.755	209.771	416.211	596.1496
20:52:56	59.951	0.000	140.139	140.139	-6.256	337.469	0.000	682.678	203.515	413.083	596.1496
20:52:58	59.951	0.000	140.139	140.139	-6.256	331.213	0.000	677.657	197.259	409.955	596.1496
20:53:00	59.953	0.000	134.423	134.423	-6.256	319.241	0.000	672.609	191.004	406.827	596.1496
20:53:02	59.956	0.000	125.836	125.836	-6.256	304.399	0.000	667.495	184.748	403.699	596.1496
20:53:04	59.958	0.000	120.119	120.119	-6.256	292.426	0.000	662.357	178.492	400.571	596.1496
20:53:06	59.958	0.000	120.119	120.119	-6.256	286.170	0.000	657.274	172.236	397.443	596.1496
20:53:08	59.959	0.000	117.261	117.261	-6.256	277.056	0.000	652.204	165.981	394.316	596.1496
20:53:10	59.958	0.000	120.119	120.119	-6.256	273.659	0.000	647.223	159.725	391.188	596.1496
20:53:12	59.958	0.000	120.119	120.119	-6.256	267.403	0.000	642.290	153.469	388.060	596.1496
20:53:14	59.958	0.000	120.119	120.119	-6.256	261.147	0.000	637.404	147.213	384.932	596.1496
20:53:16	59.96	0.000	114.403	114.403	-6.256	249.175	0.000	632.490	140.957	381.804	596.1496
20:53:18	59.962	0.000	108.675	108.675	-6.256	237.191	0.000	627.548	134.702	378.676	596.1496
20:53:20	59.965	0.000	100.100	100.100	-6.256	222.360	0.000	622.546	128.446	375.548	596.1496
20:53:22	59.967	0.000	94.383	94.383	-6.256	210.388	0.000	617.520	122.190	372.420	596.1496
20:53:24	59.97	0.000	85.797	85.797	-6.256	195.546	0.000	612.436	115.934	369.293	596.1496
20:53:26	59.971	0.000	82.938	82.938	-6.256	186.432	0.000	607.364	109.679	366.165	596.1496
20:53:28	59.973	0.000	77.221	77.221	-6.256	174.459	0.000	602.271	103.423	363.037	596.1496
20:53:30	59.971	0.000	82.938	82.938	-6.256	173.920	0.000	597.290	97.167	359.909	596.1496
20:53:32	59.971	0.000	82.938	82.938	-6.256	167.664	0.000	592.352	90.911	356.781	596.1496
20:53:34	59.972	0.000	80.080	80.080	-6.256	158.550	0.000	587.423	84.656	353.653	596.1496
20:53:36	59.974	0.000	74.363	74.363	-6.256	146.577	0.000	582.469	78.400	350.525	596.1496
20:53:38	59.975	0.000	71.504	71.504	-6.256	137.463	0.000	577.525	72.144	347.397	596.1496
20:53:40	59.977	0.000	65.777	65.777	-6.256	125.480	0.000	572.557	65.888	344.270	596.1496
20:53:42	59.979	0.000	60.060	60.060	-6.256	113.507	0.000	567.568	59.633	341.142	596.1496
20:53:44	59.981	0.000	54.343	54.343	-6.256	101.535	0.000	562.556	53.377	338.014	596.1496
20:53:46	59.982	0.000	51.484	51.484	-6.256	92.420	0.000	557.555	47.121	334.886	596.1496
20:53:48	59.984	0.000	45.757	45.757	-6.256	80.437	0.000	552.533	40.865	331.758	596.1496
20:53:50	59.986	0.000	40.040	40.040	-6.256	68.464	0.000	547.490	34.610	328.630	596.1496
20:53:52	59.989	0.000	31.465	31.465	-6.256	53.633	0.000	542.399	28.354	325.502	596.1496
20:53:54	59.991	0.000	25.737	25.737	-6.256	41.650	0.000	537.289	22.098	322.374	596.1496
20:53:56	59.993	0.000	20.020	20.020	-6.256	29.677	0.000	532.162	15.842	319.247	596.1496
20:53:58	59.996	0.000	11.445	11.445	-6.256	14.846	0.000	526.989	9.587	316.119	596.1496
20:54:00	59.999	0.000	2.858	2.858	-6.256	0.004	0.000	521.771	3.331	312.991	596.1496
20:54:02	60.002	0.000	-5.717	-5.717	0.000	-8.571	0.000	516.572	3.331	309.925	596.1496
20:54:04	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	511.390	3.331	306.919	596.1496
20:54:06	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	506.308	3.331	303.972	596.1496

20:54:08	60.009	0.000	-25.737	-25.737	0.000	-28.591	0.000	501.213	3.331	301.081	596.1496
20:54:10	60.01	0.000	-28.595	-28.595	0.000	-31.450	0.000	496.188	3.331	298.245	596.1496
20:54:12	60.011	0.000	-31.465	-31.465	0.000	-34.319	0.000	491.230	3.331	295.463	596.1496
20:54:14	60.012	0.000	-34.323	-34.323	0.000	-37.177	0.000	486.338	3.331	292.733	596.1496
20:54:16	60.011	0.000	-31.465	-31.465	0.000	-34.319	0.000	481.561	3.331	290.053	596.1496
20:54:18	60.013	0.000	-37.181	-37.181	0.000	-40.036	0.000	476.819	3.331	287.423	596.1496
20:54:20	60.014	0.000	-40.040	-40.040	0.000	-42.894	0.000	472.137	3.331	284.840	596.1496
20:54:22	60.017	0.000	-48.615	-48.615	0.000	-51.470	0.000	467.462	3.331	282.304	596.1496
20:54:24	60.021	0.000	-60.060	-60.060	0.000	-62.914	0.000	462.768	3.331	279.813	596.1496
20:54:26	60.023	0.000	-65.777	-65.777	0.000	-68.631	0.000	458.107	3.331	277.366	596.1496
20:54:28	60.024	0.000	-68.635	-68.635	0.000	-71.489	0.000	453.502	3.331	274.962	596.1496
20:54:30	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	448.951	3.331	272.600	596.1496
20:54:32	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	444.454	3.331	270.279	596.1496
20:54:34	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	440.033	3.331	267.997	596.1496
20:54:36	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	435.638	3.331	265.755	596.1496
20:54:38	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	431.293	3.331	263.549	596.1496
20:54:40	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	427.020	3.331	261.381	596.1496
20:54:42	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	422.793	3.331	259.248	596.1496
20:54:44	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	418.588	3.331	257.150	596.1496
20:54:46	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	414.428	3.331	255.087	596.1496
20:54:48	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	410.335	3.331	253.057	596.1496
20:54:50	60.031	0.000	-88.655	-88.655	0.000	-91.509	0.000	406.352	3.331	251.059	596.1496
20:54:52	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	402.477	3.331	249.093	596.1496
20:54:54	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	398.640	3.331	247.158	596.1496
20:54:56	60.031	0.000	-88.655	-88.655	0.000	-91.509	0.000	394.841	3.331	245.253	596.1496
20:54:58	60.031	0.000	-88.655	-88.655	0.000	-91.509	0.000	391.099	3.331	243.377	596.1496
20:55:00	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	387.393	3.331	241.531	596.1496
20:55:02	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	383.722	3.331	239.712	596.1496
20:55:04	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	380.106	3.331	237.922	596.1496
20:55:06	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	376.543	3.331	236.158	596.1496
20:55:08	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	373.055	3.331	234.420	596.1496
20:55:10	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	369.660	3.331	232.709	596.1496
20:55:12	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	366.252	3.331	231.022	596.1496
20:55:14	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	362.873	3.331	229.360	596.1496
20:55:16	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	359.522	3.331	227.722	596.1496
20:55:18	60.037	0.000	-105.816	-105.816	0.000	-108.671	0.000	356.177	3.331	226.108	596.1496
20:55:20	60.039	0.000	-111.544	-111.544	0.000	-114.399	0.000	352.840	3.331	224.517	596.1496
20:55:22	60.038	0.000	-108.675	-108.675	0.000	-111.529	0.000	349.570	3.331	222.948	596.1496
20:55:24	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	346.185	3.331	221.401	596.1496
20:55:26	60.052	0.000	-148.715	-148.715	0.000	-151.569	0.000	342.729	3.331	219.876	596.1496
20:55:28	60.051	0.000	-145.856	-145.856	0.000	-148.711	0.000	339.339	3.331	218.372	596.1496
20:55:30	60.05	0.000	-142.998	-142.998	0.000	-145.852	0.000	336.016	3.331	216.889	596.1496
20:55:32	60.051	0.000	-145.856	-145.856	0.000	-148.711	0.000	332.719	3.331	215.427	596.1496
20:55:34	60.049	0.000	-140.139	-140.139	0.000	-142.994	0.000	329.504	3.331	213.984	596.1496
20:55:36	60.05	0.000	-142.998	-142.998	0.000	-145.852	0.000	326.314	3.331	212.561	596.1496
20:55:38	60.051	0.000	-145.856	-145.856	0.000	-148.711	0.000	323.147	3.331	211.156	596.1496

20:55:40	60.049	0.000	-140.139	-140.139	0.000	-142.994	0.000	320.060	3.331	209.771	596.1496
20:55:42	60.048	0.000	-137.281	-137.281	0.000	-140.135	0.000	317.033	3.331	208.404	596.1496
20:55:44	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	314.082	3.331	207.054	596.1496
20:55:46	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	311.170	3.331	205.723	596.1496
20:55:48	60.042	0.000	-120.119	-120.119	0.000	-122.974	0.000	308.369	3.331	204.409	596.1496
20:55:50	60.044	0.000	-125.836	-125.836	0.000	-128.691	0.000	305.567	3.331	203.111	596.1496
20:55:52	60.045	0.000	-128.695	-128.695	0.000	-131.549	0.000	302.783	3.331	201.831	596.1496
20:55:54	60.045	0.000	-128.695	-128.695	0.000	-131.549	0.000	300.034	3.331	200.566	596.1496
20:55:56	60.045	0.000	-128.695	-128.695	0.000	-131.549	0.000	297.320	3.331	199.318	596.1496
20:55:58	60.045	0.000	-128.695	-128.695	0.000	-131.549	0.000	294.639	3.331	198.086	596.1496
20:56:00	60.045	0.000	-128.695	-128.695	0.000	-131.549	0.000	291.992	3.331	196.868	596.1496
20:56:02	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	289.360	3.331	195.666	596.1496
20:56:04	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	286.760	3.331	194.479	596.1496
20:56:06	60.045	0.000	-128.695	-128.695	0.000	-131.549	0.000	284.209	3.331	193.306	596.1496
20:56:08	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	281.672	3.331	192.148	596.1496
20:56:10	60.044	0.000	-125.836	-125.836	0.000	-128.691	0.000	279.200	3.331	191.004	596.1496
20:56:12	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	276.723	3.331	189.873	596.1496
20:56:14	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	274.276	3.331	188.756	596.1496
20:56:16	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	271.858	3.331	187.652	596.1496
20:56:18	60.047	0.000	-134.423	-134.423	0.000	-137.277	0.000	269.451	3.331	186.562	596.1496
20:56:20	60.047	0.000	-134.423	-134.423	0.000	-137.277	0.000	267.073	3.331	185.484	596.1496
20:56:22	60.048	0.000	-137.281	-137.281	0.000	-140.135	0.000	264.705	3.331	184.419	596.1496
20:56:24	60.05	0.000	-142.998	-142.998	0.000	-145.852	0.000	262.332	3.331	183.366	596.1496
20:56:26	60.052	0.000	-148.715	-148.715	0.000	-151.569	0.000	259.953	3.331	182.325	596.1496
20:56:28	60.052	0.000	-148.715	-148.715	0.000	-151.569	0.000	257.602	3.331	181.296	596.1496
20:56:30	60.049	0.000	-140.139	-140.139	0.000	-142.994	0.000	255.326	3.331	180.279	596.1496
20:56:32	60.048	0.000	-137.281	-137.281	0.000	-140.135	0.000	253.091	3.331	179.274	596.1496
20:56:34	60.049	0.000	-140.139	-140.139	0.000	-142.994	0.000	250.866	3.331	178.280	596.1496
20:56:36	60.051	0.000	-145.856	-145.856	0.000	-148.711	0.000	248.634	3.331	177.297	596.1496
20:56:38	60.05	0.000	-142.998	-142.998	0.000	-145.852	0.000	246.442	3.331	176.325	596.1496
20:56:40	60.049	0.000	-140.139	-140.139	0.000	-142.994	0.000	244.291	3.331	175.364	596.1496
20:56:42	60.048	0.000	-137.281	-137.281	0.000	-140.135	0.000	242.178	3.331	174.414	596.1496
20:56:44	60.046	0.000	-131.564	-131.564	0.000	-134.419	0.000	240.121	3.331	173.474	596.1496
20:56:46	60.044	0.000	-125.836	-125.836	0.000	-128.691	0.000	238.116	3.331	172.544	596.1496
20:56:48	60.043	0.000	-122.978	-122.978	0.000	-125.832	0.000	236.149	3.331	171.624	596.1496
20:56:50	60.045	0.000	-128.695	-128.695	0.000	-131.549	0.000	234.172	3.331	170.715	596.1496
20:56:52	60.044	0.000	-125.836	-125.836	0.000	-128.691	0.000	232.232	3.331	169.815	596.1496
20:56:54	60.04	0.000	-114.403	-114.403	0.000	-117.257	0.000	230.373	3.331	168.924	596.1496
20:56:56	60.038	0.000	-108.675	-108.675	0.000	-111.529	0.000	228.564	3.331	168.044	596.1496
20:56:58	60.036	0.000	-102.958	-102.958	0.000	-105.812	0.000	226.804	3.331	167.172	596.1496
20:57:00	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	225.077	3.331	166.310	596.1496
20:57:02	60.031	0.000	-88.655	-88.655	0.000	-91.509	0.000	223.428	3.331	165.456	596.1496
20:57:04	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	221.811	3.331	164.612	596.1496
20:57:06	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	220.211	3.331	163.776	596.1496
20:57:08	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	218.598	3.331	162.949	596.1496
20:57:10	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	216.986	3.331	162.131	596.1496

20:57:12	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	215.391	3.331	161.321	596.1496
20:57:14	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	213.827	3.331	160.519	596.1496
20:57:16	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	212.235	3.331	159.725	596.1496
20:57:18	60.038	0.000	-108.675	-108.675	0.000	-111.529	0.000	210.616	3.331	158.939	596.1496
20:57:20	60.039	0.000	-111.544	-111.544	0.000	-114.399	0.000	208.999	3.331	158.161	596.1496
20:57:22	60.038	0.000	-108.675	-108.675	0.000	-111.529	0.000	207.412	3.331	157.391	596.1496
20:57:24	60.039	0.000	-111.544	-111.544	0.000	-114.399	0.000	205.827	3.331	156.628	596.1496
20:57:26	60.04	0.000	-114.403	-114.403	0.000	-117.257	0.000	204.243	3.331	155.873	596.1496
20:57:28	60.04	0.000	-114.403	-114.403	0.000	-117.257	0.000	202.675	3.331	155.125	596.1496
20:57:30	60.039	0.000	-111.544	-111.544	0.000	-114.399	0.000	201.136	3.331	154.384	596.1496
20:57:32	60.039	0.000	-111.544	-111.544	0.000	-114.399	0.000	199.611	3.331	153.651	596.1496
20:57:34	60.038	0.000	-108.675	-108.675	0.000	-111.529	0.000	198.116	3.331	152.925	596.1496
20:57:36	60.037	0.000	-105.816	-105.816	0.000	-108.671	0.000	196.648	3.331	152.206	596.1496
20:57:38	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	195.221	3.331	151.494	596.1496
20:57:40	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	193.821	3.331	150.788	596.1496
20:57:42	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	192.435	3.331	150.089	596.1496
20:57:44	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	191.062	3.331	149.397	596.1496
20:57:46	60.036	0.000	-102.958	-102.958	0.000	-105.812	0.000	189.674	3.331	148.711	596.1496
20:57:48	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	188.327	3.331	148.032	596.1496
20:57:50	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	187.018	3.331	147.359	596.1496
20:57:52	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	185.708	3.331	146.692	596.1496
20:57:54	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	184.397	3.331	146.031	596.1496
20:57:56	60.036	0.000	-102.958	-102.958	0.000	-105.812	0.000	183.072	3.331	145.377	596.1496
20:57:58	60.038	0.000	-108.675	-108.675	0.000	-111.529	0.000	181.733	3.331	144.728	596.1496
20:58:00	60.04	0.000	-114.403	-114.403	0.000	-117.257	0.000	180.380	3.331	144.085	596.1496
20:58:02	60.039	0.000	-111.544	-111.544	0.000	-114.399	0.000	179.052	3.331	143.448	596.1496
20:58:04	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	177.787	3.331	142.817	596.1496
20:58:06	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	176.534	3.331	142.192	596.1496
20:58:08	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	175.305	3.331	141.572	596.1496
20:58:10	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	174.099	3.331	140.957	596.1496
20:58:12	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	172.954	3.331	140.349	596.1496
20:58:14	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	171.806	3.331	139.745	596.1496
20:58:16	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	170.681	3.331	139.147	596.1496
20:58:18	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	169.579	3.331	138.554	596.1496
20:58:20	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	168.510	3.331	137.966	596.1496
20:58:22	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	167.427	3.331	137.383	596.1496
20:58:24	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	166.327	3.331	136.805	596.1496
20:58:26	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	165.213	3.331	136.232	596.1496
20:58:28	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	164.097	3.331	135.664	596.1496
20:58:30	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	162.965	3.331	135.101	596.1496
20:58:32	60.036	0.000	-102.958	-102.958	0.000	-105.812	0.000	161.831	3.331	134.543	596.1496
20:58:34	60.037	0.000	-105.816	-105.816	0.000	-108.671	0.000	160.694	3.331	133.989	596.1496
20:58:36	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	159.603	3.331	133.440	596.1496
20:58:38	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	158.545	3.331	132.896	596.1496
20:58:40	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	157.519	3.331	132.356	596.1496
20:58:42	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	156.526	3.331	131.820	596.1496

20:58:44	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	155.540	3.331	131.290	596.1496
20:58:46	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	154.563	3.331	130.763	596.1496
20:58:48	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	153.593	3.331	130.241	596.1496
20:58:50	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	152.609	3.331	129.723	596.1496
20:58:52	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	151.644	3.331	129.209	596.1496
20:58:54	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	150.675	3.331	128.699	596.1496
20:58:56	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	149.690	3.331	128.194	596.1496
20:58:58	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	148.680	3.331	127.692	596.1496
20:59:00	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	147.677	3.331	127.195	596.1496
20:59:02	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	146.683	3.331	126.701	596.1496
20:59:04	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	145.707	3.331	126.212	596.1496
20:59:06	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	144.751	3.331	125.726	596.1496
20:59:08	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	143.791	3.331	125.244	596.1496
20:59:10	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	142.838	3.331	124.766	596.1496
20:59:12	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	141.893	3.331	124.292	596.1496
20:59:14	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	140.966	3.331	123.821	596.1496
20:59:16	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	140.090	3.331	123.354	596.1496
20:59:18	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	139.244	3.331	122.891	596.1496
20:59:20	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	138.425	3.331	122.431	596.1496
20:59:22	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	137.613	3.331	121.975	596.1496
20:59:24	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	136.796	3.331	121.522	596.1496
20:59:26	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	135.986	3.331	121.072	596.1496
20:59:28	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	135.192	3.331	120.626	596.1496
20:59:30	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	134.393	3.331	120.184	596.1496
20:59:32	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	133.590	3.331	119.744	596.1496
20:59:34	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	132.793	3.331	119.308	596.1496
20:59:36	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	131.991	3.331	118.876	596.1496
20:59:38	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	131.174	3.331	118.446	596.1496
20:59:40	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	130.373	3.331	118.020	596.1496
20:59:42	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	129.568	3.331	117.597	596.1496
20:59:44	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	128.789	3.331	117.176	596.1496
20:59:46	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	128.037	3.331	116.759	596.1496
20:59:48	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	127.281	3.331	116.345	596.1496
20:59:50	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	126.509	3.331	115.934	596.1496
20:59:52	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	125.732	3.331	115.526	596.1496
20:59:54	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	124.940	3.331	115.121	596.1496
20:59:56	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	124.185	3.331	114.719	596.1496
20:59:58	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	123.435	3.331	114.320	596.1496
21:00:00	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	122.660	3.331	113.924	596.1496
21:00:02	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	121.880	3.331	113.530	596.1496
21:00:04	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	121.106	3.331	113.139	596.1496
21:00:06	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	120.347	3.331	112.751	596.1496
21:00:08	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	119.614	3.331	112.366	596.1496
21:00:10	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	118.895	3.331	111.983	596.1496
21:00:12	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	118.142	3.331	111.604	596.1496
21:00:14	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	117.375	3.331	111.226	596.1496

21:00:16	60.035	0.000	-100.100	-100.100	0.000	-102.954	0.000	116.612	3.331	110.852	596.1496
21:00:18	60.031	0.000	-88.655	-88.655	0.000	-91.509	0.000	115.895	3.331	110.480	596.1496
21:00:20	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	115.172	3.331	110.110	596.1496
21:00:22	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	114.484	3.331	109.743	596.1496
21:00:24	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	113.820	3.331	109.379	596.1496
21:00:26	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	113.170	3.331	109.017	596.1496
21:00:28	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	112.515	3.331	108.657	596.1496
21:00:30	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	111.864	3.331	108.300	596.1496
21:00:32	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	111.228	3.331	107.946	596.1496
21:00:34	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	110.595	3.331	107.593	596.1496
21:00:36	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	109.948	3.331	107.244	596.1496
21:00:38	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	109.305	3.331	106.896	596.1496
21:00:40	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	108.676	3.331	106.551	596.1496
21:00:42	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	108.060	3.331	106.208	596.1496
21:00:44	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	107.440	3.331	105.867	596.1496
21:00:46	60.028	0.000	-80.080	-80.080	0.000	-82.934	0.000	106.813	3.331	105.529	596.1496
21:00:48	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	106.201	3.331	105.193	596.1496
21:00:50	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	105.592	3.331	104.859	596.1496
21:00:52	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	104.987	3.331	104.527	596.1496
21:00:54	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	104.386	3.331	104.197	596.1496
21:00:56	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	103.808	3.331	103.870	596.1496
21:00:58	60.024	0.000	-68.635	-68.635	0.000	-71.489	0.000	103.242	3.331	103.544	596.1496
21:01:00	60.024	0.000	-68.635	-68.635	0.000	-71.489	0.000	102.680	3.331	103.221	596.1496
21:01:02	60.024	0.000	-68.635	-68.635	0.000	-71.489	0.000	102.122	3.331	102.900	596.1496
21:01:04	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	101.558	3.331	102.581	596.1496
21:01:06	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	100.998	3.331	102.264	596.1496
21:01:08	60.026	0.000	-74.363	-74.363	0.000	-77.217	0.000	100.432	3.331	101.949	596.1496
21:01:10	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	99.879	3.331	101.636	596.1496
21:01:12	60.023	0.000	-65.777	-65.777	0.000	-68.631	0.000	99.348	3.331	101.325	596.1496
21:01:14	60.022	0.000	-62.918	-62.918	0.000	-65.773	0.000	98.828	3.331	101.015	596.1496
21:01:16	60.021	0.000	-60.060	-60.060	0.000	-62.914	0.000	98.321	3.331	100.708	596.1496
21:01:18	60.02	0.000	-57.201	-57.201	0.000	-60.056	0.000	97.826	3.331	100.403	596.1496
21:01:20	60.018	0.000	-51.484	-51.484	0.000	-54.339	0.000	97.352	3.331	100.100	596.1496
21:01:22	60.015	0.000	-42.898	-42.898	0.000	-45.753	0.000	96.908	3.331	99.798	596.1496
21:01:24	60.013	0.000	-37.181	-37.181	0.000	-40.036	0.000	96.484	3.331	99.499	596.1496
21:01:26	60.013	0.000	-37.181	-37.181	0.000	-40.036	0.000	96.063	3.331	99.201	596.1496
21:01:28	60.013	0.000	-37.181	-37.181	0.000	-40.036	0.000	95.644	3.331	98.905	596.1496
21:01:30	60.014	0.000	-40.040	-40.040	0.000	-42.894	0.000	95.219	3.331	98.611	596.1496
21:01:32	60.014	0.000	-40.040	-40.040	0.000	-42.894	0.000	94.796	3.331	98.319	596.1496
21:01:34	60.015	0.000	-42.898	-42.898	0.000	-45.753	0.000	94.368	3.331	98.028	596.1496
21:01:36	60.017	0.000	-48.615	-48.615	0.000	-51.470	0.000	93.925	3.331	97.739	596.1496
21:01:38	60.016	0.000	-45.757	-45.757	0.000	-48.611	0.000	93.493	3.331	97.452	596.1496
21:01:40	60.016	0.000	-45.757	-45.757	0.000	-48.611	0.000	93.063	3.331	97.167	596.1496
21:01:42	60.016	0.000	-45.757	-45.757	0.000	-48.611	0.000	92.637	3.331	96.884	596.1496
21:01:44	60.015	0.000	-42.898	-42.898	0.000	-45.753	0.000	92.221	3.331	96.602	596.1496
21:01:46	60.014	0.000	-40.040	-40.040	0.000	-42.894	0.000	91.817	3.331	96.322	596.1496

21:01:48	60.013	0.000	-37.181	-37.181	0.000	-40.036	0.000	91.423	3.331	96.043	596.1496
21:01:50	60.014	0.000	-40.040	-40.040	0.000	-42.894	0.000	91.023	3.331	95.767	596.1496
21:01:52	60.018	0.000	-51.484	-51.484	0.000	-54.339	0.000	90.592	3.331	95.492	596.1496
21:01:54	60.018	0.000	-51.484	-51.484	0.000	-54.339	0.000	90.163	3.331	95.218	596.1496
21:01:56	60.018	0.000	-51.484	-51.484	0.000	-54.339	0.000	89.737	3.331	94.946	596.1496
21:01:58	60.016	0.000	-45.757	-45.757	0.000	-48.611	0.000	89.330	3.331	94.676	596.1496
21:02:00	60.017	0.000	-48.615	-48.615	0.000	-51.470	0.000	88.917	3.331	94.407	596.1496
21:02:02	60.025	0.000	-71.504	-71.504	0.000	-74.359	0.000	88.440	3.331	94.140	596.1496
21:02:04	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	87.923	3.331	93.875	596.1496
21:02:06	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	87.393	3.331	93.611	596.1496
21:02:08	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	86.850	3.331	93.348	596.1496
21:02:10	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	86.318	3.331	93.087	596.1496
21:02:12	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	85.789	3.331	92.828	596.1496
21:02:14	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	85.263	3.331	92.570	596.1496
21:02:16	60.033	0.000	-94.383	-94.383	0.000	-97.237	0.000	84.740	3.331	92.314	596.1496
21:02:18	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	84.212	3.331	92.059	596.1496
21:02:20	60.037	0.000	-105.816	-105.816	0.000	-108.671	0.000	83.662	3.331	91.805	596.1496
21:02:22	60.036	0.000	-102.958	-102.958	0.000	-105.812	0.000	83.124	3.331	91.553	596.1496
21:02:24	60.034	0.000	-97.241	-97.241	0.000	-100.096	0.000	82.605	3.331	91.302	596.1496
21:02:26	60.03	0.000	-85.797	-85.797	0.000	-88.651	0.000	82.121	3.331	91.053	596.1496
21:02:28	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	81.624	3.331	90.805	596.1496
21:02:30	60.031	0.000	-88.655	-88.655	0.000	-91.509	0.000	81.138	3.331	90.559	596.1496
21:02:32	60.032	0.000	-91.524	-91.524	0.000	-94.379	0.000	80.646	3.331	90.314	596.1496
21:02:34	60.031	0.000	-88.655	-88.655	0.000	-91.509	0.000	80.165	3.331	90.070	596.1496
21:02:36	60.029	0.000	-82.938	-82.938	0.000	-85.793	0.000	79.703	3.331	89.828	596.1496
21:02:38	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	79.259	3.331	89.587	596.1496
21:02:40	60.027	0.000	-77.221	-77.221	0.000	-80.076	0.000	78.818	3.331	89.348	596.1496
21:02:42	60.023	0.000	-65.777	-65.777	0.000	-68.631	0.000	78.411	3.331	89.109	596.1496
21:02:44	60.022	0.000	-62.918	-62.918	0.000	-65.773	0.000	78.013	3.331	88.872	596.1496
21:02:46	60.02	0.000	-57.201	-57.201	0.000	-60.056	0.000	77.634	3.331	88.637	596.1496
21:02:48	60.018	0.000	-51.484	-51.484	0.000	-54.339	0.000	77.272	3.331	88.402	596.1496
21:02:50	60.019	0.000	-54.343	-54.343	0.000	-57.197	0.000	76.905	3.331	88.169	596.1496
21:02:52	60.018	0.000	-51.484	-51.484	0.000	-54.339	0.000	76.547	3.331	87.937	596.1496
21:02:54	60.019	0.000	-54.343	-54.343	0.000	-57.197	0.000	76.184	3.331	87.707	596.1496
21:02:56	60.019	0.000	-54.343	-54.343	0.000	-57.197	0.000	75.823	3.331	87.478	596.1496
21:02:58	60.017	0.000	-48.615	-48.615	0.000	-51.470	0.000	75.479	3.331	87.250	596.1496
21:03:00	60.016	0.000	-45.757	-45.757	0.000	-48.611	0.000	75.144	3.331	87.023	596.1496
21:03:02	60.017	0.000	-48.615	-48.615	0.000	-51.470	0.000	74.804	3.331	86.797	596.1496
21:03:04	60.015	0.000	-42.898	-42.898	0.000	-45.753	0.000	74.480	3.331	86.573	596.1496
21:03:06	60.014	0.000	-40.040	-40.040	0.000	-42.894	0.000	74.167	3.331	86.350	596.1496
21:03:08	60.012	0.000	-34.323	-34.323	0.000	-37.177	0.000	73.870	3.331	86.128	596.1496
21:03:10	60.011	0.000	-31.465	-31.465	0.000	-34.319	0.000	73.582	3.331	85.907	596.1496
21:03:12	60.011	0.000	-31.465	-31.465	0.000	-34.319	0.000	73.296	3.331	85.687	596.1496
21:03:14	60.011	0.000	-31.465	-31.465	0.000	-34.319	0.000	73.011	3.331	85.469	596.1496
21:03:16	60.013	0.000	-37.181	-37.181	0.000	-40.036	0.000	72.713	3.331	85.251	596.1496
21:03:18	60.013	0.000	-37.181	-37.181	0.000	-40.036	0.000	72.416	3.331	85.035	596.1496

21:03:20	60.012	0.000	-34.323	-34.323	0.000	-37.177	0.000	72.128	3.331	84.820	596.1496
21:03:22	60.012	0.000	-34.323	-34.323	0.000	-37.177	0.000	71.842	3.331	84.606	596.1496
21:03:24	60.012	0.000	-34.323	-34.323	0.000	-37.177	0.000	71.558	3.331	84.394	596.1496
21:03:26	60.011	0.000	-31.465	-31.465	0.000	-34.319	0.000	71.282	3.331	84.182	596.1496
21:03:28	60.007	0.000	-20.020	-20.020	0.000	-22.874	0.000	71.037	3.331	83.971	596.1496
21:03:30	60.004	0.000	-11.445	-11.445	0.000	-14.299	0.000	70.816	3.331	83.762	596.1496
21:03:32	60.001	0.000	-2.858	-2.858	0.000	-5.713	0.000	70.619	3.331	83.554	596.1496
21:03:34	59.998	0.000	5.717	5.717	0.000	2.862	0.000	70.444	3.331	83.346	596.1496
21:03:36	59.998	0.000	5.717	5.717	0.000	2.862	0.000	70.270	3.331	83.140	596.1496
21:03:38	59.999	0.000	2.858	2.858	0.000	0.004	0.000	70.090	3.331	82.935	596.1496
21:03:40	60.001	0.000	-2.858	-2.858	0.000	-5.713	0.000	69.896	3.331	82.731	596.1496
21:03:42	60.002	0.000	-5.717	-5.717	0.000	-8.571	0.000	69.696	3.331	82.528	596.1496
21:03:44	60.004	0.000	-11.445	-11.445	0.000	-14.299	0.000	69.482	3.331	82.326	596.1496
21:03:46	60.006	0.000	-17.161	-17.161	0.000	-20.016	0.000	69.255	3.331	82.125	596.1496
21:03:48	60.006	0.000	-17.161	-17.161	0.000	-20.016	0.000	69.029	3.331	81.925	596.1496
21:03:50	60.006	0.000	-17.161	-17.161	0.000	-20.016	0.000	68.804	3.331	81.726	596.1496
21:03:52	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	68.588	3.331	81.528	596.1496
21:03:54	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	68.372	3.331	81.331	596.1496
21:03:56	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	68.158	3.331	81.135	596.1496
21:03:58	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	67.945	3.331	80.940	596.1496
21:04:00	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	67.732	3.331	80.746	596.1496
21:04:02	60.004	0.000	-11.445	-11.445	0.000	-14.299	0.000	67.528	3.331	80.553	596.1496
21:04:04	60.004	0.000	-11.445	-11.445	0.000	-14.299	0.000	67.325	3.331	80.361	596.1496
21:04:06	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	67.116	3.331	80.170	596.1496
21:04:08	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	66.908	3.331	79.979	596.1496
21:04:10	60.005	0.000	-14.303	-14.303	0.000	-17.157	0.000	66.701	3.331	79.790	596.1496
21:04:12	60.002	0.000	-5.717	-5.717	0.000	-8.571	0.000	66.516	3.331	79.602	596.1496
21:04:14	59.999	0.000	2.858	2.858	0.000	0.004	0.000	66.353	3.331	79.414	596.1496
21:04:16	59.996	0.000	11.445	11.445	0.000	8.590	0.000	66.212	3.331	79.228	596.1496
21:04:18	59.998	0.000	5.717	5.717	0.000	2.862	0.000	66.057	3.331	79.042	596.1496
21:04:20	59.999	0.000	2.858	2.858	0.000	0.004	0.000	65.897	3.331	78.858	596.1496
21:04:22	60.001	0.000	-2.858	-2.858	0.000	-5.713	0.000	65.723	3.331	78.674	596.1496
21:04:24	59.999	0.000	2.858	2.858	0.000	0.004	0.000	65.564	3.331	78.491	596.1496
21:04:26	59.998	0.000	5.717	5.717	0.000	2.862	0.000	65.412	3.331	78.309	596.1496
21:04:28	59.998	0.000	5.717	5.717	0.000	2.862	0.000	65.261	3.331	78.128	596.1496
21:04:30	59.998	0.000	5.717	5.717	0.000	2.862	0.000	65.112	3.331	77.948	596.1496
21:04:32	59.997	0.000	8.575	8.575	0.000	5.721	0.000	64.969	3.331	77.768	596.1496
21:04:34	59.996	0.000	11.445	11.445	0.000	8.590	0.000	64.834	3.331	77.590	596.1496
21:04:36	59.995	0.000	14.303	14.303	0.000	11.449	0.000	64.707	3.331	77.412	596.1496
21:04:38	59.993	0.000	20.020	20.020	0.000	17.165	0.000	64.594	3.331	77.235	596.1496
21:04:40	59.993	0.000	20.020	20.020	0.000	17.165	0.000	64.481	3.331	77.059	596.1496
21:04:42	59.993	0.000	20.020	20.020	0.000	17.165	0.000	64.369	3.331	76.884	596.1496
21:04:44	59.995	0.000	14.303	14.303	0.000	11.449	0.000	64.244	3.331	76.710	596.1496
21:04:46	59.995	0.000	14.303	14.303	0.000	11.449	0.000	64.119	3.331	76.537	596.1496
21:04:48	59.996	0.000	11.445	11.445	0.000	8.590	0.000	63.989	3.331	76.364	596.1496
21:04:50	59.995	0.000	14.303	14.303	0.000	11.449	0.000	63.865	3.331	76.192	596.1496

21:04:52	59.993	0.000	20.020	20.020	0.000	17.165	0.000	63.756	3.331	76.021	596.1496
21:04:54	59.99	0.000	28.595	28.595	0.000	25.741	0.000	63.667	3.331	75.851	596.1496
21:04:56	59.988	0.000	34.323	34.323	0.000	31.469	0.000	63.592	3.331	75.681	596.1496
21:04:58	59.987	0.000	37.181	37.181	0.000	34.327	0.000	63.524	3.331	75.513	596.1496
21:05:00	59.987	0.000	37.181	37.181	0.000	34.327	0.000	63.456	3.331	75.345	596.1496
21:05:02	59.989	0.000	31.465	31.465	0.000	28.610	0.000	63.375	3.331	75.178	596.1496
21:05:04	59.991	0.000	25.737	25.737	0.000	22.882	0.000	63.282	3.331	75.011	596.1496
21:05:06	59.993	0.000	20.020	20.020	0.000	17.165	0.000	63.176	3.331	74.846	596.1496
21:05:08	59.996	0.000	11.445	11.445	0.000	8.590	0.000	63.050	3.331	74.681	596.1496
21:05:10	59.997	0.000	8.575	8.575	0.000	5.721	0.000	62.919	3.331	74.517	596.1496
21:05:12	59.995	0.000	14.303	14.303	0.000	11.449	0.000	62.801	3.331	74.354	596.1496
21:05:14	59.993	0.000	20.020	20.020	0.000	17.165	0.000	62.697	3.331	74.191	596.1496
21:05:16	59.993	0.000	20.020	20.020	0.000	17.165	0.000	62.593	3.331	74.029	596.1496
21:05:18	59.992	0.000	22.878	22.878	0.000	20.024	0.000	62.496	3.331	73.868	596.1496
21:05:20	59.99	0.000	28.595	28.595	0.000	25.741	0.000	62.413	3.331	73.708	596.1496
21:05:22	59.989	0.000	31.465	31.465	0.000	28.610	0.000	62.336	3.331	73.549	596.1496
21:05:24	59.988	0.000	34.323	34.323	0.000	31.469	0.000	62.267	3.331	73.390	596.1496
21:05:26	59.986	0.000	40.040	40.040	0.000	37.185	0.000	62.210	3.331	73.232	596.1496
21:05:28	59.985	0.000	42.898	42.898	0.000	40.044	0.000	62.161	3.331	73.074	596.1496
21:05:30	59.985	0.000	42.898	42.898	0.000	40.044	0.000	62.111	3.331	72.917	596.1496
21:05:32	59.985	0.000	42.898	42.898	0.000	40.044	0.000	62.062	3.331	72.761	596.1496
21:05:34	59.985	0.000	42.898	42.898	0.000	40.044	0.000	62.012	3.331	72.606	596.1496
21:05:36	59.983	0.000	48.615	48.615	0.000	45.761	0.000	61.976	3.331	72.451	596.1496
21:05:38	59.983	0.000	48.615	48.615	0.000	45.761	0.000	61.940	3.331	72.297	596.1496
21:05:40	59.981	0.000	54.343	54.343	0.000	51.488	0.000	61.917	3.331	72.144	596.1496

A Point	20:50:38		
FPointA	60.0070	8:50:38 PM	
A Value	60.0084		
C Value	59.8660	#N/A	
Delta FCA	-0.142374039		
FR C	-418.7	MW/0.1 Hz	
Slope A-C dF/dT	#N/A	Hz/second	
C Value Maximum Resource Loss	596.1496277		
Secondary C Value	No	n/a	Time

A Point	20:50:38		
FPointA	60.00699997	20:50:38	
A Value	60.00837517		
C Value	59.86600113	#N/A	
Delta FC			

	Value B 12 to 24 sec	FR B 12 to 24 sec	Value B 18 to 30 sec	FR B 18 to 30 sec	Value B 20 to 40 sec	FR B 20 to 40 sec	Value B 18 to 52 sec	FR B 18 to 52 sec
B Frequency Value	59.8751		59.8799		59.8807		59.8804	
Delta FB	-0.1332	-448.212	-0.1285	-463.988	-0.1277	-465.091	-0.1279	-466.087
Slope B dF/dT	-0.00666162		-0.0064259		-0.0063835		-0.0063965	
RatioB-C	93.5791		90.2678		89.6716		89.8552	
Sustainability Index	0.0262		0.0214		0.0206		0.0209	

Tzero	20:50:38	
FT+4	59.91799927	
FT+10	59.86600113	
FT+20	59.87799835	
FT+60	59.89400101	

Interconnection Evaluation

riod (indicates ramp direction during recovery period)

B Value Average Resource Loss	596.1496277	
B Value Average LaaR Loss	0	
B Value Average Net Loss	596.1496277	

		Interconnection Bias Total		
		EI	ERCOT	WECC
Interconnection Bias Setting	-660	-6349	-660	-2024
IPFR as a % of Bias Setting	0.00%			
Interconnection Total Energy	37446	60.07%		
Interconnection Peak Energy	62339			

Frequency and Interconnection Frequency Response @ different Average pe

Generator Trip MW	Generator Trip MW	Generator Trip MW	Generator Trip MW	Generator Trip MW	Generator Trip MW	LaaR Trip MW	Total Generation Trip MW	Interconnection Primary Frequency Response	FR B 20 to 52 sec Average MW
								MW/0.1 Hz	
							0		
							0		
							0		
							0		

	Value B 12 to 24 sec Average Frequency	FR B 12 to 24 sec Average MW	Value B 18 to 30 sec Average Frequency	FR B 18 to 30 sec Average MW	Value B 20 to 40 sec Average Frequency	FR B 20 to 40 sec Average MW	Value B 18 to 52 sec Average Frequency	FR B 18 to 52 sec Average MW
T-72 sec								
T-70 sec								
T-68 sec								

				T-66 sec									
				T-64 sec									
				T-62 sec									
				T-60 sec									
				T-58 sec									
				T-56 sec									
				T-54 sec									
				T-52 sec									
				T-50 sec									
				T-48 sec									
				T-46 sec									
				T-44 sec									
				T-42 sec									
				T-40 sec									
				T-38 sec									
				T-36 sec									
				T-34 sec									
				T-32 sec									
				T-30 sec									
				T-28 sec									
				T-26 sec									
				T-24 sec									
				T-22 sec									
				T-20 sec									
				T-18 sec									
				T-16 sec	60.008								
				T-14 sec	60.008								
				T-12 sec	60.008								
				T-10 sec	60.008								
				T-08 sec	60.008								
				T-06 sec	60.008								
				T-04 sec	60.008								
				T-02 sec	60.008								
	596.1496	-3076.62266		T+0 sec									
	596.1496	-659.6334044		T+02 sec									
	596.1496	-659.6334044		T+04 sec									
0	596.1496	-464.3846609		T+06 sec									
0	596.1496	-437.1447097		T+08 sec									
0	596.1496	-418.7207395		T+10 sec									
0	596.1496	-421.6808948		T+12 sec	59.8751	-448.212							
0	596.1496	-424.6832018		T+14 sec	59.8751	-448.212							
0	596.1496	-443.647494		T+16 sec	59.8751	-448.212							
0	596.1496	-450.3466651		T+18 sec	59.8751	-448.212	59.8799	-463.988			59.8804	-466.087	
0	596.1496	-457.2512559	-467.0124455	T+20 sec	59.8751	-448.212	59.8799	-463.988	59.8807	-465.091	59.8804	-466.087	
0	596.1496	-464.3846609	-467.0124455	T+22 sec	59.8751	-448.212	59.8799	-463.988	59.8807	-465.091	59.8804	-466.087	
0	596.1496	-475.4903869	-467.0124455	T+24 sec	59.8751	-448.212	59.8799	-463.988	59.8807	-465.091	59.8804	-466.087	

0	596.1496	-468.0284752	-467.0124455	T+26 sec			59.8799	-463.988	59.8807	-465.091	59.8804	-466.087
0	596.1496	-464.3846609	-467.0124455	T+28 sec			59.8799	-463.988	59.8807	-465.091	59.8804	-466.087
0	596.1496	-468.0284752	-467.0124455	T+30 sec			59.8799	-463.988	59.8807	-465.091	59.8804	-466.087
0	596.1496	-468.0284752	-467.0124455	T+32 sec					59.8807	-465.091	59.8804	-466.087
0	596.1496	-464.3846609	-467.0124455	T+34 sec					59.8807	-465.091	59.8804	-466.087
0	596.1496	-457.2512559	-467.0124455	T+36 sec					59.8807	-465.091	59.8804	-466.087
0	596.1496	-464.3846609	-467.0124455	T+38 sec					59.8807	-465.091	59.8804	-466.087
0	596.1496	-464.3846609	-467.0124455	T+40 sec					59.8807	-465.091	59.8804	-466.087
0	596.1496	-464.3846609	-467.0124455	T+42 sec							59.8804	-466.087
0	596.1496	-471.7299244	-467.0124455	T+44 sec							59.8804	-466.087
0	596.1496	-475.4903869	-467.0124455	T+46 sec							59.8804	-466.087
0	596.1496	-471.7299244	-467.0124455	T+48 sec							59.8804	-466.087
0	596.1496	-475.4903869	-467.0124455	T+50 sec							59.8804	-466.087
0	596.1496	-464.3846609	-467.0124455	T+52 sec							59.8804	-466.087
0	596.1496	-468.0284752		T+54 sec								
0	596.1496	-479.3112853		T+56 sec								
0	596.1496	-512.2577989		T+58 sec								
0	596.1496	-521.2275427		T+60 sec								
0	596.1496	-530.4990003		T+62 sec								
0	596.1496	-550.0872877		T+64 sec								
0	596.1496	-560.4240483		T+66 sec								
0	596.1496	-571.1567275		T+68 sec								
0	596.1496	-565.7394899		T+70 sec								
0	596.1496	-560.4240483		T+72 sec								
0	596.1496	-565.7394899		T+74 sec								
0	596.1496	-560.4240483		T+76 sec								
0	596.1496	-555.2075602		T+78 sec								
0	596.1496	-550.0872877		T+80 sec								
0	596.1496	-555.2075602										
0	596.1496	-571.1567275										
0	596.1496	-588.071452										
0	596.1496	-605.9951063										
0	596.1496	-625.0456874										
0	596.1496	-645.3595755										
0	596.1496	-645.3595755										
0	596.1496	-667.0097441										
0	596.1496	-690.1934327										
0	596.1496	-706.5445125										
0	596.1496	-706.5445125										
0	596.1496	-706.5445125										
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0	596.1496	-1900.14041
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0	596.1496	-4816.675851
0	596.1496	-6359.188118
0	596.1496	-9349.509303
0	596.1496	-17668.40565
0	596.1496	-17668.40565

0	596.1496	95582.29235
0	596.1496	36727.86087
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0	596.1496	22698.19143
0	596.1496	12888.8287
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0	596.1496	2523.242884
0	596.1496	2420.83569
0	596.1496	2420.83569
0	596.1496	2420.83569
0	596.1496	2523.242884
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0	596.1496	1467.459017
0	596.1496	1432.223324
0	596.1496	1398.640068

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0	596.1496	1504.472183
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0	596.1496	1584.397506
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0	596.1496	1673.470557
0	596.1496	1627.801135
0	596.1496	1627.801135
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0	596.1496	1627.801135
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0	596.1496	1543.4008
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0	596.1496	1467.459017
0	596.1496	1504.472183
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0	596.1496	1467.459017
0	596.1496	1504.472183
0	596.1496	1584.397506
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0	596.1496	1721.776544
0	596.1496	1627.801135
0	596.1496	1673.470557
0	596.1496	1885.013546
0	596.1496	2012.453132
0	596.1496	2158.075647
0	596.1496	2239.086582
0	596.1496	2635.141185
0	596.1496	2756.938308
0	596.1496	2756.938308
0	596.1496	2523.242884
0	596.1496	2420.83569

0	596.1496	2420.83569
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0	596.1496	2239.086582
0	596.1496	2012.453132
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0	596.1496	2012.453132
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0	596.1496	1946.528592
0	596.1496	1946.528592
0	596.1496	2012.453132
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0	596.1496	2239.086582
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0	596.1496	2326.416792
0	596.1496	2326.416792
0	596.1496	2158.075647
0	596.1496	2326.416792
0	596.1496	2523.242884
0	596.1496	2420.83569
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0	596.1496	12888.8287
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0	596.1496	10598.64686
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0	596.1496	-9349.509303
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0	596.1496	-4456.781634
0	596.1496	-4816.675851
0	596.1496	-4456.781634

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0	596.1496	-3076.62266
0	596.1496	-3431.266835
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0	596.1496	-4816.675851
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0	596.1496	-3877.36132
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0	596.1496	-3076.62266
0	596.1496	-2925.714649
0	596.1496	-2664.343159
0	596.1496	-2550.42102
0	596.1496	-2550.42102
0	596.1496	-2550.42102
0	596.1496	-2550.42102
0	596.1496	-2349.500834
0	596.1496	-2349.500834
0	596.1496	-2177.622072

Non-Conforming Load sign convention - (Data is positive for Load then enter "+" else "-"

Value B 20 to 52 sec Average Frequency	FR B 20 to 52 sec Average MW
59.8807	
-0.1277	-467.012
-0.0063835	
89.6716	
0.0206	

riods of B

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

12 to 24

	T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	FRO Expected Primary Freq Response MW	T
T-72 sec	20:49:28	60.0120	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57058.09	-34.323	T-72 sec 20:49:28
T-70 sec	20:49:30	60.0100	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57058.09	-28.595	T-70 sec 20:49:30
T-68 sec	20:49:32	60.0100	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57042.50	-28.595	T-68 sec 20:49:32

		T-66 sec	20:49:34	60.0110	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57042.50	-31.465	T-66 sec	20:49:34
		T-64 sec	20:49:36	60.0110	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57042.50	-31.465	T-64 sec	20:49:36
		T-62 sec	20:49:38	60.0100	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57042.50	-28.595	T-62 sec	20:49:38
		T-60 sec	20:49:40	60.0110	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57042.50	-31.465	T-60 sec	20:49:40
		T-58 sec	20:49:42	60.0110	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57050.12	-31.465	T-58 sec	20:49:42
		T-56 sec	20:49:44	60.0120	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57050.12	-34.323	T-56 sec	20:49:44
		T-54 sec	20:49:46	60.0120	593.30	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57050.12	-34.323	T-54 sec	20:49:46
		T-52 sec	20:49:48	60.0110	585.63	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57057.21	-31.465	T-52 sec	20:49:48
		T-50 sec	20:49:50	60.0120	585.63	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57057.21	-34.323	T-50 sec	20:49:50
		T-48 sec	20:49:52	60.0130	586.14	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57051.74	-37.181	T-48 sec	20:49:52
		T-46 sec	20:49:54	60.0150	586.14	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57051.74	-42.898	T-46 sec	20:49:54
		T-44 sec	20:49:56	60.0160	586.80	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57051.74	-45.757	T-44 sec	20:49:56
		T-42 sec	20:49:58	60.0150	586.80	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57051.74	-42.898	T-42 sec	20:49:58
		T-40 sec	20:50:00	60.0140	585.95	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57037.88	-40.040	T-40 sec	20:50:00
		T-38 sec	20:50:02	60.0130	585.95	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57037.88	-37.181	T-38 sec	20:50:02
		T-36 sec	20:50:04	60.0120	585.67	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57050.43	-34.323	T-36 sec	20:50:04
		T-34 sec	20:50:06	60.0120	585.67	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57050.43	-34.323	T-34 sec	20:50:06
		T-32 sec	20:50:08	60.0120	585.12	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57029.92	-34.323	T-32 sec	20:50:08
		T-30 sec	20:50:10	60.0130	585.12	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57029.92	-37.181	T-30 sec	20:50:10
		T-28 sec	20:50:12	60.0150	584.66	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57033.71	-42.898	T-28 sec	20:50:12
		T-26 sec	20:50:14	60.0170	584.66	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57033.71	-48.615	T-26 sec	20:50:14
		T-24 sec	20:50:16	60.0170	585.31	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57035.56	-48.615	T-24 sec	20:50:16
		T-22 sec	20:50:18	60.0140	585.31	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57035.56	-40.040	T-22 sec	20:50:18
		T-20 sec	20:50:20	60.0150	585.21	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57020.60	-42.898	T-20 sec	20:50:20
		T-18 sec	20:50:22	60.0130	585.21	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57020.60	-37.181	T-18 sec	20:50:22
		T-16 sec	20:50:24	60.0120	585.92	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57030.37	-34.323	T-16 sec	20:50:24
		T-14 sec	20:50:26	60.0110	585.92	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57030.37	-31.465	T-14 sec	20:50:26
		T-12 sec	20:50:28	60.0080	593.28	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57039.15	-22.878	T-12 sec	20:50:28
		T-10 sec	20:50:30	60.0080	593.28	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57039.15	-22.878	T-10 sec	20:50:30
		T-08 sec	20:50:32	60.0070	602.70	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57042.20	-20.020	T-08 sec	20:50:32
		T-06 sec	20:50:34	60.0070	602.70	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57042.20	-20.020	T-06 sec	20:50:34
		T-04 sec	20:50:36	60.0070	602.70	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57089.30	-20.020	T-04 sec	20:50:36
		T-02 sec	20:50:38	60.0070	602.70	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	57089.30	-20.020	T-02 sec	20:50:38
		T+0 sec	20:50:40	59.9890	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56704.13	31.465	T+0 sec	20:50:40
		T+02 sec	20:50:42	59.9180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56704.13	234.522	T+02 sec	20:50:42
		T+04 sec	20:50:44	59.9180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56704.13	234.522	T+04 sec	20:50:44
		T+06 sec	20:50:46	59.8800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56763.97	343.197	T+06 sec	20:50:46
		T+08 sec	20:50:48	59.8720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56763.97	366.075	T+08 sec	20:50:48
		T+10 sec	20:50:50	59.8660	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56811.20	383.237	T+10 sec	20:50:50
		T+12 sec	20:50:52	59.8670	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56811.20	380.378	T+12 sec	20:50:52
		T+14 sec	20:50:54	59.8680	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56864.96	377.520	T+14 sec	20:50:54
		T+16 sec	20:50:56	59.8740	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56864.96	360.358	T+16 sec	20:50:56
		T+18 sec	20:50:58	59.8760	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56863.43	354.642	T+18 sec	20:50:58
59.8807	-467.012	T+20 sec	20:51:00	59.8780	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56863.43	348.925	T+20 sec	20:51:00
59.8807	-467.012	T+22 sec	20:51:02	59.8800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56867.51	343.197	T+22 sec	20:51:02
59.8807	-467.012	T+24 sec	20:51:04	59.8830	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56867.51	334.622	T+24 sec	20:51:04

59.8807	-467.012	T+26 sec	20:51:06	59.8810	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56878.36	340.339	T+26 sec	20:51:06
59.8807	-467.012	T+28 sec	20:51:08	59.8800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56878.36	343.197	T+28 sec	20:51:08
59.8807	-467.012	T+30 sec	20:51:10	59.8810	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56886.32	340.339	T+30 sec	20:51:10
59.8807	-467.012	T+32 sec	20:51:12	59.8810	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56886.32	340.339	T+32 sec	20:51:12
59.8807	-467.012	T+34 sec	20:51:14	59.8800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56893.13	343.197	T+34 sec	20:51:14
59.8807	-467.012	T+36 sec	20:51:16	59.8780	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56893.13	348.925	T+36 sec	20:51:16
59.8807	-467.012	T+38 sec	20:51:18	59.8800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56875.62	343.197	T+38 sec	20:51:18
59.8807	-467.012	T+40 sec	20:51:20	59.8800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56875.62	343.197	T+40 sec	20:51:20
59.8807	-467.012	T+42 sec	20:51:22	59.8800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56890.82	343.197	T+42 sec	20:51:22
59.8807	-467.012	T+44 sec	20:51:24	59.8820	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56890.82	337.480	T+44 sec	20:51:24
59.8807	-467.012	T+46 sec	20:51:26	59.8830	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56891.07	334.622	T+46 sec	20:51:26
59.8807	-467.012	T+48 sec	20:51:28	59.8820	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56891.07	337.480	T+48 sec	20:51:28
59.8807	-467.012	T+50 sec	20:51:30	59.8830	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56899.47	334.622	T+50 sec	20:51:30
59.8807	-467.012	T+52 sec	20:51:32	59.8800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56899.47	343.197	T+52 sec	20:51:32
		T+54 sec	20:51:34	59.8810	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56874.90	340.339	T+54 sec	20:51:34
		T+56 sec	20:51:36	59.8840	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56874.90	331.763	T+56 sec	20:51:36
		T+58 sec	20:51:38	59.8920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56854.81	308.885	T+58 sec	20:51:38
		T+60 sec	20:51:40	59.8940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56854.81	303.157	T+60 sec	20:51:40
		T+62 sec	20:51:42	59.8960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56837.21	297.440	T+62 sec	20:51:42
		T+64 sec	20:51:44	59.9000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56837.21	285.996	T+64 sec	20:51:44
		T+66 sec	20:51:46	59.9020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56827.59	280.279	T+66 sec	20:51:46
		T+68 sec	20:51:48	59.9040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56827.59	274.562	T+68 sec	20:51:48
		T+70 sec	20:51:50	59.9030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56841.84	277.420	T+70 sec	20:51:50
		T+72 sec	20:51:52	59.9020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56841.84	280.279	T+72 sec	20:51:52
		T+74 sec	20:51:54	59.9030	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56835.30	277.420	T+74 sec	20:51:54
		T+76 sec	20:51:56	59.9020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56835.30	280.279	T+76 sec	20:51:56
		T+78 sec	20:51:58	59.9010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56837.30	283.137	T+78 sec	20:51:58
		T+80 sec	20:52:00	59.9000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56837.30	285.996	T+80 sec	20:52:00
			20:52:02	59.9010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56854.15	283.137		
			20:52:04	59.9040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56854.15	274.562		
			20:52:06	59.9070	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56861.54	265.976		
			20:52:08	59.9100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56861.54	257.400		
			20:52:10	59.9130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56861.64	248.825		
			20:52:12	59.9160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56861.64	240.239		
			20:52:14	59.9160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56866.16	240.239		
			20:52:16	59.9190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56866.16	231.664		
			20:52:18	59.9220	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56869.21	223.077		
			20:52:20	59.9240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56869.21	217.361		
			20:52:22	59.9240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56876.27	217.361		
			20:52:24	59.9240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56876.27	217.361		
			20:52:26	59.9250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56881.39	214.502		
			20:52:28	59.9280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56881.39	205.916		
			20:52:30	59.9290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56889.59	203.058		
			20:52:32	59.9320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56889.59	194.482		
			20:52:34	59.9340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56893.89	188.765		

20:52:36	59.9350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56900.44	185.896
20:52:38	59.9350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56900.44	185.896
20:52:40	59.9350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56900.44	185.896
20:52:42	59.9350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56887.58	185.896
20:52:44	59.9340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56887.58	188.765
20:52:46	59.9350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56901.59	185.896
20:52:48	59.9380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56901.59	177.321
20:52:50	59.9410	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56915.66	168.735
20:52:52	59.9430	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56915.66	163.018
20:52:54	59.9480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56912.21	148.715
20:52:56	59.9510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56912.21	140.139
20:52:58	59.9510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56914.31	140.139
20:53:00	59.9530	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56914.31	134.423
20:53:02	59.9560	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56907.54	125.836
20:53:04	59.9580	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56907.54	120.119
20:53:06	59.9580	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56897.04	120.119
20:53:08	59.9590	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56897.04	117.261
20:53:10	59.9580	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56902.03	120.119
20:53:12	59.9580	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56902.03	120.119
20:53:14	59.9580	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56903.03	120.119
20:53:16	59.9600	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56903.03	114.403
20:53:18	59.9620	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56917.74	108.675
20:53:20	59.9650	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56917.74	100.100
20:53:22	59.9670	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56900.81	94.383
20:53:24	59.9700	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56900.81	85.797
20:53:26	59.9710	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56914.80	82.938
20:53:28	59.9730	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56914.80	77.221
20:53:30	59.9710	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56922.52	82.938
20:53:32	59.9710	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56922.52	82.938
20:53:34	59.9720	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56932.45	80.080
20:53:36	59.9740	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56932.45	74.363
20:53:38	59.9750	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56920.23	71.504
20:53:40	59.9770	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56920.23	65.777
20:53:42	59.9790	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56912.88	60.060
20:53:44	59.9810	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56912.88	54.343
20:53:46	59.9820	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56905.22	51.484
20:53:48	59.9840	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56905.22	45.757
20:53:50	59.9860	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56915.62	40.040
20:53:52	59.9890	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56915.62	31.465
20:53:54	59.9910	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56923.03	25.737
20:53:56	59.9930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56923.03	20.020
20:53:58	59.9960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56932.03	11.445
20:54:00	59.9990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56932.03	2.858
20:54:02	60.0020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56926.22	-5.717
20:54:04	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56926.22	-14.303
20:54:06	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56930.33	-14.303

20:54:08	60.0090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56930.33	-25.737
20:54:10	60.0100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56935.11	-28.595
20:54:12	60.0110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56935.11	-31.465
20:54:14	60.0120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56938.24	-34.323
20:54:16	60.0110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56938.24	-31.465
20:54:18	60.0130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56947.14	-37.181
20:54:20	60.0140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56947.14	-40.040
20:54:22	60.0170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56946.19	-48.615
20:54:24	60.0210	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56946.19	-60.060
20:54:26	60.0230	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56937.30	-65.777
20:54:28	60.0240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56937.30	-68.635
20:54:30	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56931.41	-71.504
20:54:32	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56931.41	-74.363
20:54:34	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56924.84	-74.363
20:54:36	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56924.84	-80.080
20:54:38	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56933.16	-82.938
20:54:40	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56933.16	-82.938
20:54:42	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56935.62	-85.797
20:54:44	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56935.62	-91.524
20:54:46	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56957.32	-94.383
20:54:48	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56957.32	-94.383
20:54:50	60.0310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56954.23	-88.655
20:54:52	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56954.23	-82.938
20:54:54	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56956.64	-85.797
20:54:56	60.0310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56956.64	-88.655
20:54:58	60.0310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56956.60	-88.655
20:55:00	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56956.60	-91.524
20:55:02	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56938.90	-94.383
20:55:04	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56938.90	-94.383
20:55:06	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56943.18	-94.383
20:55:08	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56943.18	-91.524
20:55:10	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56939.07	-85.797
20:55:12	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56939.07	-94.383
20:55:14	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56942.44	-97.241
20:55:16	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56942.44	-100.100
20:55:18	60.0370	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56924.37	-105.816
20:55:20	60.0390	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56924.37	-111.544
20:55:22	60.0380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56907.90	-108.675
20:55:24	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56907.90	-131.564
20:55:26	60.0520	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56897.80	-148.715
20:55:28	60.0510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56897.80	-145.856
20:55:30	60.0500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56864.89	-142.998
20:55:32	60.0510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56864.89	-145.856
20:55:34	60.0490	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56842.66	-140.139
20:55:36	60.0500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56842.66	-142.998
20:55:38	60.0510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56845.28	-145.856

20:55:40	60.0490	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56845.28	-140.139
20:55:42	60.0480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56850.62	-137.281
20:55:44	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56850.62	-131.564
20:55:46	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56870.91	-131.564
20:55:48	60.0420	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56870.91	-120.119
20:55:50	60.0440	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56854.55	-125.836
20:55:52	60.0450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56854.55	-128.695
20:55:54	60.0450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56848.62	-128.695
20:55:56	60.0450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56848.62	-128.695
20:55:58	60.0450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56838.20	-128.695
20:56:00	60.0450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56838.20	-128.695
20:56:02	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56838.88	-131.564
20:56:04	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56838.88	-131.564
20:56:06	60.0450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56851.80	-128.695
20:56:08	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56851.80	-131.564
20:56:10	60.0440	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56861.98	-125.836
20:56:12	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56861.98	-131.564
20:56:14	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56851.02	-131.564
20:56:16	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56851.02	-131.564
20:56:18	60.0470	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56845.13	-134.423
20:56:20	60.0470	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56845.13	-134.423
20:56:22	60.0480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56847.95	-137.281
20:56:24	60.0500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56847.95	-142.998
20:56:26	60.0520	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56843.66	-148.715
20:56:28	60.0520	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56843.66	-148.715
20:56:30	60.0490	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.39	-140.139
20:56:32	60.0480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.39	-137.281
20:56:34	60.0490	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56814.38	-140.139
20:56:36	60.0510	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56814.38	-145.856
20:56:38	60.0500	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56817.16	-142.998
20:56:40	60.0490	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56817.16	-140.139
20:56:42	60.0480	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56805.52	-137.281
20:56:44	60.0460	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56805.52	-131.564
20:56:46	60.0440	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56807.83	-125.836
20:56:48	60.0430	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56807.83	-122.978
20:56:50	60.0450	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56827.41	-128.695
20:56:52	60.0440	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56827.41	-125.836
20:56:54	60.0400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56821.69	-114.403
20:56:56	60.0380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56821.69	-108.675
20:56:58	60.0360	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.95	-102.958
20:57:00	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.95	-100.100
20:57:02	60.0310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56860.51	-88.655
20:57:04	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56860.51	-85.797
20:57:06	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56877.59	-85.797
20:57:08	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56877.59	-91.524
20:57:10	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56918.66	-94.383

20:57:12	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56918.66	-94.383
20:57:14	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56891.71	-91.524
20:57:16	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56891.71	-100.100
20:57:18	60.0380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56894.35	-108.675
20:57:20	60.0390	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56894.35	-111.544
20:57:22	60.0380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56895.17	-108.675
20:57:24	60.0390	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56895.17	-111.544
20:57:26	60.0400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56889.73	-114.403
20:57:28	60.0400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56889.73	-114.403
20:57:30	60.0390	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56892.39	-111.544
20:57:32	60.0390	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56892.39	-111.544
20:57:34	60.0380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56875.33	-108.675
20:57:36	60.0370	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56874.01	-105.816
20:57:38	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56874.01	-100.100
20:57:40	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56874.01	-97.241
20:57:42	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56881.00	-97.241
20:57:44	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56881.00	-97.241
20:57:46	60.0360	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56887.45	-102.958
20:57:48	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56887.45	-97.241
20:57:50	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56882.08	-91.524
20:57:52	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56882.08	-94.383
20:57:54	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56879.11	-97.241
20:57:56	60.0360	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56879.11	-102.958
20:57:58	60.0380	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56884.36	-108.675
20:58:00	60.0400	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56884.36	-114.403
20:58:02	60.0390	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56872.63	-111.544
20:58:04	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56872.63	-100.100
20:58:06	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56865.52	-100.100
20:58:08	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56865.52	-97.241
20:58:10	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56874.48	-94.383
20:58:12	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56874.48	-82.938
20:58:14	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56866.35	-85.797
20:58:16	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56866.35	-82.938
20:58:18	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56868.50	-80.080
20:58:20	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56868.50	-74.363
20:58:22	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56865.58	-80.080
20:58:24	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56865.58	-85.797
20:58:26	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56862.76	-91.524
20:58:28	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56862.76	-94.383
20:58:30	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56871.13	-100.100
20:58:32	60.0360	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56871.13	-102.958
20:58:34	60.0370	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56863.48	-105.816
20:58:36	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56863.48	-97.241
20:58:38	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56856.71	-91.524
20:58:40	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56856.71	-85.797
20:58:42	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56859.67	-80.080

20:58:44	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56859.67	-80.080
20:58:46	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56860.41	-80.080
20:58:48	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56860.41	-80.080
20:58:50	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56867.31	-85.797
20:58:52	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56867.31	-82.938
20:58:54	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56852.14	-85.797
20:58:56	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56852.14	-91.524
20:58:58	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56838.81	-100.100
20:59:00	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56838.81	-100.100
20:59:02	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56839.64	-100.100
20:59:04	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56839.64	-97.241
20:59:06	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56839.96	-94.383
20:59:08	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56839.96	-97.241
20:59:10	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56841.01	-97.241
20:59:12	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56841.01	-97.241
20:59:14	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56854.90	-94.383
20:59:16	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56854.90	-82.938
20:59:18	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56846.00	-77.221
20:59:20	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56846.00	-71.504
20:59:22	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.07	-71.504
20:59:24	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.07	-74.363
20:59:26	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56827.28	-74.363
20:59:28	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56827.28	-71.504
20:59:30	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56829.42	-74.363
20:59:32	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56829.42	-77.221
20:59:34	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56846.66	-77.221
20:59:36	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56846.66	-80.080
20:59:38	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56840.57	-85.797
20:59:40	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56840.57	-82.938
20:59:42	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56831.91	-85.797
20:59:44	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56831.91	-80.080
20:59:46	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.35	-74.363
20:59:48	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.35	-77.221
20:59:50	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.63	-82.938
20:59:52	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.63	-85.797
20:59:54	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56828.00	-91.524
20:59:56	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56828.00	-82.938
20:59:58	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56828.00	-82.938
21:00:00	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56828.00	-91.524
21:00:02	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.80	-94.383
21:00:04	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56833.80	-94.383
21:00:06	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56806.86	-91.524
21:00:08	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56806.86	-85.797
21:00:10	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56813.18	-82.938
21:00:12	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56813.18	-94.383
21:00:14	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56804.27	-100.100

21:00:16	60.0350	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56804.27	-100.100
21:00:18	60.0310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56787.34	-88.655
21:00:20	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56787.34	-91.524
21:00:22	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56786.84	-82.938
21:00:24	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56786.84	-77.221
21:00:26	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56773.49	-74.363
21:00:28	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56773.49	-77.221
21:00:30	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56759.37	-77.221
21:00:32	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56759.37	-74.363
21:00:34	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56742.34	-74.363
21:00:36	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56742.34	-80.080
21:00:38	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56734.98	-80.080
21:00:40	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56734.98	-77.221
21:00:42	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56750.62	-74.363
21:00:44	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56750.62	-77.221
21:00:46	60.0280	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56746.89	-80.080
21:00:48	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56746.89	-77.221
21:00:50	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56753.28	-77.221
21:00:52	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56753.28	-77.221
21:00:54	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56749.96	-77.221
21:00:56	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56749.96	-71.504
21:00:58	60.0240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56728.95	-68.635
21:01:00	60.0240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56728.95	-68.635
21:01:02	60.0240	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56723.32	-68.635
21:01:04	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56723.32	-71.504
21:01:06	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56715.22	-71.504
21:01:08	60.0260	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56715.22	-74.363
21:01:10	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56724.10	-71.504
21:01:12	60.0230	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56724.10	-65.777
21:01:14	60.0220	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56718.91	-62.918
21:01:16	60.0210	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56718.91	-60.060
21:01:18	60.0200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56704.99	-57.201
21:01:20	60.0180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56704.99	-51.484
21:01:22	60.0150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56708.48	-42.898
21:01:24	60.0130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56708.48	-37.181
21:01:26	60.0130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56730.45	-37.181
21:01:28	60.0130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56730.45	-37.181
21:01:30	60.0140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56720.16	-40.040
21:01:32	60.0140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56720.16	-40.040
21:01:34	60.0150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56711.63	-42.898
21:01:36	60.0170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56711.63	-48.615
21:01:38	60.0160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56708.66	-45.757
21:01:40	60.0160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56708.66	-45.757
21:01:42	60.0160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56706.61	-45.757
21:01:44	60.0150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56706.61	-42.898
21:01:46	60.0140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56716.55	-40.040

21:01:48	60.0130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56716.55	-37.181
21:01:50	60.0140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56705.83	-40.040
21:01:52	60.0180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56705.83	-51.484
21:01:54	60.0180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56696.39	-51.484
21:01:56	60.0180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56696.39	-51.484
21:01:58	60.0160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56670.62	-45.757
21:02:00	60.0170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56670.62	-48.615
21:02:02	60.0250	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56642.69	-71.504
21:02:04	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56642.69	-85.797
21:02:06	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56644.32	-91.524
21:02:08	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56644.32	-97.241
21:02:10	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56636.41	-94.383
21:02:12	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56636.41	-94.383
21:02:14	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56630.75	-94.383
21:02:16	60.0330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56630.75	-94.383
21:02:18	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56620.91	-97.241
21:02:20	60.0370	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56620.91	-105.816
21:02:22	60.0360	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56619.00	-102.958
21:02:24	60.0340	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56619.00	-97.241
21:02:26	60.0300	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56610.45	-85.797
21:02:28	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56610.45	-91.524
21:02:30	60.0310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56598.06	-88.655
21:02:32	60.0320	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56598.06	-91.524
21:02:34	60.0310	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56587.05	-88.655
21:02:36	60.0290	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56589.89	-82.938
21:02:38	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56589.89	-77.221
21:02:40	60.0270	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56589.89	-77.221
21:02:42	60.0230	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56581.13	-65.777
21:02:44	60.0220	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56581.13	-62.918
21:02:46	60.0200	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56587.69	-57.201
21:02:48	60.0180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56587.69	-51.484
21:02:50	60.0190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56605.20	-54.343
21:02:52	60.0180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56605.20	-51.484
21:02:54	60.0190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56592.78	-54.343
21:02:56	60.0190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56592.78	-54.343
21:02:58	60.0170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56586.05	-48.615
21:03:00	60.0160	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56586.05	-45.757
21:03:02	60.0170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56581.38	-48.615
21:03:04	60.0150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56581.38	-42.898
21:03:06	60.0140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56576.92	-40.040
21:03:08	60.0120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56576.92	-34.323
21:03:10	60.0110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56570.90	-31.465
21:03:12	60.0110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56570.90	-31.465
21:03:14	60.0110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56585.30	-31.465
21:03:16	60.0130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56585.30	-37.181
21:03:18	60.0130	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56579.29	-37.181

21:03:20	60.0120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56579.29	-34.323
21:03:22	60.0120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56575.29	-34.323
21:03:24	60.0120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56575.29	-34.323
21:03:26	60.0110	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56567.70	-31.465
21:03:28	60.0070	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56567.70	-20.020
21:03:30	60.0040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56566.86	-11.445
21:03:32	60.0010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56566.86	-2.858
21:03:34	59.9980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56567.80	5.717
21:03:36	59.9980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56567.80	5.717
21:03:38	59.9990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56565.92	2.858
21:03:40	60.0010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56565.92	-2.858
21:03:42	60.0020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56570.00	-5.717
21:03:44	60.0040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56570.00	-11.445
21:03:46	60.0060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56565.58	-17.161
21:03:48	60.0060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56565.58	-17.161
21:03:50	60.0060	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56557.96	-17.161
21:03:52	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56557.96	-14.303
21:03:54	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56538.89	-14.303
21:03:56	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56538.89	-14.303
21:03:58	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56537.92	-14.303
21:04:00	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56537.92	-14.303
21:04:02	60.0040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56544.36	-11.445
21:04:04	60.0040	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56544.36	-11.445
21:04:06	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56542.68	-14.303
21:04:08	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56542.68	-14.303
21:04:10	60.0050	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56554.31	-14.303
21:04:12	60.0020	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56554.31	-5.717
21:04:14	59.9990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56543.29	2.858
21:04:16	59.9960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56543.29	11.445
21:04:18	59.9980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56531.34	5.717
21:04:20	59.9990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56531.34	2.858
21:04:22	60.0010	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56542.45	-2.858
21:04:24	59.9990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56542.45	2.858
21:04:26	59.9980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56546.61	5.717
21:04:28	59.9980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56546.61	5.717
21:04:30	59.9980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56538.92	5.717
21:04:32	59.9970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56538.92	8.575
21:04:34	59.9960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56548.07	11.445
21:04:36	59.9950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56548.07	14.303
21:04:38	59.9930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56542.02	20.020
21:04:40	59.9930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56542.02	20.020
21:04:42	59.9930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56531.91	20.020
21:04:44	59.9950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56531.91	14.303
21:04:46	59.9950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56528.67	14.303
21:04:48	59.9960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56528.67	11.445
21:04:50	59.9950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56528.46	14.303

21:04:52	59.9930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56528.46	20.020
21:04:54	59.9900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56519.61	28.595
21:04:56	59.9880	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56519.61	34.323
21:04:58	59.9870	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56512.20	37.181
21:05:00	59.9870	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56512.20	37.181
21:05:02	59.9890	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56514.52	31.465
21:05:04	59.9910	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56514.52	25.737
21:05:06	59.9930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56508.47	20.020
21:05:08	59.9960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56508.47	11.445
21:05:10	59.9970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56512.15	8.575
21:05:12	59.9950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56512.15	14.303
21:05:14	59.9930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56508.86	20.020
21:05:16	59.9930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56508.86	20.020
21:05:18	59.9920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56503.34	22.878
21:05:20	59.9900	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56503.34	28.595
21:05:22	59.9890	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56510.09	31.465
21:05:24	59.9880	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56510.09	34.323
21:05:26	59.9860	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56514.67	40.040
21:05:28	59.9850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56514.67	42.898
21:05:30	59.9850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56501.90	42.898
21:05:32	59.9850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56501.90	42.898
21:05:34	59.9850	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56510.46	42.898
21:05:36	59.9830	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56510.46	48.615
21:05:38	59.9830	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56504.74	48.615
21:05:40	59.9810	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	56504.74	54.343

Date:	Monday, July 18, 2011				
Time of T(0)	20:50:40				
ne of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	20:54:00				
ue A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0084	Hz			
B Post-Perturbation Average Frequency [T(+12 to T(+24)]	59.8751	Hz			
Pre to Post Perturbation Delta Frequency Actual	-0.133	Hz			
re-Perturbation Average Interchange MW [T(-2) to T(-16)]	596.15	MW			
t-Perturbation Average Interchange MW [T(+12 to T(+24)]	0.00	MW			
Pre to Post Perturbation Interchange Delta MW Actual	-596.15	MW			
Net Total Adjustments	0.00	MW			
EPFR for FRO Pre-Perturbation Average	-23.95	MW			
EPFR for FRO Post-Perturbation Average	357.09	MW			
EPFR for FRO Delta	381.04	MW			
EPFR for FRO Adjusted	381.04	MW			
Pre JOU Dynamic Schedules MW	0.00		Pre-Perturbation Bias Setting	-653.000	MW/0.1 Hz
Pre Non-Conforming Load MW	0.00		Post-Perturbation Bias Setting	-653.000	MW/0.1 Hz
Pre Pumped Hydro MW	0.00		EPFR for Bias Setting Pre-Perturbation Average	-54.6898	MW
Pre Ramping Units MW	0.00		EPFR for Bias Setting Post-Perturbation Average	815.3177	MW
Pre Transferred Frequency Response MW	0.00		EPFR for Bias Setting Delta	870.0075	MW
Pre Contingent BA Lost Generation MW	0.00		Primary Frequency Response Delivery of Bias	-68.52%	
Sum of Pre Perturbation Adjustments	0.00				
Post JOU Dynamic Schedules MW	0.00		Pre-Perturbation BA Load	57050.256	MW
Post Non-Conforming Load MW	0.00		Post-Perturbation BA Load	56857.573	MW
Post Pumped Hydro MW	0.00		Pre to Post Perturbation BA Load Change	-192.683	MW
Post Ramping Units MW	0.00		Load Dampening Frequency Response	-144.622	MW/0.1 Hz
Post Transferred Frequency Response MW	0.00		Load Dampening % of Total BA Frequency Response	-32.32%	
Post Contingent BA Lost Generation MW	0.00				
Sum of Post Perturbation Adjustments	0.00				
Net Total Adjustments MW	0.00				

1 second Average Period Evaluation

Initial P.U. Performance for FRO	1.565	P.U.
Initial P.U. Performance Adjusted for FRO	1.565	P.U.

Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Frequency Response Obligation EPFR MW	Expected Net Actual Interchange MW

18 to 30 second Average Period Evalu

Initial P.U. Perfor
Initial P.U. Performance Ac

T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW
T-72 sec	20:49:28		
T-70 sec	20:49:30		
T-68 sec	20:49:32		

												T-66 sec	20:49:34			
												T-64 sec	20:49:36			
												T-62 sec	20:49:38			
												T-60 sec	20:49:40			
												T-58 sec	20:49:42			
												T-56 sec	20:49:44			
												T-54 sec	20:49:46			
												T-52 sec	20:49:48			
												T-50 sec	20:49:50			
												T-48 sec	20:49:52			
												T-46 sec	20:49:54			
												T-44 sec	20:49:56			
												T-42 sec	20:49:58			
												T-40 sec	20:50:00			
												T-38 sec	20:50:02			
												T-36 sec	20:50:04			
												T-34 sec	20:50:06			
												T-32 sec	20:50:08			
												T-30 sec	20:50:10			
												T-28 sec	20:50:12			
												T-26 sec	20:50:14			
												T-24 sec	20:50:16			
												T-22 sec	20:50:18			
												T-20 sec	20:50:20			
												T-18 sec	20:50:22			
60.008	596.150	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953		T-16 sec	20:50:24	60.008	596.150	0.000
60.008	596.150	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953		T-14 sec	20:50:26	60.008	596.150	0.000
60.008	596.150	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953		T-12 sec	20:50:28	60.008	596.150	0.000
60.008	596.150	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953		T-10 sec	20:50:30	60.008	596.150	0.000
60.008	596.150	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953		T-08 sec	20:50:32	60.008	596.150	0.000
60.008	596.150	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953		T-06 sec	20:50:34	60.008	596.150	0.000
60.008	596.150	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953		T-04 sec	20:50:36	60.008	596.150	0.000
60.008	596.150	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953		T-02 sec	20:50:38	60.008	596.150	0.000
													T+0 sec	20:50:40			
													T+02 sec	20:50:42			
													T+04 sec	20:50:44			
													T+06 sec	20:50:46			
													T+08 sec	20:50:48			
													T+10 sec	20:50:50			
59.875	0.000	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	56857.573	357.092	977.194	T+12 sec	20:50:52			
59.875	0.000	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	56857.573	357.092	977.194	T+14 sec	20:50:54			
59.875	0.000	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	56857.573	357.092	977.194	T+16 sec	20:50:56			
59.875	0.000	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	56857.573	357.092	977.194	T+18 sec	20:50:58	59.880	0.000	0.000
59.875	0.000	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	56857.573	357.092	977.194	T+20 sec	20:51:00	59.880	0.000	0.000
59.875	0.000	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	56857.573	357.092	977.194	T+22 sec	20:51:02	59.880	0.000	0.000
59.875	0.000	0.000	0.000		0.000	0.000	0.000	0.000	-653.000	56857.573	357.092	977.194	T+24 sec	20:51:04	59.880	0.000	0.000

T+26 sec	20:51:06	59.880	0.000	0.000
T+28 sec	20:51:08	59.880	0.000	0.000
T+30 sec	20:51:10	59.880	0.000	0.000
T+32 sec	20:51:12			
T+34 sec	20:51:14			
T+36 sec	20:51:16			
T+38 sec	20:51:18			
T+40 sec	20:51:20			
T+42 sec	20:51:22			
T+44 sec	20:51:24			
T+46 sec	20:51:26			
T+48 sec	20:51:28			
T+50 sec	20:51:30			
T+52 sec	20:51:32			
T+54 sec	20:51:34			
T+56 sec	20:51:36			
T+58 sec	20:51:38			
T+60 sec	20:51:40			
T+62 sec	20:51:42			
T+64 sec	20:51:44			
T+66 sec	20:51:46			
T+68 sec	20:51:48			
T+70 sec	20:51:50			
T+72 sec	20:51:52			
T+74 sec	20:51:54			
T+76 sec	20:51:56			
T+78 sec	20:51:58			
T+80 sec	20:52:00			

Date:	Monday, July 18, 2011				
Time of T(0)	20:50:40				
erturbation Hz	20:54:00				
T(-2) to T(-16)]	60.0084	Hz			
(+18 to T(+30)]	59.8799	Hz			
equency Actual	-0.129	Hz			
T(-2) to T(-16)]	596.15	MW			
(+18 to T(+30)]	0.00	MW			
elta MW Actual	-596.15	MW			
al Adjustments	0.00	MW			
bation Average	-23.95	MW			
bation Average	343.61	MW			
R for FRO Delta	367.56	MW			
r FRO Adjusted	367.56	MW			
Schedules MW	0.00		Pre-Perturbation Bias Setting	-653.000	MW/0.1 Hz
ming Load MW	0.00		Post-Perturbation Bias Setting	-653.000	MW/0.1 Hz
ped Hydro MW	0.00		EPFR for Bias Setting Pre-Perturbation Average	-54.6898	MW
ping Units MW	0.00		EPFR for Bias Setting Post-Perturbation Average	784.5325	MW
Response MW	0.00		EPFR for Bias Setting Delta	839.2223	MW
ieneration MW	0.00		Primary Frequency Response Delivery of Bias	-71.04%	
n Adjustments	0.00				
Schedules MW	0.00		Pre-Perturbation BA Load	57050.256	MW
ming Load MW	0.00		Post-Perturbation BA Load	56872.132	MW
ped Hydro MW	0.00		Pre to Post Perturbation BA Load Change	-178.124	MW
ping Units MW	0.00		Load Dampening Frequency Response	-138.598	MW/0.1 Hz
Response MW	0.00		Load Dampening % of Total BA Frequency Response	-29.88%	
ieneration MW	0.00				
n Adjustments	0.00				
justments MW	0.00				

Date:	Monday, July 18, 2011				
Time of T(0)	20:50:40				
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	20:54:00				
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0084				
Value B Post-Perturbation Average Frequency [T(+20 to T(+40)]	59.8802				
Pre to Post Perturbation Delta Frequency Actual	-0.128				
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	596.15				
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+40)]	0.00				
Pre to Post Perturbation Interchange Delta MW Actual	-596.15				
Net Total Adjustments	0.00				
EPFR for FRO Pre-Perturbation Average	-23.95				
EPFR for FRO Post-Perturbation Average	342.68				
EPFR for FRO Delta	366.63				
EPFR for FRO Adjusted	366.63				
Pre JOU Dynamic Schedules MW	0.00				
Pre Non-Conforming Load MW	0.00				
Pre Pumped Hydro MW	0.00				
Pre Ramping Units MW	0.00				
Pre Transferred Frequency Response MW	0.00				
Pre Contingent BA Lost Generation MW	0.00				
Sum of Pre Perturbation Adjustments	0.00				
Post JOU Dynamic Schedules MW	0.00				
Post Non-Conforming Load MW	0.00				
Post Pumped Hydro MW	0.00				
Post Ramping Units MW	0.00				
Post Transferred Frequency Response MW	0.00				
Post Contingent BA Lost Generation MW	0.00				
Sum of Post Perturbation Adjustments	0.00				
Net Total Adjustments MW	0.00				

uation

mance for FRO	1.622	P.U.
djusted for FRO	1.622	P.U.

20 to 40 second Average Period Evaluation

Initial P.U. Performance for FRO	1.626	
Initial P.U. Performance Adjusted for FRO	1.626	

Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Frequency Response Obligation EPFR MW	Expected Net Actual Interchange MW

T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW
T-72 sec	20:49:28				
T-70 sec	20:49:30				
T-68 sec	20:49:32				

								T-66 sec	20:49:34								
								T-64 sec	20:49:36								
								T-62 sec	20:49:38								
								T-60 sec	20:49:40								
								T-58 sec	20:49:42								
								T-56 sec	20:49:44								
								T-54 sec	20:49:46								
								T-52 sec	20:49:48								
								T-50 sec	20:49:50								
								T-48 sec	20:49:52								
								T-46 sec	20:49:54								
								T-44 sec	20:49:56								
								T-42 sec	20:49:58								
								T-40 sec	20:50:00								
								T-38 sec	20:50:02								
								T-36 sec	20:50:04								
								T-34 sec	20:50:06								
								T-32 sec	20:50:08								
								T-30 sec	20:50:10								
								T-28 sec	20:50:12								
								T-26 sec	20:50:14								
								T-24 sec	20:50:16								
								T-22 sec	20:50:18								
								T-20 sec	20:50:20								
								T-18 sec	20:50:22								
0.000	0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953	T-16 sec	20:50:24	60.008	596.150	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953	T-14 sec	20:50:26	60.008	596.150	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953	T-12 sec	20:50:28	60.008	596.150	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953	T-10 sec	20:50:30	60.008	596.150	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953	T-08 sec	20:50:32	60.008	596.150	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953	T-06 sec	20:50:34	60.008	596.150	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953	T-04 sec	20:50:36	60.008	596.150	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	57050.256	-23.953	T-02 sec	20:50:38	60.008	596.150	0.000	0.000	0.000			
								T+0 sec	20:50:40								
								T+02 sec	20:50:42								
								T+04 sec	20:50:44								
								T+06 sec	20:50:46								
								T+08 sec	20:50:48								
								T+10 sec	20:50:50								
								T+12 sec	20:50:52								
								T+14 sec	20:50:54								
								T+16 sec	20:50:56								
0.000	0.000	0.000	0.000	0.000	-653.000	56872.132	343.608	963.711	T+18 sec	20:50:58							
0.000	0.000	0.000	0.000	0.000	-653.000	56872.132	343.608	963.711	T+20 sec	20:51:00	59.880	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	56872.132	343.608	963.711	T+22 sec	20:51:02	59.880	0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	-653.000	56872.132	343.608	963.711	T+24 sec	20:51:04	59.880	0.000	0.000	0.000			

0.000	0.000	0.000	0.000	0.000	-653.000	56872.132	343.608	963.711	T+26 sec	20:51:06	59.880	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	-653.000	56872.132	343.608	963.711	T+28 sec	20:51:08	59.880	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	-653.000	56872.132	343.608	963.711	T+30 sec	20:51:10	59.880	0.000	0.000	0.000	0.000
									T+32 sec	20:51:12	59.880	0.000	0.000	0.000	0.000
									T+34 sec	20:51:14	59.880	0.000	0.000	0.000	0.000
									T+36 sec	20:51:16	59.880	0.000	0.000	0.000	0.000
									T+38 sec	20:51:18	59.880	0.000	0.000	0.000	0.000
									T+40 sec	20:51:20	59.880	0.000	0.000	0.000	0.000
									T+42 sec	20:51:22					
									T+44 sec	20:51:24					
									T+46 sec	20:51:26					
									T+48 sec	20:51:28					
									T+50 sec	20:51:30					
									T+52 sec	20:51:32					
									T+54 sec	20:51:34					
									T+56 sec	20:51:36					
									T+58 sec	20:51:38					
									T+60 sec	20:51:40					
									T+62 sec	20:51:42					
									T+64 sec	20:51:44					
									T+66 sec	20:51:46					
									T+68 sec	20:51:48					
									T+70 sec	20:51:50					
									T+72 sec	20:51:52					
									T+74 sec	20:51:54					
									T+76 sec	20:51:56					
									T+78 sec	20:51:58					
									T+80 sec	20:52:00					

			Date:	Monday, July 18, 2011	
			Time of T(0)	20:50:40	
			Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	20:54:00	
Hz			Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0084	Hz
Hz			Value B Post-Perturbation Average Frequency [T(+18 to T(+52)]	59.8804	Hz
Hz			Pre to Post Perturbation Delta Frequency Actual	-0.128	Hz
MW			Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	596.15	MW
MW			Value B Post-Perturbation Average Interchange MW [T(+18 to T(+52)]	0.00	MW
MW			Pre to Post Perturbation Interchange Delta MW Actual	-596.15	MW
MW			Net Total Adjustments	0.00	MW
MW			EPFR for FRO Pre-Perturbation Average	-23.95	MW
MW			EPFR for FRO Post-Perturbation Average	341.93	MW
MW			EPFR for FRO Delta	365.88	MW
MW			EPFR for FRO Adjusted	365.88	MW
MW	Pre-Perturbation Bias Setting	-653.000 MW/0.1 Hz	Pre JOU Dynamic Schedules MW	0.00	MW
MW	Post-Perturbation Bias Setting	-653.000 MW/0.1 Hz	Pre Non-Conforming Load MW	0.00	MW
MW	EPFR for Bias Setting Pre-Perturbation Average	-54.6898 MW	Pre Pumped Hydro MW	0.00	MW EPFR
MW	EPFR for Bias Setting Post-Perturbation Average	782.4109 MW	Pre Ramping Units MW	0.00	MW EPFR
MW	EPFR for Bias Setting Delta	837.1008 MW	Pre Transferred Frequency Response MW	0.00	MW
MW	Primary Frequency Response Delivery of Bias	-71.22%	Pre Contingent BA Lost Generation MW	0.00	MW Pri
MW			Sum of Pre Perturbation Adjustments	0.00	MW
MW	Pre-Perturbation BA Load	57050.256 MW	Post JOU Dynamic Schedules MW	0.00	MW
MW	Post-Perturbation BA Load	56878.664 MW	Post Non-Conforming Load MW	0.00	MW
MW	Pre to Post Perturbation BA Load Change	-171.591 MW	Post Pumped Hydro MW	0.00	MW
MW	Load Dampening Frequency Response	-133.854 MW/0.1 Hz	Post Ramping Units MW	0.00	MW
MW	Load Dampening % of Total BA Frequency Response	-28.78%	Post Transferred Frequency Response MW	0.00	MW Load Dam
MW			Post Contingent BA Lost Generation MW	0.00	MW
MW			Sum of Post Perturbation Adjustments	0.00	MW
MW			Net Total Adjustments MW	0.00	MW

18 to 52 second Average Period Evaluation

P.U.	Initial P.U. Performance for FRO	1.629	P.U.
P.U.	Initial P.U. Performance Adjusted for FRO	1.629	P.U.

Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Frequency Response Obligation EPFR MW	Expected Net Actual Interchange MW	T		Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz
							T-72 sec	20:49:28							
							T-70 sec	20:49:30							
							T-68 sec	20:49:32							

							T-66 sec	20:49:34							
							T-64 sec	20:49:36							
							T-62 sec	20:49:38							
							T-60 sec	20:49:40							
							T-58 sec	20:49:42							
							T-56 sec	20:49:44							
							T-54 sec	20:49:46							
							T-52 sec	20:49:48							
							T-50 sec	20:49:50							
							T-48 sec	20:49:52							
							T-46 sec	20:49:54							
							T-44 sec	20:49:56							
							T-42 sec	20:49:58							
							T-40 sec	20:50:00							
							T-38 sec	20:50:02							
							T-36 sec	20:50:04							
							T-34 sec	20:50:06							
							T-32 sec	20:50:08							
							T-30 sec	20:50:10							
							T-28 sec	20:50:12							
							T-26 sec	20:50:14							
							T-24 sec	20:50:16							
							T-22 sec	20:50:18							
							T-20 sec	20:50:20							
							T-18 sec	20:50:22							
0.000	0.000	0.000	-653.000	57050.256	-23.953		T-16 sec	20:50:24	60.008	596.150	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	57050.256	-23.953		T-14 sec	20:50:26	60.008	596.150	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	57050.256	-23.953		T-12 sec	20:50:28	60.008	596.150	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	57050.256	-23.953		T-10 sec	20:50:30	60.008	596.150	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	57050.256	-23.953		T-08 sec	20:50:32	60.008	596.150	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	57050.256	-23.953		T-06 sec	20:50:34	60.008	596.150	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	57050.256	-23.953		T-04 sec	20:50:36	60.008	596.150	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	57050.256	-23.953		T-02 sec	20:50:38	60.008	596.150	0.000	0.000	0.000	0.000	0.000
							T+0 sec	20:50:40							
							T+02 sec	20:50:42							
							T+04 sec	20:50:44							
							T+06 sec	20:50:46							
							T+08 sec	20:50:48							
							T+10 sec	20:50:50							
							T+12 sec	20:50:52							
							T+14 sec	20:50:54							
							T+16 sec	20:50:56							
							T+18 sec	20:50:58	59.880	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+20 sec	20:51:00	59.880	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+22 sec	20:51:02	59.880	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+24 sec	20:51:04	59.880	0.000	0.000	0.000	0.000	0.000	0.000

0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+26 sec	20:51:06	59.880	0.000	0.000	0.000		0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+28 sec	20:51:08	59.880	0.000	0.000	0.000		0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+30 sec	20:51:10	59.880	0.000	0.000	0.000		0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+32 sec	20:51:12	59.880	0.000	0.000	0.000		0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+34 sec	20:51:14	59.880	0.000	0.000	0.000		0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+36 sec	20:51:16	59.880	0.000	0.000	0.000		0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+38 sec	20:51:18	59.880	0.000	0.000	0.000		0.000	0.000	0.000
0.000	0.000	0.000	-653.000	56878.664	342.679	962.782	T+40 sec	20:51:20	59.880	0.000	0.000	0.000		0.000	0.000	0.000
							T+42 sec	20:51:22	59.880	0.000	0.000	0.000		0.000	0.000	0.000
							T+44 sec	20:51:24	59.880	0.000	0.000	0.000		0.000	0.000	0.000
							T+46 sec	20:51:26	59.880	0.000	0.000	0.000		0.000	0.000	0.000
							T+48 sec	20:51:28	59.880	0.000	0.000	0.000		0.000	0.000	0.000
							T+50 sec	20:51:30	59.880	0.000	0.000	0.000		0.000	0.000	0.000
							T+52 sec	20:51:32	59.880	0.000	0.000	0.000		0.000	0.000	0.000
							T+54 sec	20:51:34								
							T+56 sec	20:51:36								
							T+58 sec	20:51:38								
							T+60 sec	20:51:40								
							T+62 sec	20:51:42								
							T+64 sec	20:51:44								
							T+66 sec	20:51:46								
							T+68 sec	20:51:48								
							T+70 sec	20:51:50								
							T+72 sec	20:51:52								
							T+74 sec	20:51:54								
							T+76 sec	20:51:56								
							T+78 sec	20:51:58								
							T+80 sec	20:52:00								

Date:	Monday, July 18, 2011	
Time of T(0)	20:50:40	
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	20:54:00	
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0084	Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.8807	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.128	Hz
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	596.15	MW
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	0.00	MW
Pre to Post Perturbation Interchange Delta MW Actual	-596.15	MW
Net Total Adjustments	0.00	MW
EPFR for FRO Pre-Perturbation Average	-23.95	MW
EPFR for FRO Post-Perturbation Average	341.18	MW
EPFR for FRO Delta	365.13	MW
EPFR for FRO Adjusted	365.13	MW
Pre JOU Dynamic Schedules MW	0.00	MW
Pre Non-Conforming Load MW	0.00	MW
Pre Pumped Hydro MW	0.00	MW
Pre Ramping Units MW	0.00	MW
Pre Transferred Frequency Response MW	0.00	MW
Pre Contingent BA Lost Generation MW	0.00	MW
Sum of Pre Perturbation Adjustments	0.00	MW
Post JOU Dynamic Schedules MW	0.00	MW
Post Non-Conforming Load MW	0.00	MW
Post Pumped Hydro MW	0.00	MW
Post Ramping Units MW	0.00	MW
Post Transferred Frequency Response MW	0.00	MW
Post Contingent BA Lost Generation MW	0.00	MW
Sum of Post Perturbation Adjustments	0.00	MW
Net Total Adjustments MW	0.00	MW

Pre-Perturbation Bias Setting	-653.000	MW/0.1 Hz
Post-Perturbation Bias Setting	-653.000	MW/0.1 Hz
for Bias Setting Pre-Perturbation Average	-54.6898	MW
for Bias Setting Post-Perturbation Average	780.6965	MW
EPFR for Bias Setting Delta	835.3864	MW
mary Frequency Response Delivery of Bias	-71.36%	
Pre-Perturbation BA Load	57050.256	MW
Post-Perturbation BA Load	56882.859	MW
Pre to Post Perturbation BA Load Change	-167.397	MW
Load Dampening Frequency Response	-130.850	MW/0.1 Hz
ipening % of Total BA Frequency Response	-28.08%	

20 to 52 second Average Period Evaluation

Initial P.U. Performance for FRO	1.633	P.U.
Initial P.U. Performance Adjusted for FRO	1.633	P.U.

Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Frequency Response Obligation EPFR MW	Expected Net Actual Interchange MW	T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW
					T-72 sec	20:49:28							
					T-70 sec	20:49:30							
					T-68 sec	20:49:32							

					T-66 sec	20:49:34								
					T-64 sec	20:49:36								
					T-62 sec	20:49:38								
					T-60 sec	20:49:40								
					T-58 sec	20:49:42								
					T-56 sec	20:49:44								
					T-54 sec	20:49:46								
					T-52 sec	20:49:48								
					T-50 sec	20:49:50								
					T-48 sec	20:49:52								
					T-46 sec	20:49:54								
					T-44 sec	20:49:56								
					T-42 sec	20:49:58								
					T-40 sec	20:50:00								
					T-38 sec	20:50:02								
					T-36 sec	20:50:04								
					T-34 sec	20:50:06								
					T-32 sec	20:50:08								
					T-30 sec	20:50:10								
					T-28 sec	20:50:12								
					T-26 sec	20:50:14								
					T-24 sec	20:50:16								
					T-22 sec	20:50:18								
					T-20 sec	20:50:20								
					T-18 sec	20:50:22								
0.000	-653.000	57050.256	-23.953		T-16 sec	20:50:24	60.008	596.150	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	57050.256	-23.953		T-14 sec	20:50:26	60.008	596.150	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	57050.256	-23.953		T-12 sec	20:50:28	60.008	596.150	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	57050.256	-23.953		T-10 sec	20:50:30	60.008	596.150	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	57050.256	-23.953		T-08 sec	20:50:32	60.008	596.150	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	57050.256	-23.953		T-06 sec	20:50:34	60.008	596.150	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	57050.256	-23.953		T-04 sec	20:50:36	60.008	596.150	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	57050.256	-23.953		T-02 sec	20:50:38	60.008	596.150	0.000	0.000	0.000	0.000	0.000	0.000
					T+0 sec	20:50:40								
					T+02 sec	20:50:42								
					T+04 sec	20:50:44								
					T+06 sec	20:50:46								
					T+08 sec	20:50:48								
					T+10 sec	20:50:50								
					T+12 sec	20:50:52								
					T+14 sec	20:50:54								
					T+16 sec	20:50:56								
0.000	-653.000	56882.859	341.928	962.031	T+18 sec	20:50:58								
0.000	-653.000	56882.859	341.928	962.031	T+20 sec	20:51:00	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+22 sec	20:51:02	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+24 sec	20:51:04	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000

0.000	-653.000	56882.859	341.928	962.031	T+26 sec	20:51:06	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+28 sec	20:51:08	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+30 sec	20:51:10	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+32 sec	20:51:12	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+34 sec	20:51:14	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+36 sec	20:51:16	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+38 sec	20:51:18	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+40 sec	20:51:20	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+42 sec	20:51:22	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+44 sec	20:51:24	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+46 sec	20:51:26	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+48 sec	20:51:28	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+50 sec	20:51:30	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	-653.000	56882.859	341.928	962.031	T+52 sec	20:51:32	59.881	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					T+54 sec	20:51:34								
					T+56 sec	20:51:36								
					T+58 sec	20:51:38								
					T+60 sec	20:51:40								
					T+62 sec	20:51:42								
					T+64 sec	20:51:44								
					T+66 sec	20:51:46								
					T+68 sec	20:51:48								
					T+70 sec	20:51:50								
					T+72 sec	20:51:52								
					T+74 sec	20:51:54								
					T+76 sec	20:51:56								
					T+78 sec	20:51:58								
					T+80 sec	20:52:00								

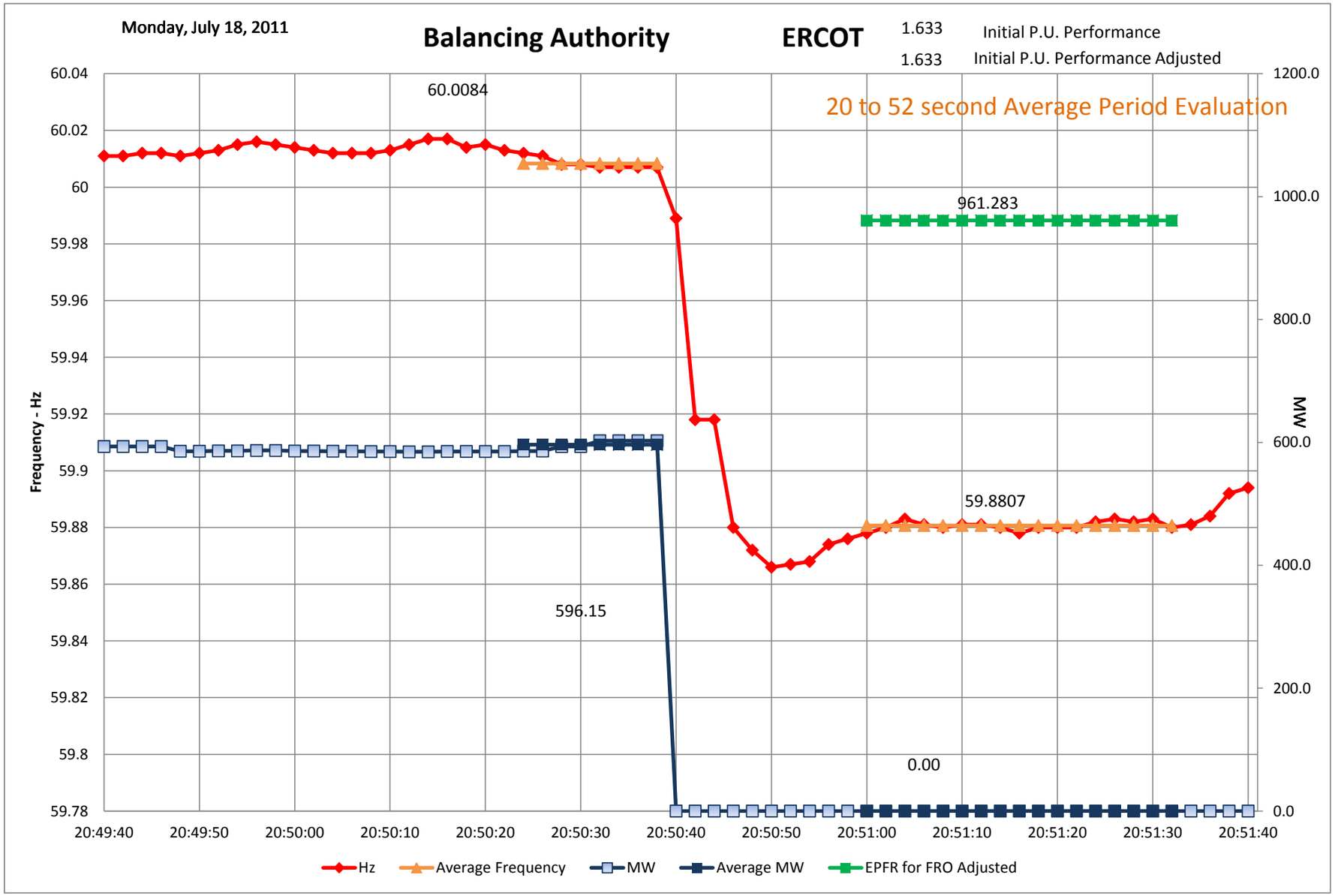
erturbation Bias Setting	-653.000	MW/0.1 Hz
erturbation Bias Setting	-653.000	MW/0.1 Hz
e-Perturbation Average	-54.6898	MW
it-Perturbation Average	778.9891	MW
FR for Bias Setting Delta	833.6789	MW
esponse Delivery of Bias	-71.51%	

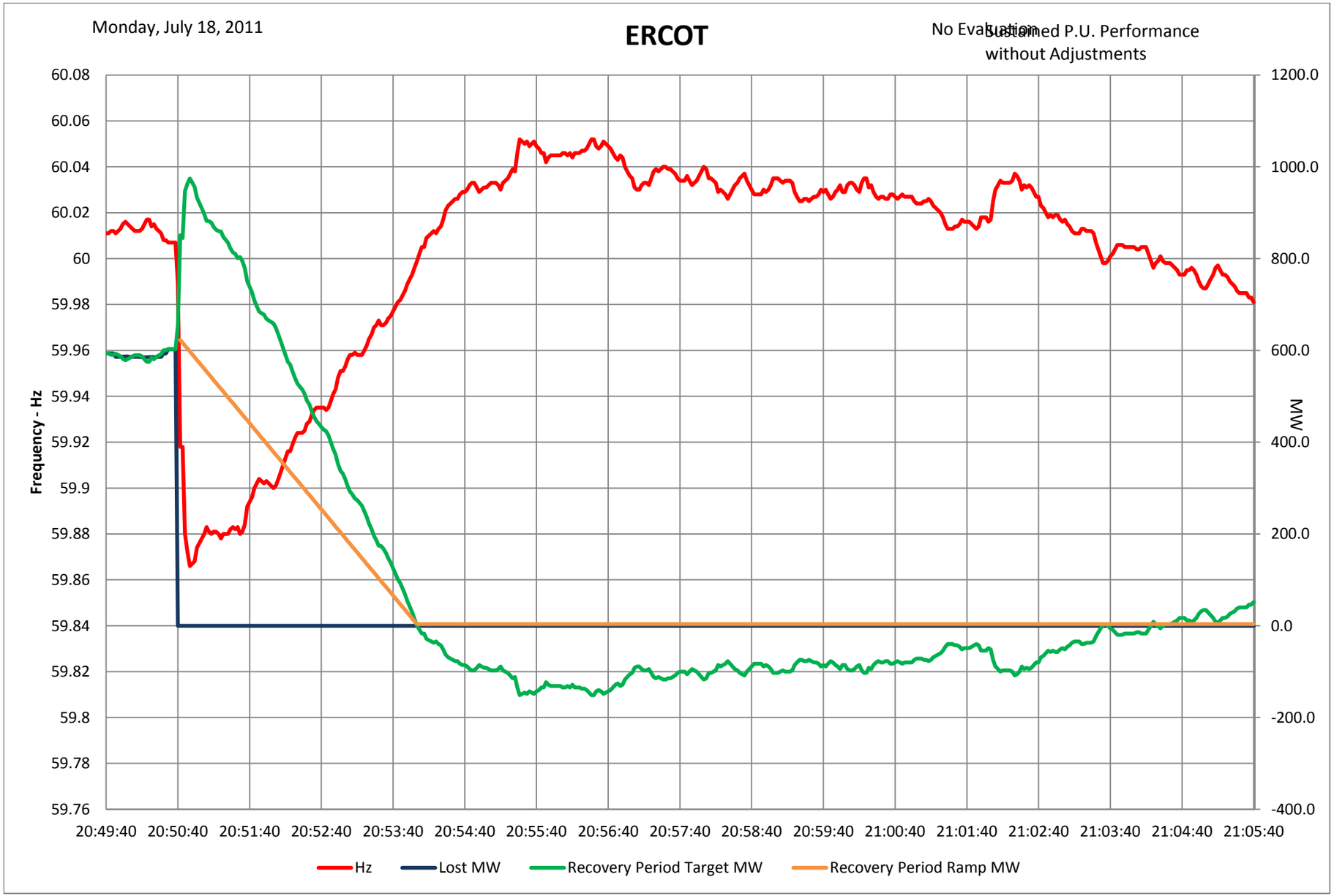
e-Perturbation BA Load	57050.256	MW
it-Perturbation BA Load	56884.002	MW
bation BA Load Change	-166.254	MW
ng Frequency Response	-130.223	MW/0.1 Hz
BA Frequency Response	-27.89%	

BA Bias Setting	BA Load	Frequency Response Obligation EPFR	Expected Net Actual Interchange
MW/0.1 Hz	MW	MW	MW

-653.000	57050.256	-23.953	
-653.000	57050.256	-23.953	
-653.000	57050.256	-23.953	
-653.000	57050.256	-23.953	
-653.000	57050.256	-23.953	
-653.000	57050.256	-23.953	
-653.000	57050.256	-23.953	
-653.000	57050.256	-23.953	
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283

-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283
-653.000	56884.002	341.181	961.283


Monday, July 18, 2011
Balancing Authority
ERCOT
1.633 Initial P.U. Performance
1.633 Initial P.U. Performance Adjusted
20 to 52 second Average Period Evaluation
60.0084
961.283
59.8807
596.15
0.00
Frequency - Hz
MW
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
20:49:40
20:49:50
20:50:00
20:50:10
20:50:20
20:50:30
20:50:40
20:50:50
20:51:00
20:51:10
20:51:20
20:51:30
20:51:40
Hz
Average Frequency
MW
Average MW
EPFR for FRO Adjusted


Monday, July 18, 2011
ERCOT
No Evaluation
Sustained P.U. Performance
without Adjustments
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
20:49:40
20:50:40
20:51:40
20:52:40
20:53:40
20:54:40
20:55:40
20:56:40
20:57:40
20:58:40
20:59:40
21:00:40
21:01:40
21:02:40
21:03:40
21:04:40
21:05:40
Hz
Lost MW
Recovery Period Target MW
Recovery Period Ramp MW

Date	A Point Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz
Monday, July 18, 2011	20:50:38	60.0070	60.0084	20:50:40	59.8660

Interconnection Performance

Value B 12 to 24 sec Average Frequency	FR B 12 to 24 sec Average MW	Value B 18 to 30 sec Average Frequency	FR B 18 to 30 sec Average MW	Value B 20 to 40 sec Average Frequency	FR B 20 to 40 sec Average MW	Value B 18 to 52 sec Average Frequency	FR B 18 to 52 sec Average MW	Value B 20 to 52 sec Average Frequency	FR B 20 to 52 sec Average MW
59.8751428	-448.21208	59.8798572	-463.9878	59.8807061	-465.09106	59.8804446	-466.08657	59.8807061	-467.01245

Value A Data BA Performance

Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW
60.008375	596.15	0.00	0.00	0.00	0.00	0.00	0.00	-653	57050.26	-54.6898

Value B 12 to 24 second Average Period Evaluation

Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a
59.875143	0.00	0.00	0.00	0.00	0.00	0.00

Value B 18 to 30 second Average Period Evaluation

Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.
0.00	1.565	1.565	No Evaluation	-653	56857.57	815.3177	59.879857	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.622

Value B

20 to 40 second Average Period Evaluation

Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.
1.622	No Evaluation	-653	56872.13	784.5325	59.880182	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.626	1.626	No Evaluation

Value B

18 to 52 second Average Period Evaluation

Value B

BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz
-653	56878.66	782.4109	59.880445	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.629	1.629	No Evaluation	-653	56882.86	780.6965	59.880706

20 to 52 second Average Period Evaluation

Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.633	1.633	No Evaluation	-653	56884	778.9891

Steps **To be completed for each event evaluated.**

1 Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order:
Column A: Date and Time in this format, mm/dd/yy HH:MM:SS
Column B: Frequency Hz
Column C: Total Lost Generation: enter the MW data of the units that tripped as a single generator where the value typically goes to zero at t(0).
Column D: not applicable
Column E: Non Conforming Load
Column F: Pumped Hydro
Column G: not applicable
Column H: not applicable
Column I: not applicable
Column J: BA Bias Setting
Column K: BA Load

2 Note: Columns D, E, F, G and H are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.

3 Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.

4 Data must be at 3 second sample rate for the full 25 minute minimum collection period that starts a minimum of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event.
The spreadsheet will work with larger sample size data.
If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data. The data must be numbers not text.

5 Once data is in place in the "Data" worksheet, determine when the beginning of the event occurred. This is accomplished by knowing the UTC event time from the master event list.
Convert the UTC event time to your PI data time and then scroll through the Data worksheet column B data of frequency and observe when frequency moves from the normal, pre-event frequency.
This will usually be a single change in frequency of 0.008 to 0.010 Hz more or less. Note the row number in the worksheet that this change occurs. In this sample data spreadsheet this occurs in row 313 of the data.

6 Edit cell "C8" of the "Entry Data" worksheet, change the formula in the cell "C8" to reference the row number identified in step 5 above. In the sample data of this workbook this formula is: "=Data!A313"

7 Determine the end of the event to be evaluated. Use the same rules that are used for DCS only look at frequency instead of ACE. Scroll down the frequency data in column B of the "Data" worksheet until frequency reaches 60 Hz or the pre-disturbance value. Note the row number in the worksheet that this occurs. In this sample data spreadsheet this occurs in row 424.

8 Edit cell "C11" of the "Entry Data" worksheet, change the formula in the cell "C11" to reference the row number identified in step 7 above. In the sample data of this workbook this formula is: "=Data!A424"

9 Skip for single BA Interconnections.

10 Use the "copy" button provided to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data" of this workbook.
Use PasteSpecial/Values when pasting the data into FRS Form 1 on the appropriate event row.

Steps **To be completed once at the initial setup of the evaluation spreadsheet for your BA.**

A Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Entry Data" worksheet. For example: "NYISO".

B Enter your Balancing Authorities Frequency Response Obligation in cell "B2" of the "Entry Data" worksheet. For example: -80 MW/0.1 Hz (This value could change annually)

Note: For ease of use, only the necessary worksheets are displayed. If you are interested in viewing graphs and other hidden worksheets, select the "tab" at the bottom, right click, select unhide and select the worksheet you wish to unhide.

mm/dd/yy hh:mm:ss Time (T)	Frequency Hz	Total Lost Generation MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	BA Bias Setting MW/0.1 Hz	BA Load MW	LaaR Tripped
10/12/09 02:12:00	59.980999	633		351.3615112	0				-420	7500	0
10/12/09 02:12:03	59.9799995	633		351.3615112	0				-420	7500.33	
10/12/09 02:12:06	59.9819984	633		351.3615112	0				-420	7500.66	
10/12/09 02:12:09	59.980999	633		357.9475098	0				-420	7500.99	
10/12/09 02:12:12	59.980999	633		357.9475098	0				-420	7501.32	
10/12/09 02:12:15	59.9819984	633		357.9475098	0				-420	7501.65	
10/12/09 02:12:18	59.9790001	633		357.9475098	0				-420	7501.98	
10/12/09 02:12:21	59.9799995	633		357.9475098	0				-420	7502.31	
10/12/09 02:12:24	59.9830017	633		360.2347412	0				-420	7502.64	
10/12/09 02:12:27	59.9860001	633		360.2347412	0				-420	7502.97	
10/12/09 02:12:30	59.9799995	633		360.2347412	0				-420	7503.3	
10/12/09 02:12:33	59.9760017	633		360.2347412	0				-420	7503.63	
10/12/09 02:12:36	59.9790001	633		360.2347412	0				-420	7503.96	
10/12/09 02:12:39	59.980999	633		346.5258789	0				-420	7504.29	
10/12/09 02:12:42	59.9869995	633		346.5258789	0				-420	7504.62	
10/12/09 02:12:45	59.9900017	633		346.5258789	0				-420	7504.95	
10/12/09 02:12:48	59.9939995	633		346.5258789	0				-420	7505.28	
10/12/09 02:12:51	59.9949989	633		346.5258789	0				-420	7505.61	
10/12/09 02:12:54	59.9949989	633		296.4433594	0				-420	7505.94	
10/12/09 02:12:57	59.9949989	633		296.4433594	0				-420	7506.27	
10/12/09 02:13:00	59.9939995	633		296.4433594	0				-420	7506.6	
10/12/09 02:13:03	59.9939995	633		296.4433594	0				-420	7506.93	
10/12/09 02:13:06	59.9970016	633		296.4433594	0				-420	7507.26	
10/12/09 02:13:09	60.0009995	633		341.0611572	0				-420	7507.59	
10/12/09 02:13:12	60.0009995	633		341.0611572	0				-420	7507.92	
10/12/09 02:13:15	60.0029984	633		341.0611572	0				-420	7508.25	
10/12/09 02:13:18	60.0050011	633		341.0611572	0				-420	7508.58	
10/12/09 02:13:21	60.0029984	633		341.0611572	0				-420	7508.91	
10/12/09 02:13:24	60.0009995	633		322.8262939	0				-420	7509.24	
10/12/09 02:13:27	60.0029984	633		322.8262939	0				-420	7509.57	
10/12/09 02:13:30	60.0050011	633		322.8262939	0				-420	7509.9	
10/12/09 02:13:33	60.0009995	633		322.8262939	0				-420	7510.23	
10/12/09 02:13:36	60.0009995	633		322.8262939	0				-420	7510.56	
10/12/09 02:13:39	60.0040016	633		321.5444031	0				-420	7510.89	
10/12/09 02:13:42	60.0040016	633		321.5444031	0				-420	7511.22	
10/12/09 02:13:45	60.0040016	633		321.5444031	0				-420	7511.55	
10/12/09 02:13:48	60.0029984	633		321.5444031	0				-420	7511.88	
10/12/09 02:13:51	60.0019989	633		321.5444031	0				-420	7512.21	
10/12/09 02:13:54	60.0009995	633		362.136261	0				-420	7512.54	
10/12/09 02:13:57	59.9990005	633		362.136261	0				-420	7512.87	
10/12/09 02:14:00	59.9970016	633		362.136261	0				-420	7513.2	
10/12/09 02:14:03	59.9980011	633		362.136261	0				-420	7513.53	
10/12/09 02:14:06	59.9949989	633		362.136261	0				-420	7513.86	
10/12/09 02:14:09	59.993	633		336.3117981	0				-420	7514.19	

10/12/09 02:14:12	59.9959984	633	336.3117981	0	-420	7514.52
10/12/09 02:14:15	59.9990005	633	336.3117981	0	-420	7514.85
10/12/09 02:14:18	60.0050011	633	336.3117981	0	-420	7515.18
10/12/09 02:14:21	60.007	633	336.3117981	0	-420	7515.51
10/12/09 02:14:24	60.0050011	633	316.4430542	0	-420	7515.84
10/12/09 02:14:27	60.0019989	633	316.4430542	0	-420	7516.17
10/12/09 02:14:30	59.9970016	633	316.4430542	0	-420	7516.5
10/12/09 02:14:33	59.9990005	633	316.4430542	0	-420	7516.83
10/12/09 02:14:36	60.007	633	316.4430542	0	-420	7517.16
10/12/09 02:14:39	60.0099983	633	325.4642944	0	-420	7517.49
10/12/09 02:14:42	60.0089989	633	325.4642944	0	-420	7517.82
10/12/09 02:14:45	60.0029984	633	325.4642944	0	-420	7518.15
10/12/09 02:14:48	59.9949989	633	325.4642944	0	-420	7518.48
10/12/09 02:14:51	59.9939995	633	325.4642944	0	-420	7518.81
10/12/09 02:14:54	60	633	336.6141663	0	-420	7519.14
10/12/09 02:14:57	60.0009995	633	336.6141663	0	-420	7519.47
10/12/09 02:15:00	59.9980011	633	336.6141663	0	-420	7519.8
10/12/09 02:15:03	59.9949989	633	336.6141663	0	-420	7520.13
10/12/09 02:15:06	59.9860001	633	336.6141663	0	-420	7520.46
10/12/09 02:15:09	59.9860001	633	316.7261658	0	-420	7520.79
10/12/09 02:15:12	59.987999	633	316.7261658	0	-420	7521.12
10/12/09 02:15:15	59.9889984	633	316.7261658	0	-420	7521.45
10/12/09 02:15:18	59.9869995	633	316.7261658	0	-420	7521.78
10/12/09 02:15:21	59.9850006	633	316.7261658	0	-420	7522.11
10/12/09 02:15:24	59.9830017	633	320.1955261	0	-420	7522.44
10/12/09 02:15:27	59.9819984	633	320.1955261	0	-420	7522.77
10/12/09 02:15:30	59.9840012	633	320.1955261	0	-420	7523.1
10/12/09 02:15:33	59.9850006	633	320.1955261	0	-420	7523.43
10/12/09 02:15:36	59.9869995	633	320.1955261	0	-420	7523.76
10/12/09 02:15:39	59.9900017	633	341.8661499	0	-420	7524.09
10/12/09 02:15:42	59.9869995	633	341.8661499	0	-420	7524.42
10/12/09 02:15:45	59.9830017	633	341.8661499	0	-420	7524.75
10/12/09 02:15:48	59.9790001	633	341.8661499	0	-420	7525.08
10/12/09 02:15:51	59.9830017	633	341.8661499	0	-420	7525.41
10/12/09 02:15:54	59.9860001	633	348.5978394	0	-420	7525.74
10/12/09 02:15:57	59.987999	633	348.5978394	0	-420	7526.07
10/12/09 02:16:00	59.9830017	633	348.5978394	0	-420	7526.4
10/12/09 02:16:03	59.9780006	633	348.5978394	0	-420	7526.73
10/12/09 02:16:06	59.9790001	633	348.5978394	0	-420	7527.06
10/12/09 02:16:09	59.9889984	633	329.085022	0	-420	7527.39
10/12/09 02:16:12	59.987999	633	329.085022	0	-420	7527.72
10/12/09 02:16:15	59.9830017	633	329.085022	0	-420	7528.05
10/12/09 02:16:18	59.9910011	633	329.085022	0	-420	7528.38
10/12/09 02:16:21	59.9889984	633	329.085022	0	-420	7528.71
10/12/09 02:16:24	59.993	633	342.4182434	0	-420	7529.04
10/12/09 02:16:27	59.9949989	633	342.4182434	0	-420	7529.37
10/12/09 02:16:30	59.9980011	633	342.4182434	0	-420	7529.7
10/12/09 02:16:33	59.9980011	633	342.4182434	0	-420	7530.03
10/12/09 02:16:36	59.9990005	633	342.4182434	0	-420	7530.36

10/12/09 02:16:39	59.9949989	633	338.7946472	0	-420	7530.69
10/12/09 02:16:42	59.9920006	633	338.7946472	0	-420	7531.02
10/12/09 02:16:45	59.9949989	633	338.7946472	0	-420	7531.35
10/12/09 02:16:48	60.0009995	633	338.7946472	0	-420	7531.68
10/12/09 02:16:51	60.0029984	633	338.7946472	0	-420	7532.01
10/12/09 02:16:54	60.0089989	633	335.9309998	0	-420	7532.34
10/12/09 02:16:57	60.0089989	633	335.9309998	0	-420	7532.67
10/12/09 02:17:00	60.012001	633	335.9309998	0	-420	7533
10/12/09 02:17:03	60.0110016	633	335.9309998	0	-420	7533.33
10/12/09 02:17:06	60.0079994	633	335.9309998	0	-420	7533.66
10/12/09 02:17:09	60.007	633	339.7124023	0	-420	7533.99
10/12/09 02:17:12	60.012001	633	339.7124023	0	-420	7534.32
10/12/09 02:17:15	60.0130005	633	339.7124023	0	-420	7534.65
10/12/09 02:17:18	60.0099983	633	339.7124023	0	-420	7534.98
10/12/09 02:17:21	60.007	633	339.7124023	0	-420	7535.31
10/12/09 02:17:24	60.0089989	633	332.0246582	0	-420	7535.64
10/12/09 02:17:27	60.0060005	633	332.0246582	0	-420	7535.97
10/12/09 02:17:30	60.0089989	633	332.0246582	0	-420	7536.3
10/12/09 02:17:33	60.0089989	633	332.0246582	0	-420	7536.63
10/12/09 02:17:36	60.0089989	633	332.0246582	0	-420	7536.96
10/12/09 02:17:39	60.0089989	633	330.7590332	0	-420	7537.29
10/12/09 02:17:42	60.0040016	633	330.7590332	0	-420	7537.62
10/12/09 02:17:45	60.0009995	633	330.7590332	0	-420	7537.95
10/12/09 02:17:48	59.993	633	330.7590332	0	-420	7538.28
10/12/09 02:17:51	59.9910011	633	330.7590332	0	-420	7538.61
10/12/09 02:17:54	59.9920006	633	323.4199524	0	-420	7538.94
10/12/09 02:17:57	59.9939995	633	323.4199524	0	-420	7539.27
10/12/09 02:18:00	59.9939995	633	323.4199524	0	-420	7539.6
10/12/09 02:18:03	59.9949989	633	323.4199524	0	-420	7539.93
10/12/09 02:18:06	59.9900017	633	323.4199524	0	-420	7540.26
10/12/09 02:18:09	59.9900017	633	342.3509216	0	-420	7540.59
10/12/09 02:18:12	59.9830017	633	342.3509216	0	-420	7540.92
10/12/09 02:18:15	59.9770012	633	342.3509216	0	-420	7541.25
10/12/09 02:18:18	59.9889984	633	342.3509216	0	-420	7541.58
10/12/09 02:18:21	59.9949989	633	342.3509216	0	-420	7541.91
10/12/09 02:18:24	59.9939995	633	345.0818176	0	-420	7542.24
10/12/09 02:18:27	59.9889984	633	345.0818176	0	-420	7542.57
10/12/09 02:18:30	59.9860001	633	345.0818176	0	-420	7542.9
10/12/09 02:18:33	59.9840012	633	345.0818176	0	-420	7543.23
10/12/09 02:18:36	59.9850006	633	345.0818176	0	-420	7543.56
10/12/09 02:18:39	59.9860001	633	346.537384	0	-420	7543.89
10/12/09 02:18:42	59.9860001	633	346.537384	0	-420	7544.22
10/12/09 02:18:45	59.9799995	633	346.537384	0	-420	7544.55
10/12/09 02:18:48	59.980999	633	346.537384	0	-420	7544.88
10/12/09 02:18:51	59.9889984	633	346.537384	0	-420	7545.21
10/12/09 02:18:54	60.007	633	342.9057617	0	-420	7545.54
10/12/09 02:18:57	60.007	633	342.9057617	0	-420	7545.87
10/12/09 02:19:00	59.9860001	633	342.9057617	0	-420	7546.2
10/12/09 02:19:03	59.980999	633	342.9057617	0	-420	7546.53

10/12/09 02:19:06	59.973999	633	342.9057617	0	-420	7546.86
10/12/09 02:19:09	59.9760017	633	340.0943909	0	-420	7547.19
10/12/09 02:19:12	59.973999	633	340.0943909	0	-420	7547.52
10/12/09 02:19:15	59.9770012	633	340.0943909	0	-420	7547.85
10/12/09 02:19:18	59.9790001	633	340.0943909	0	-420	7548.18
10/12/09 02:19:21	59.9819984	633	340.0943909	0	-420	7548.51
10/12/09 02:19:24	59.9869995	633	342.7711792	0	-420	7548.84
10/12/09 02:19:27	59.987999	633	342.7711792	0	-420	7549.17
10/12/09 02:19:30	59.9869995	633	342.7711792	0	-420	7549.5
10/12/09 02:19:33	59.9869995	633	342.7711792	0	-420	7549.83
10/12/09 02:19:36	59.9850006	633	342.7711792	0	-420	7550.16
10/12/09 02:19:39	59.9840012	633	342.9099121	0	-420	7550.49
10/12/09 02:19:42	59.9830017	633	342.9099121	0	-420	7550.82
10/12/09 02:19:45	59.9889984	633	342.9099121	0	-420	7551.15
10/12/09 02:19:48	59.987999	633	342.9099121	0	-420	7551.48
10/12/09 02:19:51	59.9840012	633	342.9099121	0	-420	7551.81
10/12/09 02:19:54	59.9830017	633	343.2860107	0	-420	7552.14
10/12/09 02:19:57	59.980999	633	343.2860107	0	-420	7552.47
10/12/09 02:20:00	59.9830017	633	343.2860107	0	-420	7552.8
10/12/09 02:20:03	59.9860001	633	343.2860107	0	-420	7553.13
10/12/09 02:20:06	59.9869995	633	343.2860107	0	-420	7553.46
10/12/09 02:20:09	59.9850006	633	331.8529663	0	-420	7553.79
10/12/09 02:20:12	59.9799995	633	331.8529663	0	-420	7554.12
10/12/09 02:20:15	59.9830017	633	331.8529663	0	-420	7554.45
10/12/09 02:20:18	59.9790001	633	331.8529663	0	-420	7554.78
10/12/09 02:20:21	59.9790001	633	331.8529663	0	-420	7555.11
10/12/09 02:20:24	59.980999	633	329.9882202	0	-420	7555.44
10/12/09 02:20:27	59.9799995	633	329.9882202	0	-420	7555.77
10/12/09 02:20:30	59.980999	633	329.9882202	0	-420	7556.1
10/12/09 02:20:33	59.9799995	633	329.9882202	0	-420	7556.43
10/12/09 02:20:36	59.9770012	633	329.9882202	0	-420	7556.76
10/12/09 02:20:39	59.9790001	633	255.4441681	0	-420	7557.09
10/12/09 02:20:42	59.9790001	633	255.4441681	0	-420	7557.42
10/12/09 02:20:45	59.9760017	633	255.4441681	0	-420	7557.75
10/12/09 02:20:48	59.9720001	633	255.4441681	0	-420	7558.08
10/12/09 02:20:51	59.9710007	633	255.4441681	0	-420	7558.41
10/12/09 02:20:54	59.9729996	633	254.8383026	0	-420	7558.74
10/12/09 02:20:57	59.9729996	633	254.8383026	0	-420	7559.07
10/12/09 02:21:00	59.9710007	633	254.8383026	0	-420	7559.4
10/12/09 02:21:03	59.9749985	633	254.8383026	0	-420	7559.73
10/12/09 02:21:06	59.9770012	633	254.8383026	0	-420	7560.06
10/12/09 02:21:09	59.9749985	633	257.1469727	0	-420	7560.39
10/12/09 02:21:12	59.9799995	633	257.1469727	0	-420	7560.72
10/12/09 02:21:15	59.9790001	633	257.1469727	0	-420	7561.05
10/12/09 02:21:18	59.9819984	633	257.1469727	0	-420	7561.38
10/12/09 02:21:21	59.9819984	633	257.1469727	0	-420	7561.71
10/12/09 02:21:24	59.9819984	633	262.2893677	0	-420	7562.04
10/12/09 02:21:27	59.980999	633	262.2893677	0	-420	7562.37
10/12/09 02:21:30	59.9840012	633	262.2893677	0	-420	7562.7

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10/12/09 02:33:06	60.007	0	164.9734039	0	-420	7639.26
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10/12/09 02:45:18	60.0410004	0	230.7344208	0	-420	7719.78
10/12/09 02:45:21	60.0379982	0	230.7344208	0	-420	7720.11
10/12/09 02:45:24	60.0369987	0	234.8471069	0	-420	7720.44
10/12/09 02:45:27	60.0390015	0	234.8471069	0	-420	7720.77
10/12/09 02:45:30	60.0400009	0	234.8471069	0	-420	7721.1
10/12/09 02:45:33	60.0390015	0	234.8471069	0	-420	7721.43
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10/12/09 02:56:09	59.9819984	0	223.0157318	0	-420	7791.39
10/12/09 02:56:12	59.9819984	0	223.0157318	0	-420	7791.72
10/12/09 02:56:15	59.9869995	0	223.0157318	0	-420	7792.05
10/12/09 02:56:18	59.9970016	0	223.0157318	0	-420	7792.38
10/12/09 02:56:21	60	0	223.0157318	0	-420	7792.71
10/12/09 02:56:24	60.0029984	0	223.0157318	0	-420	7793.04
10/12/09 02:56:27	60.0029984	0	223.0157318	0	-420	7793.37
10/12/09 02:56:30	60.0029984	0	223.0157318	0	-420	7793.7
10/12/09 02:56:33	60.0019989	0	223.0157318	0	-420	7794.03
10/12/09 02:56:36	60.0040016	0	223.0157318	0	-420	7794.36
10/12/09 02:56:39	60.0050011	0	223.0157318	0	-420	7794.69
10/12/09 02:56:42	60.0089989	0	223.0157318	0	-420	7795.02
10/12/09 02:56:45	60.012001	0	223.0157318	0	-420	7795.35
10/12/09 02:56:48	60.0209999	0	223.0157318	0	-420	7795.68
10/12/09 02:56:51	60.0219994	0	223.0157318	0	-420	7796.01
10/12/09 02:56:54	60.0200005	0	223.0157318	0	-420	7796.34
10/12/09 02:56:57	60.0180016	0	223.0157318	0	-420	7796.67
10/12/09 02:57:00	60.0200005	0	223.0157318	0	-420	7797
10/12/09 02:57:03	60.0200005	0				
10/12/09 02:57:06	60.0180016	0				
10/12/09 02:57:09	60.019001	0				
10/12/09 02:57:12	60.0180016	0				
10/12/09 02:57:15	60.0169983	0				
10/12/09 02:57:18	60.0159988	0				
10/12/09 02:57:21	60.0159988	0				
10/12/09 02:57:24	60.0139999	0				
10/12/09 02:57:27	60.0139999	0				
10/12/09 02:57:30	60.0130005	0				
10/12/09 02:57:33	60.0149994	0				
10/12/09 02:57:36	60.0159988	0				
10/12/09 02:57:39	60.019001	0				
10/12/09 02:57:42	60.0209999	0				
10/12/09 02:57:45	60.0200005	0				
10/12/09 02:57:48	60.0239983	0				
10/12/09 02:57:51	60.026001	0				
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10/12/09 02:58:18	60.0279999	0
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10/12/09 02:58:30	60.0219994	0
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10/12/09 02:59:18	60.0099983	0
10/12/09 02:59:21	60.0110016	0
10/12/09 02:59:24	60.0159988	0
10/12/09 02:59:27	60.0180016	0
10/12/09 02:59:30	60.019001	0
10/12/09 02:59:33	60.019001	0
10/12/09 02:59:36	60.0200005	0
10/12/09 02:59:39	60.0180016	0
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10/12/09 02:59:45	60.0159988	0
10/12/09 02:59:48	60.0229988	0
10/12/09 02:59:51	60.0219994	0
10/12/09 02:59:54	60.0149994	0
10/12/09 02:59:57	60.0159988	0
10/12/09 03:00:00	60.0169983	0
10/12/09 03:00:03	60.0099983	0
10/12/09 03:00:06	60.0040016	0
10/12/09 03:00:09	59.9949989	0
10/12/09 03:00:12	59.9819984	0
10/12/09 03:00:15	59.973999	0
10/12/09 03:00:18	59.9700012	0
10/12/09 03:00:21	59.9679985	0
10/12/09 03:00:24	59.9679985	0
10/12/09 03:00:27	59.9720001	0
10/12/09 03:00:30	59.9659996	0
10/12/09 03:00:33	59.9640007	0
10/12/09 03:00:36	59.9659996	0
10/12/09 03:00:39	59.9630013	0
10/12/09 03:00:42	59.9650002	0

10/12/09 03:00:45	59.9679985	0
10/12/09 03:00:48	59.9700012	0
10/12/09 03:00:51	59.9700012	0
10/12/09 03:00:54	59.9720001	0
10/12/09 03:00:57	59.9760017	0
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10/12/09 03:03:00	60	0
10/12/09 03:03:03	60.0040016	0
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10/12/09 03:03:12	60.012001	0
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10/12/09 03:03:24	60.0130005	0
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10/12/09 03:04:03	60.019001	0
10/12/09 03:04:06	60.0219994	0
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10/12/09 03:04:12	60.0299988	0
10/12/09 03:04:15	60.0270004	0
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10/12/09 03:04:24	60.0200005	0
10/12/09 03:04:27	60.0239983	0
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10/12/09 03:04:48	60.0079994	0
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10/12/09 03:05:03	60.0149994	0
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10/12/09 03:05:45	60.0279999	0
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10/12/09 03:05:51	60.0289993	0
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10/12/09 03:06:12	60.0279999	0
10/12/09 03:06:15	60.0209999	0
10/12/09 03:06:18	60.0149994	0
10/12/09 03:06:21	60.012001	0
10/12/09 03:06:24	60.0139999	0
10/12/09 03:06:27	60.0130005	0
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10/12/09 03:07:54	59.9760017	0
10/12/09 03:07:57	59.9749985	0
10/12/09 03:08:00	59.9749985	0
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10/12/09 03:08:12	59.9770012	0
10/12/09 03:08:15	59.9749985	0
10/12/09 03:08:18	59.9790001	0
10/12/09 03:08:21	59.9799995	0
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10/12/09 03:09:36	59.9830017	0
10/12/09 03:09:39	59.9819984	0
10/12/09 03:09:42	59.9900017	0
10/12/09 03:09:45	59.9949989	0
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10/12/09 03:10:12	59.9959984	0
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10/12/09 03:10:21	60.0029984	0
10/12/09 03:10:24	60.0040016	0
10/12/09 03:10:27	60.0040016	0
10/12/09 03:10:30	60.0060005	0

10/12/09 03:10:33	60.0029984	0
10/12/09 03:10:36	60.0060005	0
10/12/09 03:10:39	60.0089989	0
10/12/09 03:10:42	60.0099983	0
10/12/09 03:10:45	60.0089989	0
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10/12/09 03:11:09	60.0139999	0
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10/12/09 03:11:15	60.0099983	0
10/12/09 03:11:18	60.007	0
10/12/09 03:11:21	60.0029984	0
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10/12/09 03:11:27	59.9980011	0
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10/12/09 03:11:33	60.0019989	0
10/12/09 03:11:36	60.0029984	0
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10/12/09 03:11:42	60.0009995	0
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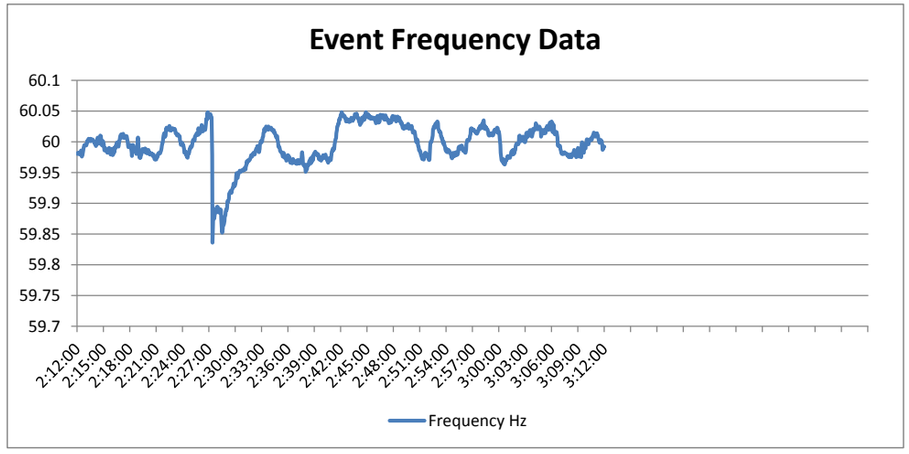
10/12/09 03:11:48	59.9869995	0
10/12/09 03:11:51	59.987999	0
10/12/09 03:11:54	59.9900017	0
10/12/09 03:11:57	59.9920006	0
10/12/09 03:12:00	59.9920006	0

Balancing Authority Name:	HQ
Balancing Authority Frequency Response Obligation (FRO from FRS Form 1)	-141

Note: See "Instruction" tab for more detailed instructions.

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.	
Step 2.	Determine Time of T(0) and edit formula in cell "C8" to reference the correct row of the "Data" worksheet. T(0) is the first change in frequency of about 0.010 Hz (10 mHz) which should be the first scan of frequency data of the event.	2:27:21
Step 3.	Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:32:54
Step 4.	Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet.	

Copy Data for Pasting into Form 1



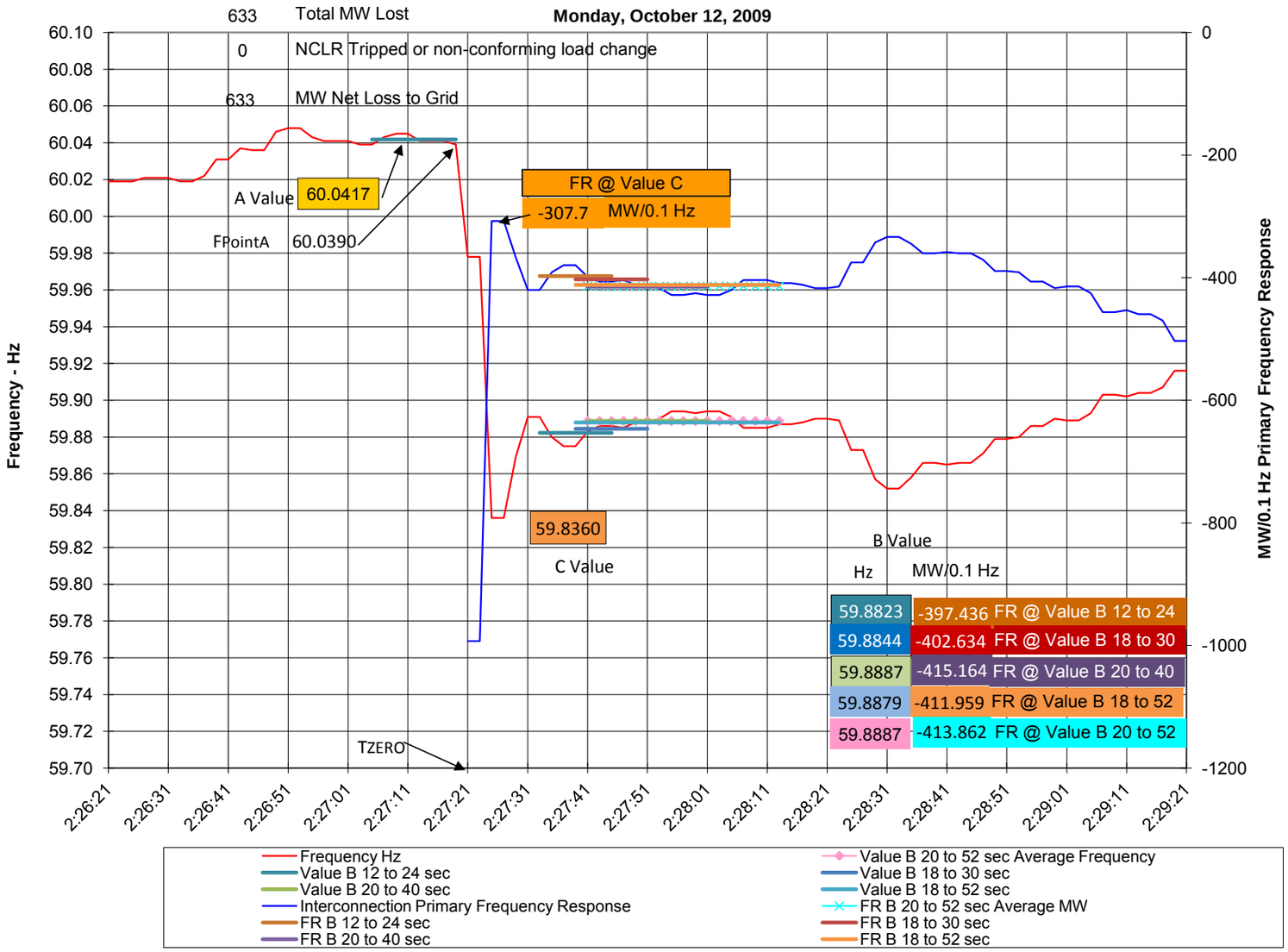
Step 5. Paste data into FRS Form 1 in the appropriate row on the "BA Event Data" worksheet.

Step 6. Save this workbook using the following file name format:MyBA_yymmdd_hhmm_FRS_Form2.xlsm

09/10/12 Date yymmdd

2:27 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic



IPFR = Interconnection Primary Frequency Response

scan rate	2 seconds	Date:	Monday, October 12, 2009		
		Time of T(0)	2:27:21		
		Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:32:54		
		Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0417	Hz	
		Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.8887	Hz	
		Pre to Post Perturbation Delta Frequency Actual	-0.153	Hz	
		Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	633.00	MW	
		Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	0.00	MW	
		Pre to Post Perturbation Interchange Delta MW Actual	-633.00	MW	
		Initial Performance Ramp Magnitude Adjustment	0.00	MW	
		EPFR Pre-Perturbation Average	-58.87	MW	
		EPFR Post-Perturbation Average	156.92	MW	
		EPFR Delta	215.79	MW	
EPFR = Expected Primary Frequency Response		EPFR(Final)	215.79	MW	

Balancing Authority	HQ	
Grid Nominal Frequency	60.000	Hz
Capacity @ Droop for Minimum Performance	4230.0	MW
Droop Setting	5.00% 3.00000	Hz
Deadband Setting	0.000	Hz
Hz Span	3.00000	Hz
Frequency Response Obligation (FRO)	-141	MW/0.1 Hz
TC (frequency response filter constant)	1	Time Constant for delayed delivery of PFR during Sustained Measure

Low Hz	Delta Hz Event
0.00	Actual Interchange MW Average during frequency recovery period
437.58	Target Interchange MW Average during frequency recovery period
348.10	Interchange Average Ramp MW during frequency recovery period
633.00	Actual MW @ T(-4)
-693.63	Starting and Ending Difference in Interchange MW during frequency recovery pe
0:05:33	Event Duration (h:mm:ss)
Yes	Target MW Average minus MW @ T(-4) less than zero
498.21	Interchange Target Relative Average Change - MW (Low Frequency Event)
60.63	Interchange Actual Relative Average Change - MW (Low Frequency Event)
Yes	Interchange Actual Average minus MW @ T(-4) less than zero
No	Interchange Average MW minus MW @ T(-4) greater than zero
No	Interchange Target MW Average minus MW @ T(-4) greater than zero
-195.42	Interchange Target Relative Average Change - MW (High Frequency Event)
-633.00	Interchange Actual Relative Average Change - MW (High Frequency Event)
Down	Ramp Direction during frequency recovery period

Initial Response P.U. Performance 2.933 P.U.

No Evaluation P.U. Sustianed Response P.U. Performance

	T	Frequency Hz	Total Generation Lost MW	Value B 20 to 52 sec Average Frequency	Average MW	FRO (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW	Generator Trip MW
T-72 sec	2:26:09	60.027	633.000			-38.071	-38.071								633.000
T-70 sec	2:26:11	60.027	633.000			-38.071	-38.071								
T-68 sec	2:26:13	60.026	633.000			-36.661	-36.661								

T-66 sec	2:26:15	60.022	633.000			-31.019	-31.019										
T-64 sec	2:26:17	60.022	633.000			-31.019	-31.019										
T-62 sec	2:26:19	60.017	633.000			-23.968	-23.968										
T-60 sec	2:26:21	60.019	633.000			-26.791	-26.791		0.972	633.000							
T-58 sec	2:26:23	60.019	633.000			-26.791	-26.791		0.972	633.972							
T-56 sec	2:26:25	60.019	633.000			-26.791	-26.791		0.972	634.945							
T-54 sec	2:26:27	60.021	633.000			-29.610	-29.610		0.972	633.099							
T-52 sec	2:26:29	60.021	633.000			-29.610	-29.610		0.972	634.071							
T-50 sec	2:26:31	60.021	633.000			-29.610	-29.610		0.972	635.044							
T-48 sec	2:26:33	60.019	633.000			-26.791	-26.791		0.972	638.835							
T-46 sec	2:26:35	60.019	633.000			-26.791	-26.791		0.972	639.807							
T-44 sec	2:26:37	60.022	633.000			-31.019	-31.019		0.972	636.552							
T-42 sec	2:26:39	60.031	633.000			-43.708	-43.708		0.972	624.836							
T-40 sec	2:26:41	60.031	633.000			-43.708	-43.708		0.972	625.808							
T-38 sec	2:26:43	60.037	633.000			-52.168	-52.168		0.972	618.320							
T-36 sec	2:26:45	60.036	633.000			-50.759	-50.759		0.972	620.702							
T-34 sec	2:26:47	60.036	633.000			-50.759	-50.759		0.972	621.674							
T-32 sec	2:26:49	60.046	633.000			-64.862	-64.862		0.972	608.544							
T-30 sec	2:26:51	60.048	633.000			-67.680	-67.680		0.972	606.697							
T-28 sec	2:26:53	60.048	633.000			-67.680	-67.680		0.972	607.670							
T-26 sec	2:26:55	60.043	633.000			-60.629	-60.629		0.972	615.694							
T-24 sec	2:26:57	60.041	633.000			-57.811	-57.811		0.972	619.485							
T-22 sec	2:26:59	60.041	633.000			-57.811	-57.811		0.972	620.457							
T-20 sec	2:27:01	60.041	633.000			-57.811	-57.811		0.972	621.430							
T-18 sec	2:27:03	60.039	633.000			-54.992	-54.992		0.972	625.221							
T-16 sec	2:27:05	60.039	633.000	60.042	633.000	-54.992	-54.992		0.972	626.193							
T-14 sec	2:27:07	60.043	633.000	60.042	633.000	-60.629	-60.629		0.972	621.528							
T-12 sec	2:27:09	60.045	633.000	60.042	633.000	-63.447	-63.447		0.972	619.682							
T-10 sec	2:27:11	60.045	633.000	60.042	633.000	-63.447	-63.447		0.972	620.655							
T-08 sec	2:27:13	60.041	633.000	60.042	633.000	-57.811	-57.811		0.972	627.264							
T-06 sec	2:27:15	60.041	633.000	60.042	633.000	-57.811	-57.811		0.972	628.237							
T-04 sec	2:27:17	60.041	633.000	60.042	633.000	-57.811	-57.811		0.972	629.209							
T-02 sec	2:27:19	60.039	633.000	60.042	633.000	-54.992	-54.992		0.972	633.000							
T+0 sec	2:27:21	59.978	0.000			31.019	31.019		0.000	719.011							633
T+02 sec	2:27:23	59.978	0.000			31.019	31.019		-4.166	714.845	0.000	716.928	691.783	691.783			633
T+04 sec	2:27:25	59.836	0.000			231.242	231.242		-4.166	910.902	0.000	781.586	687.617	689.700			633
T+06 sec	2:27:27	59.836	0.000			231.242	231.242		-4.166	906.736	0.000	812.874	683.451	687.617			633
T+08 sec	2:27:29	59.869	0.000			184.711	184.711		-4.166	856.039	0.000	821.507	679.285	685.534			633
T+10 sec	2:27:31	59.891	0.000			153.692	153.692		-4.166	820.854	0.000	821.398	675.119	683.451			633
T+12 sec	2:27:33	59.891	0.000			153.692	153.692		-4.166	816.688	0.000	820.725	670.953	681.368			633
T+14 sec	2:27:35	59.88	0.000			169.198	169.198		-4.166	828.029	0.000	821.638	666.787	679.285			633
T+16 sec	2:27:37	59.875	0.000			176.250	176.250		-4.166	830.915	0.000	822.669	662.622	677.202			633
T+18 sec	2:27:39	59.875	0.000			176.250	176.250		-4.166	826.749	0.000	823.077	658.456	675.119			633
T+20 sec	2:27:41	59.883	0.000	59.889	0.000	164.971	164.971	848.792	-4.166	811.304	0.000	822.007	654.290	673.036			633
T+22 sec	2:27:43	59.886	0.000	59.889	0.000	160.738	160.738	848.792	-4.166	802.905	0.000	820.415	650.124	670.953			633
T+24 sec	2:27:45	59.886	0.000	59.889	0.000	160.738	160.738	848.792	-4.166	798.739	0.000	818.747	645.958	668.870			633

T+26 sec	2:27:47	59.885	0.000	59.889	0.000	162.152	162.152	848.792	-4.166	795.988	0.000	817.122	641.792	666.787	633
T+28 sec	2:27:49	59.888	0.000	59.889	0.000	157.919	157.919	848.792	-4.166	787.589	0.000	815.153	637.626	664.705	633
T+30 sec	2:27:51	59.888	0.000	59.889	0.000	157.919	157.919	848.792	-4.166	783.423	0.000	813.170	633.460	662.622	633
T+32 sec	2:27:53	59.89	0.000	59.889	0.000	155.101	155.101	848.792	-4.166	776.438	0.000	811.009	629.294	660.539	633
T+34 sec	2:27:55	59.894	0.000	59.889	0.000	149.459	149.459	848.792	-4.166	766.630	0.000	808.544	625.128	658.456	633
T+36 sec	2:27:57	59.894	0.000	59.889	0.000	149.459	149.459	848.792	-4.166	762.464	0.000	806.118	620.962	656.373	633
T+38 sec	2:27:59	59.893	0.000	59.889	0.000	150.868	150.868	848.792	-4.166	759.708	0.000	803.798	616.797	654.290	633
T+40 sec	2:28:01	59.894	0.000	59.889	0.000	149.459	149.459	848.792	-4.166	754.132	0.000	801.433	612.631	652.207	633
T+42 sec	2:28:03	59.894	0.000	59.889	0.000	149.459	149.459	848.792	-4.166	749.966	0.000	799.093	608.465	650.124	633
T+44 sec	2:28:05	59.891	0.000	59.889	0.000	153.692	153.692	848.792	-4.166	750.034	0.000	796.960	604.299	648.041	633
T+46 sec	2:28:07	59.885	0.000	59.889	0.000	162.152	162.152	848.792	-4.166	754.328	0.000	795.184	600.133	645.958	633
T+48 sec	2:28:09	59.885	0.000	59.889	0.000	162.152	162.152	848.792	-4.166	750.163	0.000	793.383	595.967	643.875	633
T+50 sec	2:28:11	59.885	0.000	59.889	0.000	162.152	162.152	848.792	-4.166	745.997	0.000	791.561	591.801	641.792	633
T+52 sec	2:28:13	59.887	0.000	59.889	0.000	159.329	159.329	848.792	-4.166	739.007	0.000	789.614	587.635	639.709	633
T+54 sec	2:28:15	59.887	0.000			159.329	159.329		-4.166	734.841	0.000	787.658	583.469	637.626	633
T+56 sec	2:28:17	59.888	0.000			157.919	157.919		-4.166	729.266	0.000	785.644	579.303	635.543	633
T+58 sec	2:28:19	59.89	0.000			155.101	155.101		-4.166	722.281	0.000	783.532	575.137	633.460	633
T+60 sec	2:28:21	59.89	0.000			155.101	155.101		-4.166	718.116	0.000	781.422	570.971	631.377	633
T+62 sec	2:28:23	59.889	0.000			156.510	156.510		-4.166	715.359	0.000	779.358	566.806	629.294	633
T+64 sec	2:28:25	59.873	0.000			179.068	179.068		-4.166	733.751	0.000	777.976	562.640	627.211	633
T+66 sec	2:28:27	59.873	0.000			179.068	179.068		-4.166	729.585	0.000	776.552	558.474	625.128	633
T+68 sec	2:28:29	59.857	0.000			201.632	201.632		-4.166	747.983	0.000	775.736	554.308	623.045	633
T+70 sec	2:28:31	59.852	0.000			208.678	208.678		-4.166	750.863	0.000	775.045	550.142	620.962	633
T+72 sec	2:28:33	59.852	0.000			208.678	208.678		-4.166	746.698	0.000	774.279	545.976	618.879	633
T+74 sec	2:28:35	59.858	0.000			200.218	200.218		-4.166	734.071	0.000	773.221	541.810	616.797	633
T+76 sec	2:28:37	59.866	0.000			188.938	188.938		-4.166	718.626	0.000	771.821	537.644	614.714	633
T+78 sec	2:28:39	59.866	0.000			188.938	188.938		-4.166	714.460	0.000	770.387	533.478	612.631	633
T+80 sec	2:28:41	59.865	0.000			190.348	190.348		-4.166	711.703	0.000	768.956	529.312	610.548	633
	2:28:43	59.866	0.000			188.938	188.938		-4.166	706.128	0.000	767.460	525.146	608.465	633
	2:28:45	59.866	0.000			188.938	188.938		-4.166	701.962	0.000	765.937	520.981	606.382	633
	2:28:47	59.871	0.000			181.892	181.892		-4.166	690.750	0.000	764.228	516.815	604.299	633
	2:28:49	59.879	0.000			170.608	170.608		-4.166	675.300	0.000	762.252	512.649	602.216	633
	2:28:51	59.879	0.000			170.608	170.608		-4.166	671.134	0.000	760.271	508.483	600.133	633
	2:28:53	59.88	0.000			169.198	169.198		-4.166	665.559	0.000	758.256	504.317	598.050	633
	2:28:55	59.886	0.000			160.738	160.738		-4.166	652.932	0.000	756.061	500.151	595.967	633
	2:28:57	59.886	0.000			160.738	160.738		-4.166	648.766	0.000	753.872	495.985	593.884	633
	2:28:59	59.89	0.000			155.101	155.101		-4.166	638.963	0.000	751.574	491.819	591.801	633
	2:29:01	59.889	0.000			156.510	156.510		-4.166	636.206	0.000	749.311	487.653	589.718	633
	2:29:03	59.889	0.000			156.510	156.510		-4.166	632.041	0.000	747.056	483.487	587.635	633
	2:29:05	59.893	0.000			150.868	150.868		-4.166	622.232	0.000	744.701	479.321	585.552	633
	2:29:07	59.903	0.000			136.770	136.770		-4.166	603.969	0.000	742.095	475.155	583.469	633
	2:29:09	59.903	0.000			136.770	136.770		-4.166	599.803	0.000	739.508	470.990	581.386	633
	2:29:11	59.902	0.000			138.179	138.179		-4.166	597.046	0.000	736.964	466.824	579.303	633
	2:29:13	59.904	0.000			135.361	135.361		-4.166	590.062	0.000	734.387	462.658	577.220	633
	2:29:15	59.904	0.000			135.361	135.361		-4.166	585.896	0.000	731.826	458.492	575.137	633

2:29:17	59.907	0.000	131.128	131.128	-4.166	577.497	0.000	729.211	454.326	573.054	633
2:29:19	59.916	0.000	118.439	118.439	-4.166	560.643	0.000	726.401	450.160	570.971	633
2:29:21	59.916	0.000	118.439	118.439	-4.166	556.477	0.000	723.616	445.994	568.889	633
2:29:23	59.916	0.000	118.439	118.439	-4.166	552.311	0.000	720.853	441.828	566.806	633
2:29:25	59.918	0.000	115.621	115.621	-4.166	545.326	0.000	718.066	437.662	564.723	633
2:29:27	59.918	0.000	115.621	115.621	-4.166	541.161	0.000	715.302	433.496	562.640	633
2:29:29	59.92	0.000	112.803	112.803	-4.166	534.176	0.000	712.516	429.330	560.557	633
2:29:31	59.92	0.000	112.803	112.803	-4.166	530.010	0.000	709.751	425.165	558.474	633
2:29:33	59.92	0.000	112.803	112.803	-4.166	525.844	0.000	707.006	420.999	556.391	633
2:29:35	59.917	0.000	117.030	117.030	-4.166	525.906	0.000	704.342	416.833	554.308	633
2:29:37	59.921	0.000	111.388	111.388	-4.166	516.098	0.000	701.614	412.667	552.225	633
2:29:39	59.921	0.000	111.388	111.388	-4.166	511.932	0.000	698.905	408.501	550.142	633
2:29:41	59.923	0.000	108.570	108.570	-4.166	504.948	0.000	696.173	404.335	548.059	633
2:29:43	59.925	0.000	105.751	105.751	-4.166	497.963	0.000	693.420	400.169	545.976	633
2:29:45	59.925	0.000	105.751	105.751	-4.166	493.797	0.000	690.685	396.003	543.893	633
2:29:47	59.928	0.000	101.518	101.518	-4.166	485.398	0.000	687.911	391.837	541.810	633
2:29:49	59.932	0.000	95.881	95.881	-4.166	475.596	0.000	685.080	387.671	539.727	633
2:29:51	59.932	0.000	95.881	95.881	-4.166	471.430	0.000	682.269	383.505	537.644	633
2:29:53	59.927	0.000	102.933	102.933	-4.166	474.315	0.000	679.568	379.339	535.561	633
2:29:55	59.931	0.000	97.290	97.290	-4.166	464.507	0.000	676.811	375.174	533.478	633
2:29:57	59.931	0.000	97.290	97.290	-4.166	460.341	0.000	674.071	371.008	531.395	633
2:29:59	59.929	0.000	100.109	100.109	-4.166	458.994	0.000	671.383	366.842	529.312	633
2:30:01	59.931	0.000	97.290	97.290	-4.166	452.009	0.000	668.674	362.676	527.229	633
2:30:03	59.931	0.000	97.290	97.290	-4.166	447.843	0.000	665.981	358.510	525.146	633
2:30:05	59.937	0.000	88.830	88.830	-4.166	435.217	0.000	663.201	354.344	523.063	633
2:30:07	59.945	0.000	77.550	77.550	-4.166	419.772	0.000	660.303	350.178	520.981	633
2:30:09	59.945	0.000	77.550	77.550	-4.166	415.606	0.000	657.424	346.012	518.898	633
2:30:11	59.949	0.000	71.908	71.908	-4.166	405.798	0.000	654.498	341.846	516.815	633
2:30:13	59.942	0.000	81.778	81.778	-4.166	411.502	0.000	651.705	337.680	514.732	633
2:30:15	59.942	0.000	81.778	81.778	-4.166	407.336	0.000	648.928	333.514	512.649	633
2:30:17	59.941	0.000	83.187	83.187	-4.166	404.579	0.000	646.183	329.349	510.566	633
2:30:19	59.945	0.000	77.550	77.550	-4.166	394.776	0.000	643.389	325.183	508.483	633
2:30:21	59.945	0.000	77.550	77.550	-4.166	390.610	0.000	640.612	321.017	506.400	633
2:30:23	59.948	0.000	73.317	73.317	-4.166	382.211	0.000	637.803	316.851	504.317	633
2:30:25	59.949	0.000	71.908	71.908	-4.166	376.636	0.000	634.995	312.685	502.234	633
2:30:27	59.949	0.000	71.908	71.908	-4.166	372.470	0.000	632.202	308.519	500.151	633
2:30:29	59.951	0.000	69.090	69.090	-4.166	365.486	0.000	629.394	304.353	498.068	633
2:30:31	59.953	0.000	66.271	66.271	-4.166	358.502	0.000	626.572	300.187	495.985	633
2:30:33	59.953	0.000	66.271	66.271	-4.166	354.336	0.000	623.766	296.021	493.902	633
2:30:35	59.951	0.000	69.090	69.090	-4.166	352.988	0.000	621.003	291.855	491.819	633
2:30:37	59.952	0.000	67.680	67.680	-4.166	347.413	0.000	618.239	287.689	489.736	633
2:30:39	59.952	0.000	67.680	67.680	-4.166	343.247	0.000	615.489	283.523	487.653	633
2:30:41	59.952	0.000	67.680	67.680	-4.166	339.081	0.000	612.753	279.358	485.570	633
2:30:43	59.952	0.000	67.680	67.680	-4.166	334.915	0.000	610.029	275.192	483.487	633
2:30:45	59.952	0.000	67.680	67.680	-4.166	330.749	0.000	607.317	271.026	481.404	633
2:30:47	59.954	0.000	64.862	64.862	-4.166	323.765	0.000	604.591	266.860	479.321	633

2:30:49	59.953	0.000	66.271	66.271	-4.166	321.008	0.000	601.890	262.694	477.238	633
2:30:51	59.953	0.000	66.271	66.271	-4.166	316.842	0.000	599.201	258.528	475.155	633
2:30:53	59.953	0.000	66.271	66.271	-4.166	312.677	0.000	596.523	254.362	473.073	633
2:30:55	59.954	0.000	64.862	64.862	-4.166	307.101	0.000	593.843	250.196	470.990	633
2:30:57	59.954	0.000	64.862	64.862	-4.166	302.935	0.000	591.174	246.030	468.907	633
2:30:59	59.954	0.000	64.862	64.862	-4.166	298.770	0.000	588.516	241.864	466.824	633
2:31:01	59.957	0.000	60.629	60.629	-4.166	290.371	0.000	585.830	237.698	464.741	633
2:31:03	59.957	0.000	60.629	60.629	-4.166	286.205	0.000	583.155	233.533	462.658	633
2:31:05	59.956	0.000	62.038	62.038	-4.166	283.448	0.000	580.503	229.367	460.575	633
2:31:07	59.956	0.000	62.038	62.038	-4.166	279.282	0.000	577.860	225.201	458.492	633
2:31:09	59.956	0.000	62.038	62.038	-4.166	275.116	0.000	575.228	221.035	456.409	633
2:31:11	59.955	0.000	63.447	63.447	-4.166	272.359	0.000	572.617	216.869	454.326	633
2:31:13	59.961	0.000	54.992	54.992	-4.166	259.738	0.000	569.943	212.703	452.243	633
2:31:15	59.961	0.000	54.992	54.992	-4.166	255.572	0.000	567.279	208.537	450.160	633
2:31:17	59.962	0.000	53.577	53.577	-4.166	249.992	0.000	564.612	204.371	448.077	633
2:31:19	59.968	0.000	45.122	45.122	-4.166	237.371	0.000	561.885	200.205	445.994	633
2:31:21	59.968	0.000	45.122	45.122	-4.166	233.205	0.000	559.169	196.039	443.911	633
2:31:23	59.966	0.000	47.941	47.941	-4.166	231.857	0.000	556.486	191.873	441.828	633
2:31:25	59.968	0.000	45.122	45.122	-4.166	224.873	0.000	553.790	187.707	439.745	633
2:31:27	59.968	0.000	45.122	45.122	-4.166	220.707	0.000	551.104	183.542	437.662	633
2:31:29	59.97	0.000	42.298	42.298	-4.166	213.717	0.000	548.405	179.376	435.579	633
2:31:31	59.97	0.000	42.298	42.298	-4.166	209.551	0.000	545.715	175.210	433.496	633
2:31:33	59.97	0.000	42.298	42.298	-4.166	205.385	0.000	543.036	171.044	431.413	633
2:31:35	59.969	0.000	43.708	43.708	-4.166	202.629	0.000	540.376	166.878	429.330	633
2:31:37	59.97	0.000	42.298	42.298	-4.166	197.053	0.000	537.715	162.712	427.247	633
2:31:39	59.97	0.000	42.298	42.298	-4.166	192.888	0.000	535.062	158.546	425.165	633
2:31:41	59.971	0.000	40.889	40.889	-4.166	187.312	0.000	532.408	154.380	423.082	633
2:31:43	59.973	0.000	38.071	38.071	-4.166	180.328	0.000	529.741	150.214	420.999	633
2:31:45	59.973	0.000	38.071	38.071	-4.166	176.162	0.000	527.082	146.048	418.916	633
2:31:47	59.976	0.000	33.838	33.838	-4.166	167.763	0.000	524.401	141.882	416.833	633
2:31:49	59.978	0.000	31.019	31.019	-4.166	160.779	0.000	521.707	137.717	414.750	633
2:31:51	59.978	0.000	31.019	31.019	-4.166	156.613	0.000	519.023	133.551	412.667	633
2:31:53	59.976	0.000	33.838	33.838	-4.166	155.265	0.000	516.367	129.385	410.584	633
2:31:55	59.976	0.000	33.838	33.838	-4.166	151.100	0.000	513.720	125.219	408.501	633
2:31:57	59.976	0.000	33.838	33.838	-4.166	146.934	0.000	511.082	121.053	406.418	633
2:31:59	59.978	0.000	31.019	31.019	-4.166	139.949	0.000	508.431	116.887	404.335	633
2:32:01	59.98	0.000	28.201	28.201	-4.166	132.965	0.000	505.768	112.721	402.252	633
2:32:03	59.98	0.000	28.201	28.201	-4.166	128.799	0.000	503.113	108.555	400.169	633
2:32:05	59.982	0.000	25.382	25.382	-4.166	121.815	0.000	500.447	104.389	398.086	633
2:32:07	59.98	0.000	28.201	28.201	-4.166	120.467	0.000	497.808	100.223	396.003	633
2:32:09	59.98	0.000	28.201	28.201	-4.166	116.301	0.000	495.177	96.057	393.920	633
2:32:11	59.979	0.000	29.610	29.610	-4.166	113.545	0.000	492.563	91.891	391.837	633
2:32:13	59.979	0.000	29.610	29.610	-4.166	109.379	0.000	489.956	87.726	389.754	633
2:32:15	59.979	0.000	29.610	29.610	-4.166	105.213	0.000	487.357	83.560	387.671	633
2:32:17	59.983	0.000	23.968	23.968	-4.166	95.405	0.000	484.726	79.394	385.588	633
2:32:19	59.984	0.000	22.558	22.558	-4.166	89.829	0.000	482.094	75.228	383.505	633

2:32:21	59.984	0.000	22.558	22.558	-4.166	85.663	0.000	479.468	71.062	381.422	633
2:32:23	59.988	0.000	16.921	16.921	-4.166	75.861	0.000	476.813	66.896	379.339	633
2:32:25	59.987	0.000	18.331	18.331	-4.166	73.104	0.000	474.174	62.730	377.257	633
2:32:27	59.987	0.000	18.331	18.331	-4.166	68.938	0.000	471.543	58.564	375.174	633
2:32:29	59.987	0.000	18.331	18.331	-4.166	64.772	0.000	468.918	54.398	373.091	633
2:32:31	59.993	0.000	9.870	9.870	-4.166	52.145	0.000	466.247	50.232	371.008	633
2:32:33	59.993	0.000	9.870	9.870	-4.166	47.980	0.000	463.583	46.066	368.925	633
2:32:35	59.992	0.000	11.279	11.279	-4.166	45.223	0.000	460.935	41.901	366.842	633
2:32:37	59.989	0.000	15.512	15.512	-4.166	45.290	0.000	458.321	37.735	364.759	633
2:32:39	59.989	0.000	15.512	15.512	-4.166	41.124	0.000	455.713	33.569	362.676	633
2:32:41	59.986	0.000	19.740	19.740	-4.166	41.186	0.000	453.139	29.403	360.593	633
2:32:43	59.983	0.000	23.968	23.968	-4.166	41.248	0.000	450.596	25.237	358.510	633
2:32:45	59.983	0.000	23.968	23.968	-4.166	37.082	0.000	448.059	21.071	356.427	633
2:32:47	59.988	0.000	16.921	16.921	-4.166	25.870	0.000	445.485	16.905	354.344	633
2:32:49	59.996	0.000	5.642	5.642	-4.166	10.425	0.000	442.848	12.739	352.261	633
2:32:51	59.996	0.000	5.642	5.642	-4.166	6.259	0.000	440.218	8.573	350.178	633
2:32:53	59.998	0.000	2.818	2.818	-4.166	-0.731	0.000	437.578	4.407	348.095	633
2:32:55	60.001	0.000	-1.409	-1.409	0.000	-4.959	0.000	434.943	4.407	346.037	633
2:32:57	60.001	0.000	-1.409	-1.409	0.000	-4.959	0.000	432.341	4.407	344.004	633
2:32:59	59.999	0.000	1.409	1.409	0.000	-2.140	0.000	429.785	4.407	341.994	633
2:33:01	59.999	0.000	1.409	1.409	0.000	-2.140	0.000	427.259	4.407	340.008	633
2:33:03	59.999	0.000	1.409	1.409	0.000	-2.140	0.000	424.762	4.407	338.046	633
2:33:05	60.002	0.000	-2.818	-2.818	0.000	-6.368	0.000	422.270	4.407	336.106	633
2:33:07	60.007	0.000	-9.870	-9.870	0.000	-13.419	0.000	419.766	4.407	334.189	633
2:33:09	60.007	0.000	-9.870	-9.870	0.000	-13.419	0.000	417.291	4.407	332.293	633
2:33:11	60.008	0.000	-11.279	-11.279	0.000	-14.829	0.000	414.836	4.407	330.420	633
2:33:13	60.014	0.000	-19.740	-19.740	0.000	-23.289	0.000	412.360	4.407	328.567	633
2:33:15	60.014	0.000	-19.740	-19.740	0.000	-23.289	0.000	409.913	4.407	326.736	633
2:33:17	60.017	0.000	-23.968	-23.968	0.000	-27.517	0.000	407.469	4.407	324.925	633
2:33:19	60.021	0.000	-29.610	-29.610	0.000	-33.159	0.000	405.021	4.407	323.135	633
2:33:21	60.021	0.000	-29.610	-29.610	0.000	-33.159	0.000	402.600	4.407	321.364	633
2:33:23	60.017	0.000	-23.968	-23.968	0.000	-27.517	0.000	400.237	4.407	319.613	633
2:33:25	60.019	0.000	-26.791	-26.791	0.000	-30.341	0.000	397.884	4.407	317.881	633
2:33:27	60.019	0.000	-26.791	-26.791	0.000	-30.341	0.000	395.557	4.407	316.168	633
2:33:29	60.023	0.000	-32.428	-32.428	0.000	-35.978	0.000	393.224	4.407	314.473	633
2:33:31	60.025	0.000	-35.252	-35.252	0.000	-38.802	0.000	390.902	4.407	312.797	633
2:33:33	60.025	0.000	-35.252	-35.252	0.000	-38.802	0.000	388.604	4.407	311.139	633
2:33:35	60.021	0.000	-29.610	-29.610	0.000	-33.159	0.000	386.360	4.407	309.499	633
2:33:37	60.024	0.000	-33.838	-33.838	0.000	-37.387	0.000	384.118	4.407	307.876	633
2:33:39	60.024	0.000	-33.838	-33.838	0.000	-37.387	0.000	381.900	4.407	306.271	633
2:33:41	60.024	0.000	-33.838	-33.838	0.000	-37.387	0.000	379.705	4.407	304.682	633
2:33:43	60.02	0.000	-28.201	-28.201	0.000	-31.750	0.000	377.562	4.407	303.110	633
2:33:45	60.02	0.000	-28.201	-28.201	0.000	-31.750	0.000	375.441	4.407	301.554	633
2:33:47	60.025	0.000	-35.252	-35.252	0.000	-38.802	0.000	373.306	4.407	300.014	633
2:33:49	60.02	0.000	-28.201	-28.201	0.000	-31.750	0.000	371.228	4.407	298.491	633
2:33:51	60.02	0.000	-28.201	-28.201	0.000	-31.750	0.000	369.172	4.407	296.983	633

2:33:53	60.02	0.000	-28.201	-28.201	0.000	-31.750	0.000	367.137	4.407	295.490	633
2:33:55	60.022	0.000	-31.019	-31.019	0.000	-34.569	0.000	365.108	4.407	294.012	633
2:33:57	60.022	0.000	-31.019	-31.019	0.000	-34.569	0.000	363.100	4.407	292.550	633
2:33:59	60.022	0.000	-31.019	-31.019	0.000	-34.569	0.000	361.112	4.407	291.102	633
2:34:01	60.021	0.000	-29.610	-29.610	0.000	-33.159	0.000	359.150	4.407	289.668	633
2:34:03	60.021	0.000	-29.610	-29.610	0.000	-33.159	0.000	357.208	4.407	288.249	633
2:34:05	60.023	0.000	-32.428	-32.428	0.000	-35.978	0.000	355.271	4.407	286.844	633
2:34:07	60.022	0.000	-31.019	-31.019	0.000	-34.569	0.000	353.360	4.407	285.453	633
2:34:09	60.022	0.000	-31.019	-31.019	0.000	-34.569	0.000	351.468	4.407	284.075	633
2:34:11	60.019	0.000	-26.791	-26.791	0.000	-30.341	0.000	349.614	4.407	282.711	633
2:34:13	60.018	0.000	-25.382	-25.382	0.000	-28.932	0.000	347.786	4.407	281.360	633
2:34:15	60.018	0.000	-25.382	-25.382	0.000	-28.932	0.000	345.974	4.407	280.022	633
2:34:17	60.018	0.000	-25.382	-25.382	0.000	-28.932	0.000	344.181	4.407	278.697	633
2:34:19	60.019	0.000	-26.791	-26.791	0.000	-30.341	0.000	342.397	4.407	277.384	633
2:34:21	60.019	0.000	-26.791	-26.791	0.000	-30.341	0.000	340.631	4.407	276.084	633
2:34:23	60.019	0.000	-26.791	-26.791	0.000	-30.341	0.000	338.881	4.407	274.797	633
2:34:25	60.015	0.000	-21.149	-21.149	0.000	-24.699	0.000	337.174	4.407	273.521	633
2:34:27	60.015	0.000	-21.149	-21.149	0.000	-24.699	0.000	335.483	4.407	272.258	633
2:34:29	60.016	0.000	-22.558	-22.558	0.000	-26.108	0.000	333.801	4.407	271.006	633
2:34:31	60.013	0.000	-18.331	-18.331	0.000	-21.880	0.000	332.154	4.407	269.766	633
2:34:33	60.013	0.000	-18.331	-18.331	0.000	-21.880	0.000	330.523	4.407	268.538	633
2:34:35	60.012	0.000	-16.921	-16.921	0.000	-20.471	0.000	328.913	4.407	267.321	633
2:34:37	60.01	0.000	-14.098	-14.098	0.000	-17.647	0.000	327.330	4.407	266.115	633
2:34:39	60.01	0.000	-14.098	-14.098	0.000	-17.647	0.000	325.762	4.407	264.920	633
2:34:41	60.007	0.000	-9.870	-9.870	0.000	-13.419	0.000	324.227	4.407	263.735	633
2:34:43	60.009	0.000	-12.688	-12.688	0.000	-16.238	0.000	322.694	4.407	262.562	633
2:34:45	60.009	0.000	-12.688	-12.688	0.000	-16.238	0.000	321.174	4.407	261.399	633
2:34:47	60.009	0.000	-12.688	-12.688	0.000	-16.238	0.000	319.668	4.407	260.247	633
2:34:49	60.003	0.000	-4.228	-4.228	0.000	-7.777	0.000	318.212	4.407	259.105	633
2:34:51	60.003	0.000	-4.228	-4.228	0.000	-7.777	0.000	316.770	4.407	257.973	633
2:34:53	59.999	0.000	1.409	1.409	0.000	-2.140	0.000	315.365	4.407	256.851	633
2:34:55	59.992	0.000	11.279	11.279	0.000	7.730	0.000	314.016	4.407	255.738	633
2:34:57	59.992	0.000	11.279	11.279	0.000	7.730	0.000	312.678	4.407	254.636	633
2:34:59	59.991	0.000	12.688	12.688	0.000	9.139	0.000	311.359	4.407	253.543	633
2:35:01	59.992	0.000	11.279	11.279	0.000	7.730	0.000	310.044	4.407	252.460	633
2:35:03	59.992	0.000	11.279	11.279	0.000	7.730	0.000	308.741	4.407	251.386	633
2:35:05	59.988	0.000	16.921	16.921	0.000	13.372	0.000	307.473	4.407	250.322	633
2:35:07	59.985	0.000	21.149	21.149	0.000	17.600	0.000	306.235	4.407	249.266	633
2:35:09	59.985	0.000	21.149	21.149	0.000	17.600	0.000	305.006	4.407	248.220	633
2:35:11	59.984	0.000	22.558	22.558	0.000	19.009	0.000	303.795	4.407	247.183	633
2:35:13	59.984	0.000	22.558	22.558	0.000	19.009	0.000	302.593	4.407	246.154	633
2:35:15	59.984	0.000	22.558	22.558	0.000	19.009	0.000	301.401	4.407	245.134	633
2:35:17	59.982	0.000	25.382	25.382	0.000	21.833	0.000	300.232	4.407	244.122	633
2:35:19	59.982	0.000	25.382	25.382	0.000	21.833	0.000	299.072	4.407	243.119	633
2:35:21	59.982	0.000	25.382	25.382	0.000	21.833	0.000	297.921	4.407	242.125	633
2:35:23	59.979	0.000	29.610	29.610	0.000	26.060	0.000	296.798	4.407	241.138	633

2:35:25	59.976	0.000	33.838	33.838	0.000	30.288	0.000	295.701	4.407	240.160	633
2:35:27	59.976	0.000	33.838	33.838	0.000	30.288	0.000	294.613	4.407	239.190	633
2:35:29	59.976	0.000	33.838	33.838	0.000	30.288	0.000	293.534	4.407	238.228	633
2:35:31	59.982	0.000	25.382	25.382	0.000	21.833	0.000	292.430	4.407	237.273	633
2:35:33	59.982	0.000	25.382	25.382	0.000	21.833	0.000	291.334	4.407	236.327	633
2:35:35	59.978	0.000	31.019	31.019	0.000	27.470	0.000	290.270	4.407	235.388	633
2:35:37	59.974	0.000	36.661	36.661	0.000	33.112	0.000	289.238	4.407	234.456	633
2:35:39	59.974	0.000	36.661	36.661	0.000	33.112	0.000	288.213	4.407	233.533	633
2:35:41	59.976	0.000	33.838	33.838	0.000	30.288	0.000	287.186	4.407	232.616	633
2:35:43	59.977	0.000	32.428	32.428	0.000	28.879	0.000	286.161	4.407	231.707	633
2:35:45	59.977	0.000	32.428	32.428	0.000	28.879	0.000	285.144	4.407	230.805	633
2:35:47	59.975	0.000	35.252	35.252	0.000	31.703	0.000	284.146	4.407	229.910	633
2:35:49	59.969	0.000	43.708	43.708	0.000	40.158	0.000	283.189	4.407	229.022	633
2:35:51	59.969	0.000	43.708	43.708	0.000	40.158	0.000	282.240	4.407	228.141	633
2:35:53	59.97	0.000	42.298	42.298	0.000	38.749	0.000	281.292	4.407	227.267	633
2:35:55	59.973	0.000	38.071	38.071	0.000	34.521	0.000	280.336	4.407	226.400	633
2:35:57	59.973	0.000	38.071	38.071	0.000	34.521	0.000	279.387	4.407	225.540	633
2:35:59	59.978	0.000	31.019	31.019	0.000	27.470	0.000	278.418	4.407	224.686	633
2:36:01	59.978	0.000	31.019	31.019	0.000	27.470	0.000	277.456	4.407	223.839	633
2:36:03	59.978	0.000	31.019	31.019	0.000	27.470	0.000	276.502	4.407	222.998	633
2:36:05	59.975	0.000	35.252	35.252	0.000	31.703	0.000	275.571	4.407	222.164	633
2:36:07	59.976	0.000	33.838	33.838	0.000	30.288	0.000	274.642	4.407	221.336	633
2:36:09	59.976	0.000	33.838	33.838	0.000	30.288	0.000	273.720	4.407	220.514	633
2:36:11	59.975	0.000	35.252	35.252	0.000	31.703	0.000	272.810	4.407	219.699	633
2:36:13	59.969	0.000	43.708	43.708	0.000	40.158	0.000	271.939	4.407	218.889	633
2:36:15	59.969	0.000	43.708	43.708	0.000	40.158	0.000	271.074	4.407	218.086	633
2:36:17	59.966	0.000	47.941	47.941	0.000	44.391	0.000	270.231	4.407	217.289	633
2:36:19	59.966	0.000	47.941	47.941	0.000	44.391	0.000	269.395	4.407	216.497	633
2:36:21	59.966	0.000	47.941	47.941	0.000	44.391	0.000	268.565	4.407	215.712	633
2:36:23	59.969	0.000	43.708	43.708	0.000	40.158	0.000	267.725	4.407	214.932	633
2:36:25	59.968	0.000	45.122	45.122	0.000	41.573	0.000	266.897	4.407	214.158	633
2:36:27	59.968	0.000	45.122	45.122	0.000	41.573	0.000	266.074	4.407	213.390	633
2:36:29	59.965	0.000	49.350	49.350	0.000	45.800	0.000	265.273	4.407	212.627	633
2:36:31	59.97	0.000	42.298	42.298	0.000	38.749	0.000	264.453	4.407	211.870	633
2:36:33	59.97	0.000	42.298	42.298	0.000	38.749	0.000	263.638	4.407	211.118	633
2:36:35	59.972	0.000	39.480	39.480	0.000	35.930	0.000	262.819	4.407	210.372	633
2:36:37	59.967	0.000	46.531	46.531	0.000	42.982	0.000	262.031	4.407	209.631	633
2:36:39	59.967	0.000	46.531	46.531	0.000	42.982	0.000	261.248	4.407	208.895	633
2:36:41	59.969	0.000	43.708	43.708	0.000	40.158	0.000	260.462	4.407	208.165	633
2:36:43	59.969	0.000	43.708	43.708	0.000	40.158	0.000	259.680	4.407	207.440	633
2:36:45	59.969	0.000	43.708	43.708	0.000	40.158	0.000	258.905	4.407	206.720	633
2:36:47	59.967	0.000	46.531	46.531	0.000	42.982	0.000	258.144	4.407	206.005	633
2:36:49	59.966	0.000	47.941	47.941	0.000	44.391	0.000	257.394	4.407	205.295	633
2:36:51	59.966	0.000	47.941	47.941	0.000	44.391	0.000	256.650	4.407	204.590	633
2:36:53	59.965	0.000	49.350	49.350	0.000	45.800	0.000	255.915	4.407	203.890	633
2:36:55	59.967	0.000	46.531	46.531	0.000	42.982	0.000	255.176	4.407	203.195	633

2:36:57	59.967	0.000	46.531	46.531	0.000	42.982	0.000	254.441	4.407	202.505	633
2:36:59	59.965	0.000	49.350	49.350	0.000	45.800	0.000	253.722	4.407	201.820	633
2:37:01	59.964	0.000	50.759	50.759	0.000	47.210	0.000	253.012	4.407	201.139	633
2:37:03	59.964	0.000	50.759	50.759	0.000	47.210	0.000	252.307	4.407	200.463	633
2:37:05	59.97	0.000	42.298	42.298	0.000	38.749	0.000	251.579	4.407	199.791	633
2:37:07	59.969	0.000	43.708	43.708	0.000	40.158	0.000	250.859	4.407	199.125	633
2:37:09	59.969	0.000	43.708	43.708	0.000	40.158	0.000	250.145	4.407	198.462	633
2:37:11	59.968	0.000	45.122	45.122	0.000	41.573	0.000	249.441	4.407	197.805	633
2:37:13	59.965	0.000	49.350	49.350	0.000	45.800	0.000	248.755	4.407	197.151	633
2:37:15	59.965	0.000	49.350	49.350	0.000	45.800	0.000	248.074	4.407	196.502	633
2:37:17	59.97	0.000	42.298	42.298	0.000	38.749	0.000	247.374	4.407	195.858	633
2:37:19	59.968	0.000	45.122	45.122	0.000	41.573	0.000	246.688	4.407	195.217	633
2:37:21	59.968	0.000	45.122	45.122	0.000	41.573	0.000	246.006	4.407	194.581	633
2:37:23	59.965	0.000	49.350	49.350	0.000	45.800	0.000	245.343	4.407	193.949	633
2:37:25	59.969	0.000	43.708	43.708	0.000	40.158	0.000	244.666	4.407	193.322	633
2:37:27	59.969	0.000	43.708	43.708	0.000	40.158	0.000	243.993	4.407	192.698	633
2:37:29	59.967	0.000	46.531	46.531	0.000	42.982	0.000	243.334	4.407	192.079	633
2:37:31	59.966	0.000	47.941	47.941	0.000	44.391	0.000	242.684	4.407	191.464	633
2:37:33	59.966	0.000	47.941	47.941	0.000	44.391	0.000	242.038	4.407	190.852	633
2:37:35	59.979	0.000	29.610	29.610	0.000	26.060	0.000	241.337	4.407	190.245	633
2:37:37	59.983	0.000	23.968	23.968	0.000	20.418	0.000	240.622	4.407	189.642	633
2:37:39	59.983	0.000	23.968	23.968	0.000	20.418	0.000	239.912	4.407	189.042	633
2:37:41	59.974	0.000	36.661	36.661	0.000	33.112	0.000	239.247	4.407	188.447	633
2:37:43	59.965	0.000	49.350	49.350	0.000	45.800	0.000	238.627	4.407	187.855	633
2:37:45	59.965	0.000	49.350	49.350	0.000	45.800	0.000	238.011	4.407	187.267	633
2:37:47	59.962	0.000	53.577	53.577	0.000	50.028	0.000	237.412	4.407	186.683	633
2:37:49	59.961	0.000	54.992	54.992	0.000	51.443	0.000	236.822	4.407	186.102	633
2:37:51	59.961	0.000	54.992	54.992	0.000	51.443	0.000	236.235	4.407	185.525	633
2:37:53	59.961	0.000	54.992	54.992	0.000	51.443	0.000	235.652	4.407	184.952	633
2:37:55	59.963	0.000	52.168	52.168	0.000	48.619	0.000	235.064	4.407	184.383	633
2:37:57	59.963	0.000	52.168	52.168	0.000	48.619	0.000	234.480	4.407	183.817	633
2:37:59	59.959	0.000	57.811	57.811	0.000	54.261	0.000	233.916	4.407	183.254	633
2:38:01	59.951	0.000	69.090	69.090	0.000	65.540	0.000	233.392	4.407	182.695	633
2:38:03	59.951	0.000	69.090	69.090	0.000	65.540	0.000	232.871	4.407	182.140	633
2:38:05	59.953	0.000	66.271	66.271	0.000	62.722	0.000	232.344	4.407	181.588	633
2:38:07	59.957	0.000	60.629	60.629	0.000	57.079	0.000	231.803	4.407	181.039	633
2:38:09	59.957	0.000	60.629	60.629	0.000	57.079	0.000	231.265	4.407	180.494	633
2:38:11	59.956	0.000	62.038	62.038	0.000	58.489	0.000	230.735	4.407	179.952	633
2:38:13	59.963	0.000	52.168	52.168	0.000	48.619	0.000	230.178	4.407	179.414	633
2:38:15	59.963	0.000	52.168	52.168	0.000	48.619	0.000	229.625	4.407	178.879	633
2:38:17	59.961	0.000	54.992	54.992	0.000	51.443	0.000	229.083	4.407	178.347	633
2:38:19	59.963	0.000	52.168	52.168	0.000	48.619	0.000	228.536	4.407	177.818	633
2:38:21	59.963	0.000	52.168	52.168	0.000	48.619	0.000	227.993	4.407	177.293	633
2:38:23	59.963	0.000	52.168	52.168	0.000	48.619	0.000	227.452	4.407	176.770	633
2:38:25	59.968	0.000	45.122	45.122	0.000	41.573	0.000	226.894	4.407	176.251	633
2:38:27	59.968	0.000	45.122	45.122	0.000	41.573	0.000	226.339	4.407	175.735	633

2:38:29	59.968	0.000	45.122	45.122	0.000	41.573	0.000	225.788	4.407	175.222	633
2:38:31	59.97	0.000	42.298	42.298	0.000	38.749	0.000	225.231	4.407	174.712	633
2:38:33	59.97	0.000	42.298	42.298	0.000	38.749	0.000	224.678	4.407	174.205	633
2:38:35	59.973	0.000	38.071	38.071	0.000	34.521	0.000	224.115	4.407	173.702	633
2:38:37	59.965	0.000	49.350	49.350	0.000	45.800	0.000	223.589	4.407	173.201	633
2:38:39	59.965	0.000	49.350	49.350	0.000	45.800	0.000	223.066	4.407	172.703	633
2:38:41	59.967	0.000	46.531	46.531	0.000	42.982	0.000	222.538	4.407	172.208	633
2:38:43	59.972	0.000	39.480	39.480	0.000	35.930	0.000	221.993	4.407	171.716	633
2:38:45	59.972	0.000	39.480	39.480	0.000	35.930	0.000	221.450	4.407	171.227	633
2:38:47	59.976	0.000	33.838	33.838	0.000	30.288	0.000	220.894	4.407	170.740	633
2:38:49	59.969	0.000	43.708	43.708	0.000	40.158	0.000	220.371	4.407	170.257	633
2:38:51	59.969	0.000	43.708	43.708	0.000	40.158	0.000	219.850	4.407	169.776	633
2:38:53	59.973	0.000	38.071	38.071	0.000	34.521	0.000	219.316	4.407	169.298	633
2:38:55	59.978	0.000	31.019	31.019	0.000	27.470	0.000	218.764	4.407	168.823	633
2:38:57	59.978	0.000	31.019	31.019	0.000	27.470	0.000	218.216	4.407	168.350	633
2:38:59	59.981	0.000	26.791	26.791	0.000	23.242	0.000	217.659	4.407	167.881	633
2:39:01	59.981	0.000	26.791	26.791	0.000	23.242	0.000	217.105	4.407	167.414	633
2:39:03	59.981	0.000	26.791	26.791	0.000	23.242	0.000	216.555	4.407	166.949	633
2:39:05	59.982	0.000	25.382	25.382	0.000	21.833	0.000	216.003	4.407	166.487	633
2:39:07	59.984	0.000	22.558	22.558	0.000	19.009	0.000	215.446	4.407	166.028	633
2:39:09	59.984	0.000	22.558	22.558	0.000	19.009	0.000	214.893	4.407	165.572	633
2:39:11	59.982	0.000	25.382	25.382	0.000	21.833	0.000	214.351	4.407	165.118	633
2:39:13	59.979	0.000	29.610	29.610	0.000	26.060	0.000	213.823	4.407	164.666	633
2:39:15	59.979	0.000	29.610	29.610	0.000	26.060	0.000	213.299	4.407	164.217	633
2:39:17	59.98	0.000	28.201	28.201	0.000	24.651	0.000	212.773	4.407	163.771	633
2:39:19	59.978	0.000	31.019	31.019	0.000	27.470	0.000	212.259	4.407	163.327	633
2:39:21	59.978	0.000	31.019	31.019	0.000	27.470	0.000	211.747	4.407	162.886	633
2:39:23	59.98	0.000	28.201	28.201	0.000	24.651	0.000	211.230	4.407	162.447	633
2:39:25	59.98	0.000	28.201	28.201	0.000	24.651	0.000	210.716	4.407	162.010	633
2:39:27	59.98	0.000	28.201	28.201	0.000	24.651	0.000	210.205	4.407	161.576	633
2:39:29	59.978	0.000	31.019	31.019	0.000	27.470	0.000	209.704	4.407	161.144	633
2:39:31	59.972	0.000	39.480	39.480	0.000	35.930	0.000	209.229	4.407	160.715	633
2:39:33	59.972	0.000	39.480	39.480	0.000	35.930	0.000	208.757	4.407	160.288	633
2:39:35	59.971	0.000	40.889	40.889	0.000	37.340	0.000	208.291	4.407	159.863	633
2:39:37	59.974	0.000	36.661	36.661	0.000	33.112	0.000	207.817	4.407	159.440	633
2:39:39	59.974	0.000	36.661	36.661	0.000	33.112	0.000	207.344	4.407	159.020	633
2:39:41	59.975	0.000	35.252	35.252	0.000	31.703	0.000	206.871	4.407	158.602	633
2:39:43	59.972	0.000	39.480	39.480	0.000	35.930	0.000	206.411	4.407	158.187	633
2:39:45	59.972	0.000	39.480	39.480	0.000	35.930	0.000	205.954	4.407	157.773	633
2:39:47	59.969	0.000	43.708	43.708	0.000	40.158	0.000	205.511	4.407	157.362	633
2:39:49	59.974	0.000	36.661	36.661	0.000	33.112	0.000	205.051	4.407	156.953	633
2:39:51	59.974	0.000	36.661	36.661	0.000	33.112	0.000	204.594	4.407	156.546	633
2:39:53	59.972	0.000	39.480	39.480	0.000	35.930	0.000	204.147	4.407	156.142	633
2:39:55	59.972	0.000	39.480	39.480	0.000	35.930	0.000	203.702	4.407	155.739	633
2:39:57	59.972	0.000	39.480	39.480	0.000	35.930	0.000	203.259	4.407	155.339	633
2:39:59	59.977	0.000	32.428	32.428	0.000	28.879	0.000	202.800	4.407	154.941	633

2:40:01	59.978	0.000	31.019	31.019	0.000	27.470	0.000	202.340	4.407	154.545	633
2:40:03	59.978	0.000	31.019	31.019	0.000	27.470	0.000	201.882	4.407	154.151	633
2:40:05	59.976	0.000	33.838	33.838	0.000	30.288	0.000	201.434	4.407	153.759	633
2:40:07	59.974	0.000	36.661	36.661	0.000	33.112	0.000	200.996	4.407	153.369	633
2:40:09	59.974	0.000	36.661	36.661	0.000	33.112	0.000	200.560	4.407	152.981	633
2:40:11	59.977	0.000	32.428	32.428	0.000	28.879	0.000	200.115	4.407	152.595	633
2:40:13	59.978	0.000	31.019	31.019	0.000	27.470	0.000	199.669	4.407	152.211	633
2:40:15	59.978	0.000	31.019	31.019	0.000	27.470	0.000	199.225	4.407	151.829	633
2:40:17	59.979	0.000	29.610	29.610	0.000	26.060	0.000	198.780	4.407	151.449	633
2:40:19	59.977	0.000	32.428	32.428	0.000	28.879	0.000	198.344	4.407	151.071	633
2:40:21	59.977	0.000	32.428	32.428	0.000	28.879	0.000	197.911	4.407	150.695	633
2:40:23	59.974	0.000	36.661	36.661	0.000	33.112	0.000	197.490	4.407	150.321	633
2:40:25	59.971	0.000	40.889	40.889	0.000	37.340	0.000	197.083	4.407	149.949	633
2:40:27	59.971	0.000	40.889	40.889	0.000	37.340	0.000	196.677	4.407	149.578	633
2:40:29	59.971	0.000	40.889	40.889	0.000	37.340	0.000	196.274	4.407	149.210	633
2:40:31	59.968	0.000	45.122	45.122	0.000	41.573	0.000	195.883	4.407	148.843	633
2:40:33	59.968	0.000	45.122	45.122	0.000	41.573	0.000	195.495	4.407	148.478	633
2:40:35	59.966	0.000	47.941	47.941	0.000	44.391	0.000	195.115	4.407	148.116	633
2:40:37	59.971	0.000	40.889	40.889	0.000	37.340	0.000	194.720	4.407	147.754	633
2:40:39	59.971	0.000	40.889	40.889	0.000	37.340	0.000	194.326	4.407	147.395	633
2:40:41	59.973	0.000	38.071	38.071	0.000	34.521	0.000	193.928	4.407	147.038	633
2:40:43	59.969	0.000	43.708	43.708	0.000	40.158	0.000	193.545	4.407	146.682	633
2:40:45	59.969	0.000	43.708	43.708	0.000	40.158	0.000	193.165	4.407	146.328	633
2:40:47	59.972	0.000	39.480	39.480	0.000	35.930	0.000	192.775	4.407	145.976	633
2:40:49	59.973	0.000	38.071	38.071	0.000	34.521	0.000	192.385	4.407	145.626	633
2:40:51	59.973	0.000	38.071	38.071	0.000	34.521	0.000	191.996	4.407	145.277	633
2:40:53	59.97	0.000	42.298	42.298	0.000	38.749	0.000	191.619	4.407	144.930	633
2:40:55	59.974	0.000	36.661	36.661	0.000	33.112	0.000	191.231	4.407	144.585	633
2:40:57	59.974	0.000	36.661	36.661	0.000	33.112	0.000	190.844	4.407	144.241	633
2:40:59	59.982	0.000	25.382	25.382	0.000	21.833	0.000	190.432	4.407	143.899	633
2:41:01	59.985	0.000	21.149	21.149	0.000	17.600	0.000	190.011	4.407	143.559	633
2:41:03	59.985	0.000	21.149	21.149	0.000	17.600	0.000	189.593	4.407	143.220	633
2:41:05	59.985	0.000	21.149	21.149	0.000	17.600	0.000	189.176	4.407	142.883	633
2:41:07	59.989	0.000	15.512	15.512	0.000	11.963	0.000	188.748	4.407	142.548	633
2:41:09	59.989	0.000	15.512	15.512	0.000	11.963	0.000	188.322	4.407	142.214	633
2:41:11	59.989	0.000	15.512	15.512	0.000	11.963	0.000	187.898	4.407	141.882	633
2:41:13	59.987	0.000	18.331	18.331	0.000	14.781	0.000	187.483	4.407	141.552	633
2:41:15	59.987	0.000	18.331	18.331	0.000	14.781	0.000	187.070	4.407	141.223	633
2:41:17	59.99	0.000	14.098	14.098	0.000	10.548	0.000	186.649	4.407	140.896	633
2:41:19	59.996	0.000	5.642	5.642	0.000	2.093	0.000	186.209	4.407	140.570	633
2:41:21	59.996	0.000	5.642	5.642	0.000	2.093	0.000	185.772	4.407	140.246	633
2:41:23	60.001	0.000	-1.409	-1.409	0.000	-4.959	0.000	185.320	4.407	139.923	633
2:41:25	60.004	0.000	-5.642	-5.642	0.000	-9.192	0.000	184.860	4.407	139.602	633
2:41:27	60.004	0.000	-5.642	-5.642	0.000	-9.192	0.000	184.403	4.407	139.282	633
2:41:29	60.006	0.000	-8.461	-8.461	0.000	-12.010	0.000	183.941	4.407	138.964	633
2:41:31	60.014	0.000	-19.740	-19.740	0.000	-23.289	0.000	183.454	4.407	138.648	633

2:41:33	60.014	0.000	-19.740	-19.740	0.000	-23.289	0.000	182.970	4.407	138.333	633
2:41:35	60.019	0.000	-26.791	-26.791	0.000	-30.341	0.000	182.471	4.407	138.019	633
2:41:37	60.025	0.000	-35.252	-35.252	0.000	-38.802	0.000	181.956	4.407	137.707	633
2:41:39	60.025	0.000	-35.252	-35.252	0.000	-38.802	0.000	181.442	4.407	137.396	633
2:41:41	60.026	0.000	-36.661	-36.661	0.000	-40.211	0.000	180.928	4.407	137.087	633
2:41:43	60.029	0.000	-40.889	-40.889	0.000	-44.439	0.000	180.406	4.407	136.779	633
2:41:45	60.029	0.000	-40.889	-40.889	0.000	-44.439	0.000	179.887	4.407	136.473	633
2:41:47	60.029	0.000	-40.889	-40.889	0.000	-44.439	0.000	179.370	4.407	136.168	633
2:41:49	60.036	0.000	-50.759	-50.759	0.000	-54.309	0.000	178.833	4.407	135.864	633
2:41:51	60.036	0.000	-50.759	-50.759	0.000	-54.309	0.000	178.298	4.407	135.562	633
2:41:53	60.037	0.000	-52.168	-52.168	0.000	-55.718	0.000	177.763	4.407	135.261	633
2:41:55	60.036	0.000	-50.759	-50.759	0.000	-54.309	0.000	177.233	4.407	134.961	633
2:41:57	60.036	0.000	-50.759	-50.759	0.000	-54.309	0.000	176.706	4.407	134.663	633
2:41:59	60.041	0.000	-57.811	-57.811	0.000	-61.360	0.000	176.164	4.407	134.367	633
2:42:01	60.044	0.000	-62.038	-62.038	0.000	-65.588	0.000	175.616	4.407	134.071	633
2:42:03	60.044	0.000	-62.038	-62.038	0.000	-65.588	0.000	175.071	4.407	133.777	633
2:42:05	60.043	0.000	-60.629	-60.629	0.000	-64.178	0.000	174.530	4.407	133.485	633
2:42:07	60.048	0.000	-67.680	-67.680	0.000	-71.230	0.000	173.977	4.407	133.193	633
2:42:09	60.048	0.000	-67.680	-67.680	0.000	-71.230	0.000	173.426	4.407	132.903	633
2:42:11	60.046	0.000	-64.862	-64.862	0.000	-68.412	0.000	172.884	4.407	132.614	633
2:42:13	60.043	0.000	-60.629	-60.629	0.000	-64.178	0.000	172.353	4.407	132.327	633
2:42:15	60.043	0.000	-60.629	-60.629	0.000	-64.178	0.000	171.825	4.407	132.041	633
2:42:17	60.043	0.000	-60.629	-60.629	0.000	-64.178	0.000	171.300	4.407	131.756	633
2:42:19	60.043	0.000	-60.629	-60.629	0.000	-64.178	0.000	170.776	4.407	131.472	633
2:42:21	60.043	0.000	-60.629	-60.629	0.000	-64.178	0.000	170.256	4.407	131.190	633

A Point	2:27:19		
FPointA	60.0390	2:27:19 AM	
A Value	60.0417		
C Value	59.8360	#N/A	
Delta FCA	-0.205751419		
FR C	-307.7	MW/0.1 Hz	
Slope A-C dF/dT	#N/A	Hz/second	
C Value Maximum Resource Loss	633		
Secondary C Value	No	n/a	Time

A Point	2:27:19		
FPointA	60.03900146	2:27:19	
A Value	60.04174995		
C Value	59.83599854	#N/A	
Delta FC			

	Value B 12 to 24 sec	FR B 12 to 24 sec	Value B 18 to 30 sec	FR B 18 to 30 sec	Value B 20 to 40 sec	FR B 20 to 40 sec	Value B 18 to 52 sec	FR B 18 to 52 sec
B Frequency Value	59.8823		59.8844		59.8887		59.8879	
Delta FB	-0.1595	-397.436	-0.1573	-402.634	-0.1530	-415.164	-0.1538	-411.959
Slope B dF/dT	-0.00797319		-0.00786606		-0.0076522		-0.0076903	
RatioB-C	77.5032		76.4617		74.3829		74.7530	
Sustainability Index	-0.0172		-0.0193		-0.0236		-0.0228	

Tzero	2:27:19	
FT+4	59.83599854	
FT+10	59.89099884	
FT+20	59.88299942	
FT+60	59.88999939	

Interconnection Evaluation

riod (indicates ramp direction during recovery period)

B Value Average Resource Loss	633	
B Value Average LaaR Loss	0	
B Value Average Net Loss	633	

			Interconnection Bias Total		
			EI	ERCOT	WECC
Interconnection Bias Setting	-660		-6349	-660	-2024
IPFR as a % of Bias Setting	0.00%				
Interconnection Total Energy	37446	60.07%			
Interconnection Peak Energy	62339				

Frequency and Interconnection Frequency Response @ different Average pe

Generator Trip MW	Generator Trip MW	Generator Trip MW	Generator Trip MW	Generator Trip MW	Generator Trip MW	LaaR Trip MW	Total Generation Trip MW	Interconnection Primary Frequency Response	FR B 20 to 52 sec Average MW
								MW/0.1 Hz	
							0		
							0		
							0		
							0		

	Value B 12 to 24 sec Average Frequency	FR B 12 to 24 sec Average MW	Value B 18 to 30 sec Average Frequency	FR B 18 to 30 sec Average MW	Value B 20 to 40 sec Average Frequency	FR B 20 to 40 sec Average MW	Value B 18 to 52 sec Average Frequency	FR B 18 to 52 sec Average MW
T-72 sec								
T-70 sec								
T-68 sec								

	0			T-66 sec										
	0			T-64 sec										
	0			T-62 sec										
	0			T-60 sec										
	0			T-58 sec										
	0			T-56 sec										
	0			T-54 sec										
	0			T-52 sec										
	0			T-50 sec										
	0			T-48 sec										
	0			T-46 sec										
	0			T-44 sec										
	0			T-42 sec										
	0			T-40 sec										
	0			T-38 sec										
	0			T-36 sec										
	0			T-34 sec										
	0			T-32 sec										
	0			T-30 sec										
	0			T-28 sec										
	0			T-26 sec										
	0			T-24 sec										
	0			T-22 sec										
	0			T-20 sec										
	0			T-18 sec										
	0			T-16 sec	60.042									
	0			T-14 sec	60.042									
	0			T-12 sec	60.042									
	0			T-10 sec	60.042									
	0			T-08 sec	60.042									
	0			T-06 sec	60.042									
	0			T-04 sec	60.042									
	0			T-02 sec	60.042									
	633	-992.9518715		T+0 sec										
	633	-992.9518715		T+02 sec										
	633	-307.6527991		T+04 sec										
0	633	-307.6527991		T+06 sec										
0	633	-366.424467		T+08 sec										
0	633	-419.8973949		T+10 sec										
0	633	-419.8973949		T+12 sec	59.8823	-397.436								
0	633	-391.3473627		T+14 sec	59.8823	-397.436								
0	633	-379.6102991		T+16 sec	59.8823	-397.436								
0	633	-379.6102991		T+18 sec	59.8823	-397.436	59.8844	-402.634					59.8879	-411.959
0	633	-398.7388161	-413.8616294	T+20 sec	59.8823	-397.436	59.8844	-402.634	59.8887	-415.164			59.8879	-411.959
0	633	-406.4248062	-413.8616294	T+22 sec	59.8823	-397.436	59.8844	-402.634	59.8887	-415.164			59.8879	-411.959
0	633	-406.4248062	-413.8616294	T+24 sec	59.8823	-397.436	59.8844	-402.634	59.8887	-415.164			59.8879	-411.959

0	633	-403.823545	-413.8616294	T+26 sec		59.8844	-402.634	59.8887	-415.164	59.8879	-411.959
0	633	-411.7087472	-413.8616294	T+28 sec		59.8844	-402.634	59.8887	-415.164	59.8879	-411.959
0	633	-411.7087472	-413.8616294	T+30 sec		59.8844	-402.634	59.8887	-415.164	59.8879	-411.959
0	633	-417.1318913	-413.8616294	T+32 sec				59.8887	-415.164	59.8879	-411.959
0	633	-428.4294489	-413.8616294	T+34 sec				59.8887	-415.164	59.8879	-411.959
0	633	-428.4294489	-413.8616294	T+36 sec				59.8887	-415.164	59.8879	-411.959
0	633	-425.5508021	-413.8616294	T+38 sec				59.8887	-415.164	59.8879	-411.959
0	633	-428.4294489	-413.8616294	T+40 sec				59.8887	-415.164	59.8879	-411.959
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0	633	-419.8973949	-413.8616294	T+44 sec						59.8879	-411.959
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0	633	-403.823545	-413.8616294	T+48 sec						59.8879	-411.959
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0	633	-411.7087472		T+56 sec							
0	633	-417.1318913		T+58 sec							
0	633	-417.1318913		T+60 sec							
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0	633	-1156.155039
0	633	-1223.229162
0	633	-1383.559028
0	633	-1383.559028
0	633	-1553.355039
0	633	-1676.895074
0	633	-1676.895074
0	633	-1770.657333
0	633	-2281.079827

0	633	-2281.079827
0	633	-2782.546357
0	633	-3779.459105
0	633	-3779.459105
0	633	-4019.308514
0	633	-4964.462289
0	633	-4964.462289
0	633	-4964.462289
0	633	-11007.4396
0	633	-11007.4396
0	633	-13322.93473
0	633	-11007.4396
0	633	-11007.4396
0	633	-84446.38779
0	633	28148.79593
0	633	28148.79593
0	633	50667.83267
0	633	10127.38187
0	633	10127.38187
0	633	14888.93244
0	633	50667.83267
0	633	50667.83267
0	633	50667.83267
0	633	50667.83267
0	633	50667.83267

Non-Conforming Load sign convention - (Data is positive for Load then enter "+" else "-"

Tir
Valı
Value

Value B 20 to 52 sec	FR B 20 to 52 sec
59.8887	
-0.1530	-413.862
-0.0076522	
74.3829	
-0.0236	

Value A Pı
Value B Pos

riods of B

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

12 to 24

Value B 20 to 52 sec Average Frequency	FR B 20 to 52 sec Average MW		T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	FRO Expected Primary Freq Response MW		T
		T-72 sec	2:26:09	60.0270	633.00	0.00	253.63	0.00	0.00	0.00	0.00	-420.00	7593.39	-38.071	T-72 sec	2:26:09
		T-70 sec	2:26:11	60.0270	633.00	0.00	253.63	0.00	0.00	0.00	0.00	-420.00	7593.39	-38.071	T-70 sec	2:26:11
		T-68 sec	2:26:13	60.0260	633.00	0.00	253.63	0.00	0.00	0.00	0.00	-420.00	7593.72	-36.661	T-68 sec	2:26:13

		T-66 sec	2:26:15	60.0220	633.00	0.00	253.63	0.00	0.00	0.00	0.00	-420.00	7594.05	-31.019	T-66 sec	2:26:15
		T-64 sec	2:26:17	60.0220	633.00	0.00	253.63	0.00	0.00	0.00	0.00	-420.00	7594.05	-31.019	T-64 sec	2:26:17
		T-62 sec	2:26:19	60.0170	633.00	0.00	253.63	0.00	0.00	0.00	0.00	-420.00	7594.38	-23.968	T-62 sec	2:26:19
		T-60 sec	2:26:21	60.0190	633.00	0.00	253.63	0.00	0.00	0.00	0.00	-420.00	7594.71	-26.791	T-60 sec	2:26:21
		T-58 sec	2:26:23	60.0190	633.00	0.00	253.63	0.00	0.00	0.00	0.00	-420.00	7594.71	-26.791	T-58 sec	2:26:23
		T-56 sec	2:26:25	60.0190	633.00	0.00	246.96	0.00	0.00	0.00	0.00	-420.00	7595.04	-26.791	T-56 sec	2:26:25
		T-54 sec	2:26:27	60.0210	633.00	0.00	246.96	0.00	0.00	0.00	0.00	-420.00	7595.37	-29.610	T-54 sec	2:26:27
		T-52 sec	2:26:29	60.0210	633.00	0.00	246.96	0.00	0.00	0.00	0.00	-420.00	7595.37	-29.610	T-52 sec	2:26:29
		T-50 sec	2:26:31	60.0210	633.00	0.00	246.96	0.00	0.00	0.00	0.00	-420.00	7595.70	-29.610	T-50 sec	2:26:31
		T-48 sec	2:26:33	60.0190	633.00	0.00	246.96	0.00	0.00	0.00	0.00	-420.00	7596.03	-26.791	T-48 sec	2:26:33
		T-46 sec	2:26:35	60.0190	633.00	0.00	246.96	0.00	0.00	0.00	0.00	-420.00	7596.03	-26.791	T-46 sec	2:26:35
		T-44 sec	2:26:37	60.0220	633.00	0.00	246.96	0.00	0.00	0.00	0.00	-420.00	7596.36	-31.019	T-44 sec	2:26:37
		T-42 sec	2:26:39	60.0310	633.00	0.00	254.54	0.00	0.00	0.00	0.00	-420.00	7596.69	-43.708	T-42 sec	2:26:39
		T-40 sec	2:26:41	60.0310	633.00	0.00	254.54	0.00	0.00	0.00	0.00	-420.00	7596.69	-43.708	T-40 sec	2:26:41
		T-38 sec	2:26:43	60.0370	633.00	0.00	254.54	0.00	0.00	0.00	0.00	-420.00	7597.02	-52.168	T-38 sec	2:26:43
		T-36 sec	2:26:45	60.0360	633.00	0.00	254.54	0.00	0.00	0.00	0.00	-420.00	7597.35	-50.759	T-36 sec	2:26:45
		T-34 sec	2:26:47	60.0360	633.00	0.00	254.54	0.00	0.00	0.00	0.00	-420.00	7597.35	-50.759	T-34 sec	2:26:47
		T-32 sec	2:26:49	60.0460	633.00	0.00	254.54	0.00	0.00	0.00	0.00	-420.00	7597.68	-64.862	T-32 sec	2:26:49
		T-30 sec	2:26:51	60.0480	633.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7598.01	-67.680	T-30 sec	2:26:51
		T-28 sec	2:26:53	60.0480	633.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7598.01	-67.680	T-28 sec	2:26:53
		T-26 sec	2:26:55	60.0430	633.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7598.34	-60.629	T-26 sec	2:26:55
		T-24 sec	2:26:57	60.0410	633.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7598.67	-57.811	T-24 sec	2:26:57
		T-22 sec	2:26:59	60.0410	633.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7598.67	-57.811	T-22 sec	2:26:59
		T-20 sec	2:27:01	60.0410	633.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7599.00	-57.811	T-20 sec	2:27:01
		T-18 sec	2:27:03	60.0390	633.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7599.33	-54.992	T-18 sec	2:27:03
		T-16 sec	2:27:05	60.0390	633.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7599.33	-54.992	T-16 sec	2:27:05
		T-14 sec	2:27:07	60.0430	633.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7599.66	-60.629	T-14 sec	2:27:07
		T-12 sec	2:27:09	60.0450	633.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7599.99	-63.447	T-12 sec	2:27:09
		T-10 sec	2:27:11	60.0450	633.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7599.99	-63.447	T-10 sec	2:27:11
		T-08 sec	2:27:13	60.0410	633.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7600.32	-57.811	T-08 sec	2:27:13
		T-06 sec	2:27:15	60.0410	633.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7600.65	-57.811	T-06 sec	2:27:15
		T-04 sec	2:27:17	60.0410	633.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7600.65	-57.811	T-04 sec	2:27:17
		T-02 sec	2:27:19	60.0390	633.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7600.98	-54.992	T-02 sec	2:27:19
		T+0 sec	2:27:21	59.9780	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7601.31	31.019	T+0 sec	2:27:21
		T+02 sec	2:27:23	59.9780	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7601.31	31.019	T+02 sec	2:27:23
		T+04 sec	2:27:25	59.8360	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7570.00	231.242	T+04 sec	2:27:25
		T+06 sec	2:27:27	59.8360	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7570.00	231.242	T+06 sec	2:27:27
		T+08 sec	2:27:29	59.8690	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7569.00	184.711	T+08 sec	2:27:29
		T+10 sec	2:27:31	59.8910	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7570.00	153.692	T+10 sec	2:27:31
		T+12 sec	2:27:33	59.8910	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7570.00	153.692	T+12 sec	2:27:33
		T+14 sec	2:27:35	59.8800	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7570.00	169.198	T+14 sec	2:27:35
		T+16 sec	2:27:37	59.8750	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7570.00	176.250	T+16 sec	2:27:37
		T+18 sec	2:27:39	59.8750	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7570.00	176.250	T+18 sec	2:27:39
59.8887	-413.862	T+20 sec	2:27:41	59.8830	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7570.00	164.971	T+20 sec	2:27:41
59.8887	-413.862	T+22 sec	2:27:43	59.8860	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7570.00	160.738	T+22 sec	2:27:43
59.8887	-413.862	T+24 sec	2:27:45	59.8860	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7570.00	160.738	T+24 sec	2:27:45

59.8887	-413.862	T+26 sec	2:27:47	59.8850	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7570.00	162.152	T+26 sec	2:27:47
59.8887	-413.862	T+28 sec	2:27:49	59.8880	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7570.00	157.919	T+28 sec	2:27:49
59.8887	-413.862	T+30 sec	2:27:51	59.8880	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7570.00	157.919	T+30 sec	2:27:51
59.8887	-413.862	T+32 sec	2:27:53	59.8900	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7570.00	155.101	T+32 sec	2:27:53
59.8887	-413.862	T+34 sec	2:27:55	59.8940	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7570.00	149.459	T+34 sec	2:27:55
59.8887	-413.862	T+36 sec	2:27:57	59.8940	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7570.00	149.459	T+36 sec	2:27:57
59.8887	-413.862	T+38 sec	2:27:59	59.8930	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7570.00	150.868	T+38 sec	2:27:59
59.8887	-413.862	T+40 sec	2:28:01	59.8940	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7570.00	149.459	T+40 sec	2:28:01
59.8887	-413.862	T+42 sec	2:28:03	59.8940	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7570.00	149.459	T+42 sec	2:28:03
59.8887	-413.862	T+44 sec	2:28:05	59.8910	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7570.00	153.692	T+44 sec	2:28:05
59.8887	-413.862	T+46 sec	2:28:07	59.8850	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7570.00	162.152	T+46 sec	2:28:07
59.8887	-413.862	T+48 sec	2:28:09	59.8850	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7570.00	162.152	T+48 sec	2:28:09
59.8887	-413.862	T+50 sec	2:28:11	59.8850	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7570.00	162.152	T+50 sec	2:28:11
59.8887	-413.862	T+52 sec	2:28:13	59.8870	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7570.00	159.329	T+52 sec	2:28:13
		T+54 sec	2:28:15	59.8870	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7570.00	159.329	T+54 sec	2:28:15
		T+56 sec	2:28:17	59.8880	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7570.00	157.919	T+56 sec	2:28:17
		T+58 sec	2:28:19	59.8900	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7570.00	155.101	T+58 sec	2:28:19
		T+60 sec	2:28:21	59.8900	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7570.00	155.101	T+60 sec	2:28:21
		T+62 sec	2:28:23	59.8890	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7570.00	156.510	T+62 sec	2:28:23
		T+64 sec	2:28:25	59.8730	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7568.00	179.068	T+64 sec	2:28:25
		T+66 sec	2:28:27	59.8730	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7568.00	179.068	T+66 sec	2:28:27
		T+68 sec	2:28:29	59.8570	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7565.00	201.632	T+68 sec	2:28:29
		T+70 sec	2:28:31	59.8520	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7560.00	208.678	T+70 sec	2:28:31
		T+72 sec	2:28:33	59.8520	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7560.00	208.678	T+72 sec	2:28:33
		T+74 sec	2:28:35	59.8580	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7563.00	200.218	T+74 sec	2:28:35
		T+76 sec	2:28:37	59.8660	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7564.00	188.938	T+76 sec	2:28:37
		T+78 sec	2:28:39	59.8660	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7564.00	188.938	T+78 sec	2:28:39
		T+80 sec	2:28:41	59.8650	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7566.00	190.348	T+80 sec	2:28:41
			2:28:43	59.8660	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7570.00	188.938		
			2:28:45	59.8660	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7570.00	188.938		
			2:28:47	59.8710	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7570.00	181.892		
			2:28:49	59.8790	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7570.00	170.608		
			2:28:51	59.8790	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7570.00	170.608		
			2:28:53	59.8800	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7570.00	169.198		
			2:28:55	59.8860	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7570.00	160.738		
			2:28:57	59.8860	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7570.00	160.738		
			2:28:59	59.8900	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7569.00	155.101		
			2:29:01	59.8890	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7575.00	156.510		
			2:29:03	59.8890	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7575.00	156.510		
			2:29:05	59.8930	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7573.00	150.868		
			2:29:07	59.9030	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7571.00	136.770		
			2:29:09	59.9030	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7571.00	136.770		
			2:29:11	59.9020	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7573.00	138.179		
			2:29:13	59.9040	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7575.00	135.361		
			2:29:15	59.9040	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7575.00	135.361		

2:29:17	59.9070	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7577.00	131.128
2:29:19	59.9160	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7577.00	118.439
2:29:21	59.9160	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7577.00	118.439
2:29:23	59.9160	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7578.00	118.439
2:29:25	59.9180	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7579.00	115.621
2:29:27	59.9180	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7579.00	115.621
2:29:29	59.9200	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7580.00	112.803
2:29:31	59.9200	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7581.00	112.803
2:29:33	59.9200	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7581.00	112.803
2:29:35	59.9170	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7585.00	117.030
2:29:37	59.9210	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7588.00	111.388
2:29:39	59.9210	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7588.00	111.388
2:29:41	59.9230	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7589.00	108.570
2:29:43	59.9250	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7589.00	105.751
2:29:45	59.9250	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7589.00	105.751
2:29:47	59.9280	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7590.00	101.518
2:29:49	59.9320	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7590.00	95.881
2:29:51	59.9320	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7590.00	95.881
2:29:53	59.9270	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7590.00	102.933
2:29:55	59.9310	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7591.00	97.290
2:29:57	59.9310	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7591.00	97.290
2:29:59	59.9290	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7591.00	100.109
2:30:01	59.9310	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7591.00	97.290
2:30:03	59.9310	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7591.00	97.290
2:30:05	59.9370	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7592.00	88.830
2:30:07	59.9450	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7592.00	77.550
2:30:09	59.9450	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7592.00	77.550
2:30:11	59.9490	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7593.00	71.908
2:30:13	59.9420	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7594.00	81.778
2:30:15	59.9420	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7594.00	81.778
2:30:17	59.9410	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7595.00	83.187
2:30:19	59.9450	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7655.00	77.550
2:30:21	59.9450	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7655.00	77.550
2:30:23	59.9480	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7656.00	73.317
2:30:25	59.9490	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7656.00	71.908
2:30:27	59.9490	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7656.00	71.908
2:30:29	59.9510	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7657.00	69.090
2:30:31	59.9530	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7657.00	66.271
2:30:33	59.9530	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7657.00	66.271
2:30:35	59.9510	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7658.00	69.090
2:30:37	59.9520	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7658.00	67.680
2:30:39	59.9520	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7658.00	67.680
2:30:41	59.9520	0.00	0.00	249.34	0.00	0.00	0.00	0.00	-420.00	7659.00	67.680
2:30:43	59.9520	0.00	0.00	249.34	0.00	0.00	0.00	0.00	-420.00	7659.00	67.680
2:30:45	59.9520	0.00	0.00	249.34	0.00	0.00	0.00	0.00	-420.00	7659.00	67.680
2:30:47	59.9540	0.00	0.00	249.34	0.00	0.00	0.00	0.00	-420.00	7659.00	64.862

2:30:49	59.9530	0.00	0.00	249.34	0.00	0.00	0.00	0.00	-420.00	7660.00	66.271
2:30:51	59.9530	0.00	0.00	249.34	0.00	0.00	0.00	0.00	-420.00	7660.00	66.271
2:30:53	59.9530	0.00	0.00	249.34	0.00	0.00	0.00	0.00	-420.00	7660.00	66.271
2:30:55	59.9540	0.00	0.00	258.28	0.00	0.00	0.00	0.00	-420.00	7661.00	64.862
2:30:57	59.9540	0.00	0.00	258.28	0.00	0.00	0.00	0.00	-420.00	7661.00	64.862
2:30:59	59.9540	0.00	0.00	258.28	0.00	0.00	0.00	0.00	-420.00	7661.00	64.862
2:31:01	59.9570	0.00	0.00	258.28	0.00	0.00	0.00	0.00	-420.00	7625.40	60.629
2:31:03	59.9570	0.00	0.00	258.28	0.00	0.00	0.00	0.00	-420.00	7625.40	60.629
2:31:05	59.9560	0.00	0.00	258.28	0.00	0.00	0.00	0.00	-420.00	7625.73	62.038
2:31:07	59.9560	0.00	0.00	258.28	0.00	0.00	0.00	0.00	-420.00	7626.06	62.038
2:31:09	59.9560	0.00	0.00	258.28	0.00	0.00	0.00	0.00	-420.00	7626.06	62.038
2:31:11	59.9550	0.00	0.00	258.41	0.00	0.00	0.00	0.00	-420.00	7626.39	63.447
2:31:13	59.9610	0.00	0.00	258.41	0.00	0.00	0.00	0.00	-420.00	7626.72	54.992
2:31:15	59.9610	0.00	0.00	258.41	0.00	0.00	0.00	0.00	-420.00	7626.72	54.992
2:31:17	59.9620	0.00	0.00	258.41	0.00	0.00	0.00	0.00	-420.00	7627.05	53.577
2:31:19	59.9680	0.00	0.00	258.41	0.00	0.00	0.00	0.00	-420.00	7627.38	45.122
2:31:21	59.9680	0.00	0.00	258.41	0.00	0.00	0.00	0.00	-420.00	7627.38	45.122
2:31:23	59.9660	0.00	0.00	258.41	0.00	0.00	0.00	0.00	-420.00	7627.71	47.941
2:31:25	59.9680	0.00	0.00	260.54	0.00	0.00	0.00	0.00	-420.00	7628.04	45.122
2:31:27	59.9680	0.00	0.00	260.54	0.00	0.00	0.00	0.00	-420.00	7628.04	45.122
2:31:29	59.9700	0.00	0.00	260.54	0.00	0.00	0.00	0.00	-420.00	7628.37	42.298
2:31:31	59.9700	0.00	0.00	260.54	0.00	0.00	0.00	0.00	-420.00	7628.70	42.298
2:31:33	59.9700	0.00	0.00	260.54	0.00	0.00	0.00	0.00	-420.00	7628.70	42.298
2:31:35	59.9690	0.00	0.00	260.54	0.00	0.00	0.00	0.00	-420.00	7629.03	43.708
2:31:37	59.9700	0.00	0.00	260.54	0.00	0.00	0.00	0.00	-420.00	7629.36	42.298
2:31:39	59.9700	0.00	0.00	260.54	0.00	0.00	0.00	0.00	-420.00	7629.36	42.298
2:31:41	59.9710	0.00	0.00	257.88	0.00	0.00	0.00	0.00	-420.00	7629.69	40.889
2:31:43	59.9730	0.00	0.00	257.88	0.00	0.00	0.00	0.00	-420.00	7630.02	38.071
2:31:45	59.9730	0.00	0.00	257.88	0.00	0.00	0.00	0.00	-420.00	7630.02	38.071
2:31:47	59.9760	0.00	0.00	257.88	0.00	0.00	0.00	0.00	-420.00	7630.35	33.838
2:31:49	59.9780	0.00	0.00	257.88	0.00	0.00	0.00	0.00	-420.00	7630.68	31.019
2:31:51	59.9780	0.00	0.00	257.88	0.00	0.00	0.00	0.00	-420.00	7630.68	31.019
2:31:53	59.9760	0.00	0.00	257.88	0.00	0.00	0.00	0.00	-420.00	7631.01	33.838
2:31:55	59.9760	0.00	0.00	258.59	0.00	0.00	0.00	0.00	-420.00	7631.34	33.838
2:31:57	59.9760	0.00	0.00	258.59	0.00	0.00	0.00	0.00	-420.00	7631.34	33.838
2:31:59	59.9780	0.00	0.00	258.59	0.00	0.00	0.00	0.00	-420.00	7631.67	31.019
2:32:01	59.9800	0.00	0.00	258.59	0.00	0.00	0.00	0.00	-420.00	7632.00	28.201
2:32:03	59.9800	0.00	0.00	258.59	0.00	0.00	0.00	0.00	-420.00	7632.00	28.201
2:32:05	59.9820	0.00	0.00	258.59	0.00	0.00	0.00	0.00	-420.00	7632.33	25.382
2:32:07	59.9800	0.00	0.00	258.59	0.00	0.00	0.00	0.00	-420.00	7632.66	28.201
2:32:09	59.9800	0.00	0.00	258.59	0.00	0.00	0.00	0.00	-420.00	7632.66	28.201
2:32:11	59.9790	0.00	0.00	261.91	0.00	0.00	0.00	0.00	-420.00	7632.99	29.610
2:32:13	59.9790	0.00	0.00	261.91	0.00	0.00	0.00	0.00	-420.00	7633.32	29.610
2:32:15	59.9790	0.00	0.00	261.91	0.00	0.00	0.00	0.00	-420.00	7633.32	29.610
2:32:17	59.9830	0.00	0.00	261.91	0.00	0.00	0.00	0.00	-420.00	7633.65	23.968
2:32:19	59.9840	0.00	0.00	261.91	0.00	0.00	0.00	0.00	-420.00	7633.98	22.558

2:32:21	59.9840	0.00	0.00	261.91	0.00	0.00	0.00	0.00	-420.00	7633.98	22.558
2:32:23	59.9880	0.00	0.00	261.91	0.00	0.00	0.00	0.00	-420.00	7634.31	16.921
2:32:25	59.9870	0.00	0.00	256.75	0.00	0.00	0.00	0.00	-420.00	7634.64	18.331
2:32:27	59.9870	0.00	0.00	256.75	0.00	0.00	0.00	0.00	-420.00	7634.64	18.331
2:32:29	59.9870	0.00	0.00	256.75	0.00	0.00	0.00	0.00	-420.00	7634.97	18.331
2:32:31	59.9930	0.00	0.00	256.75	0.00	0.00	0.00	0.00	-420.00	7635.30	9.870
2:32:33	59.9930	0.00	0.00	256.75	0.00	0.00	0.00	0.00	-420.00	7635.30	9.870
2:32:35	59.9920	0.00	0.00	256.75	0.00	0.00	0.00	0.00	-420.00	7635.63	11.279
2:32:37	59.9890	0.00	0.00	256.75	0.00	0.00	0.00	0.00	-420.00	7635.96	15.512
2:32:39	59.9890	0.00	0.00	256.75	0.00	0.00	0.00	0.00	-420.00	7635.96	15.512
2:32:41	59.9860	0.00	0.00	167.43	0.00	0.00	0.00	0.00	-420.00	7636.29	19.740
2:32:43	59.9830	0.00	0.00	167.43	0.00	0.00	0.00	0.00	-420.00	7636.62	23.968
2:32:45	59.9830	0.00	0.00	167.43	0.00	0.00	0.00	0.00	-420.00	7636.62	23.968
2:32:47	59.9880	0.00	0.00	167.43	0.00	0.00	0.00	0.00	-420.00	7636.95	16.921
2:32:49	59.9960	0.00	0.00	167.43	0.00	0.00	0.00	0.00	-420.00	7637.28	5.642
2:32:51	59.9960	0.00	0.00	167.43	0.00	0.00	0.00	0.00	-420.00	7637.28	5.642
2:32:53	59.9980	0.00	0.00	167.43	0.00	0.00	0.00	0.00	-420.00	7637.61	2.818
2:32:55	60.0010	0.00	0.00	164.97	0.00	0.00	0.00	0.00	-420.00	7637.94	-1.409
2:32:57	60.0010	0.00	0.00	164.97	0.00	0.00	0.00	0.00	-420.00	7637.94	-1.409
2:32:59	59.9990	0.00	0.00	164.97	0.00	0.00	0.00	0.00	-420.00	7638.27	1.409
2:33:01	59.9990	0.00	0.00	164.97	0.00	0.00	0.00	0.00	-420.00	7638.60	1.409
2:33:03	59.9990	0.00	0.00	164.97	0.00	0.00	0.00	0.00	-420.00	7638.60	1.409
2:33:05	60.0020	0.00	0.00	164.97	0.00	0.00	0.00	0.00	-420.00	7638.93	-2.818
2:33:07	60.0070	0.00	0.00	164.97	0.00	0.00	0.00	0.00	-420.00	7639.26	-9.870
2:33:09	60.0070	0.00	0.00	164.97	0.00	0.00	0.00	0.00	-420.00	7639.26	-9.870
2:33:11	60.0080	0.00	0.00	157.63	0.00	0.00	0.00	0.00	-420.00	7639.59	-11.279
2:33:13	60.0140	0.00	0.00	157.63	0.00	0.00	0.00	0.00	-420.00	7639.92	-19.740
2:33:15	60.0140	0.00	0.00	157.63	0.00	0.00	0.00	0.00	-420.00	7639.92	-19.740
2:33:17	60.0170	0.00	0.00	157.63	0.00	0.00	0.00	0.00	-420.00	7640.25	-23.968
2:33:19	60.0210	0.00	0.00	157.63	0.00	0.00	0.00	0.00	-420.00	7640.58	-29.610
2:33:21	60.0210	0.00	0.00	157.63	0.00	0.00	0.00	0.00	-420.00	7640.58	-29.610
2:33:23	60.0170	0.00	0.00	157.63	0.00	0.00	0.00	0.00	-420.00	7640.91	-23.968
2:33:25	60.0190	0.00	0.00	155.53	0.00	0.00	0.00	0.00	-420.00	7641.24	-26.791
2:33:27	60.0190	0.00	0.00	155.53	0.00	0.00	0.00	0.00	-420.00	7641.24	-26.791
2:33:29	60.0230	0.00	0.00	155.53	0.00	0.00	0.00	0.00	-420.00	7641.57	-32.428
2:33:31	60.0250	0.00	0.00	155.53	0.00	0.00	0.00	0.00	-420.00	7641.90	-35.252
2:33:33	60.0250	0.00	0.00	155.53	0.00	0.00	0.00	0.00	-420.00	7641.90	-35.252
2:33:35	60.0210	0.00	0.00	155.53	0.00	0.00	0.00	0.00	-420.00	7642.23	-29.610
2:33:37	60.0240	0.00	0.00	155.53	0.00	0.00	0.00	0.00	-420.00	7642.56	-33.838
2:33:39	60.0240	0.00	0.00	155.53	0.00	0.00	0.00	0.00	-420.00	7642.56	-33.838
2:33:41	60.0240	0.00	0.00	160.45	0.00	0.00	0.00	0.00	-420.00	7642.89	-33.838
2:33:43	60.0200	0.00	0.00	160.45	0.00	0.00	0.00	0.00	-420.00	7643.22	-28.201
2:33:45	60.0200	0.00	0.00	160.45	0.00	0.00	0.00	0.00	-420.00	7643.22	-28.201
2:33:47	60.0250	0.00	0.00	160.45	0.00	0.00	0.00	0.00	-420.00	7643.55	-35.252
2:33:49	60.0200	0.00	0.00	160.45	0.00	0.00	0.00	0.00	-420.00	7643.88	-28.201
2:33:51	60.0200	0.00	0.00	160.45	0.00	0.00	0.00	0.00	-420.00	7643.88	-28.201

2:33:53	60.0200	0.00	0.00	160.45	0.00	0.00	0.00	0.00	-420.00	7644.21	-28.201
2:33:55	60.0220	0.00	0.00	163.96	0.00	0.00	0.00	0.00	-420.00	7644.54	-31.019
2:33:57	60.0220	0.00	0.00	163.96	0.00	0.00	0.00	0.00	-420.00	7644.54	-31.019
2:33:59	60.0220	0.00	0.00	163.96	0.00	0.00	0.00	0.00	-420.00	7644.87	-31.019
2:34:01	60.0210	0.00	0.00	163.96	0.00	0.00	0.00	0.00	-420.00	7645.20	-29.610
2:34:03	60.0210	0.00	0.00	163.96	0.00	0.00	0.00	0.00	-420.00	7645.20	-29.610
2:34:05	60.0230	0.00	0.00	163.96	0.00	0.00	0.00	0.00	-420.00	7645.53	-32.428
2:34:07	60.0220	0.00	0.00	163.96	0.00	0.00	0.00	0.00	-420.00	7645.86	-31.019
2:34:09	60.0220	0.00	0.00	163.96	0.00	0.00	0.00	0.00	-420.00	7645.86	-31.019
2:34:11	60.0190	0.00	0.00	166.07	0.00	0.00	0.00	0.00	-420.00	7646.19	-26.791
2:34:13	60.0180	0.00	0.00	166.07	0.00	0.00	0.00	0.00	-420.00	7646.52	-25.382
2:34:15	60.0180	0.00	0.00	166.07	0.00	0.00	0.00	0.00	-420.00	7646.52	-25.382
2:34:17	60.0180	0.00	0.00	166.07	0.00	0.00	0.00	0.00	-420.00	7646.85	-25.382
2:34:19	60.0190	0.00	0.00	166.07	0.00	0.00	0.00	0.00	-420.00	7647.18	-26.791
2:34:21	60.0190	0.00	0.00	166.07	0.00	0.00	0.00	0.00	-420.00	7647.18	-26.791
2:34:23	60.0190	0.00	0.00	166.07	0.00	0.00	0.00	0.00	-420.00	7647.51	-26.791
2:34:25	60.0150	0.00	0.00	163.77	0.00	0.00	0.00	0.00	-420.00	7647.84	-21.149
2:34:27	60.0150	0.00	0.00	163.77	0.00	0.00	0.00	0.00	-420.00	7647.84	-21.149
2:34:29	60.0160	0.00	0.00	163.77	0.00	0.00	0.00	0.00	-420.00	7648.17	-22.558
2:34:31	60.0130	0.00	0.00	163.77	0.00	0.00	0.00	0.00	-420.00	7648.50	-18.331
2:34:33	60.0130	0.00	0.00	163.77	0.00	0.00	0.00	0.00	-420.00	7648.50	-18.331
2:34:35	60.0120	0.00	0.00	163.77	0.00	0.00	0.00	0.00	-420.00	7648.83	-16.921
2:34:37	60.0100	0.00	0.00	163.77	0.00	0.00	0.00	0.00	-420.00	7649.16	-14.098
2:34:39	60.0100	0.00	0.00	163.77	0.00	0.00	0.00	0.00	-420.00	7649.16	-14.098
2:34:41	60.0070	0.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7649.49	-9.870
2:34:43	60.0090	0.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7649.82	-12.688
2:34:45	60.0090	0.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7649.82	-12.688
2:34:47	60.0090	0.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7650.15	-12.688
2:34:49	60.0030	0.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7650.48	-4.228
2:34:51	60.0030	0.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7650.48	-4.228
2:34:53	59.9990	0.00	0.00	165.10	0.00	0.00	0.00	0.00	-420.00	7650.81	1.409
2:34:55	59.9920	0.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7651.14	11.279
2:34:57	59.9920	0.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7651.14	11.279
2:34:59	59.9910	0.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7651.47	12.688
2:35:01	59.9920	0.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7651.80	11.279
2:35:03	59.9920	0.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7651.80	11.279
2:35:05	59.9880	0.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7652.13	16.921
2:35:07	59.9850	0.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7652.46	21.149
2:35:09	59.9850	0.00	0.00	165.48	0.00	0.00	0.00	0.00	-420.00	7652.46	21.149
2:35:11	59.9840	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7652.79	22.558
2:35:13	59.9840	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7616.00	22.558
2:35:15	59.9840	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7616.00	22.558
2:35:17	59.9820	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7626.00	25.382
2:35:19	59.9820	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7632.00	25.382
2:35:21	59.9820	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7632.00	25.382
2:35:23	59.9790	0.00	0.00	206.46	0.00	0.00	0.00	0.00	-420.00	7632.00	29.610

2:35:25	59.9760	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7632.00	33.838
2:35:27	59.9760	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7632.00	33.838
2:35:29	59.9760	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7632.00	33.838
2:35:31	59.9820	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7632.00	25.382
2:35:33	59.9820	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7632.00	25.382
2:35:35	59.9780	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7632.00	31.019
2:35:37	59.9740	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7632.00	36.661
2:35:39	59.9740	0.00	0.00	211.26	0.00	0.00	0.00	0.00	-420.00	7632.00	36.661
2:35:41	59.9760	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7632.00	33.838
2:35:43	59.9770	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7632.00	32.428
2:35:45	59.9770	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7632.00	32.428
2:35:47	59.9750	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7632.00	35.252
2:35:49	59.9690	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7632.00	43.708
2:35:51	59.9690	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7632.00	43.708
2:35:53	59.9700	0.00	0.00	214.35	0.00	0.00	0.00	0.00	-420.00	7632.00	42.298
2:35:55	59.9730	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7632.00	38.071
2:35:57	59.9730	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7632.00	38.071
2:35:59	59.9780	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7632.00	31.019
2:36:01	59.9780	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7632.00	31.019
2:36:03	59.9780	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7632.00	31.019
2:36:05	59.9750	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7632.00	35.252
2:36:07	59.9760	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7632.00	33.838
2:36:09	59.9760	0.00	0.00	212.17	0.00	0.00	0.00	0.00	-420.00	7632.00	33.838
2:36:11	59.9750	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7632.00	35.252
2:36:13	59.9690	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7632.00	43.708
2:36:15	59.9690	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7632.00	43.708
2:36:17	59.9660	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7632.00	47.941
2:36:19	59.9660	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7632.00	47.941
2:36:21	59.9660	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7632.00	47.941
2:36:23	59.9690	0.00	0.00	215.60	0.00	0.00	0.00	0.00	-420.00	7632.00	43.708
2:36:25	59.9680	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7632.00	45.122
2:36:27	59.9680	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7632.00	45.122
2:36:29	59.9650	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7632.00	49.350
2:36:31	59.9700	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7632.00	42.298
2:36:33	59.9700	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7632.00	42.298
2:36:35	59.9720	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7632.00	39.480
2:36:37	59.9670	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7632.00	46.531
2:36:39	59.9670	0.00	0.00	218.33	0.00	0.00	0.00	0.00	-420.00	7632.00	46.531
2:36:41	59.9690	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7632.00	43.708
2:36:43	59.9690	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7632.00	43.708
2:36:45	59.9690	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7632.00	43.708
2:36:47	59.9670	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7631.00	46.531
2:36:49	59.9660	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7625.00	47.941
2:36:51	59.9660	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7625.00	47.941
2:36:53	59.9650	0.00	0.00	217.38	0.00	0.00	0.00	0.00	-420.00	7623.00	49.350
2:36:55	59.9670	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7621.00	46.531

2:36:57	59.9670	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7621.00	46.531
2:36:59	59.9650	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7623.00	49.350
2:37:01	59.9640	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7625.00	50.759
2:37:03	59.9640	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7625.00	50.759
2:37:05	59.9700	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7627.00	42.298
2:37:07	59.9690	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7628.00	43.708
2:37:09	59.9690	0.00	0.00	214.83	0.00	0.00	0.00	0.00	-420.00	7628.00	43.708
2:37:11	59.9680	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7628.00	45.122
2:37:13	59.9650	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7629.00	49.350
2:37:15	59.9650	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7629.00	49.350
2:37:17	59.9700	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7630.00	42.298
2:37:19	59.9680	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7631.00	45.122
2:37:21	59.9680	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7631.00	45.122
2:37:23	59.9650	0.00	0.00	227.66	0.00	0.00	0.00	0.00	-420.00	7635.00	49.350
2:37:25	59.9690	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7638.00	43.708
2:37:27	59.9690	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7638.00	43.708
2:37:29	59.9670	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7639.00	46.531
2:37:31	59.9660	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7642.00	47.941
2:37:33	59.9660	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7642.00	47.941
2:37:35	59.9790	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7644.00	29.610
2:37:37	59.9830	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7645.00	23.968
2:37:39	59.9830	0.00	0.00	225.02	0.00	0.00	0.00	0.00	-420.00	7645.00	23.968
2:37:41	59.9740	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7647.00	36.661
2:37:43	59.9650	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7648.00	49.350
2:37:45	59.9650	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7648.00	49.350
2:37:47	59.9620	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7649.00	53.577
2:37:49	59.9610	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7650.00	54.992
2:37:51	59.9610	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7650.00	54.992
2:37:53	59.9610	0.00	0.00	228.37	0.00	0.00	0.00	0.00	-420.00	7651.00	54.992
2:37:55	59.9630	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7652.00	52.168
2:37:57	59.9630	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7652.00	52.168
2:37:59	59.9590	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7653.00	57.811
2:38:01	59.9510	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7654.00	69.090
2:38:03	59.9510	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7654.00	69.090
2:38:05	59.9530	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7655.00	66.271
2:38:07	59.9570	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7655.00	60.629
2:38:09	59.9570	0.00	0.00	234.08	0.00	0.00	0.00	0.00	-420.00	7655.00	60.629
2:38:11	59.9560	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7656.00	62.038
2:38:13	59.9630	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7656.00	52.168
2:38:15	59.9630	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7656.00	52.168
2:38:17	59.9610	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7657.00	54.992
2:38:19	59.9630	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7657.00	52.168
2:38:21	59.9630	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7657.00	52.168
2:38:23	59.9630	0.00	0.00	228.80	0.00	0.00	0.00	0.00	-420.00	7658.00	52.168
2:38:25	59.9680	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7658.00	45.122
2:38:27	59.9680	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7658.00	45.122

2:38:29	59.9680	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7659.00	45.122
2:38:31	59.9700	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7659.00	42.298
2:38:33	59.9700	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7659.00	42.298
2:38:35	59.9730	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7659.00	38.071
2:38:37	59.9650	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7660.00	49.350
2:38:39	59.9650	0.00	0.00	229.47	0.00	0.00	0.00	0.00	-420.00	7660.00	49.350
2:38:41	59.9670	0.00	0.00	228.98	0.00	0.00	0.00	0.00	-420.00	7660.00	46.531
2:38:43	59.9720	0.00	0.00	228.98	0.00	0.00	0.00	0.00	-420.00	7661.00	39.480
2:38:45	59.9720	0.00	0.00	228.98	0.00	0.00	0.00	0.00	-420.00	7661.00	39.480
2:38:47	59.9760	0.00	0.00	228.98	0.00	0.00	0.00	0.00	-420.00	7661.00	33.838
2:38:49	59.9690	0.00	0.00	228.98	0.00	0.00	0.00	0.00	-420.00	7662.00	43.708
2:38:51	59.9690	0.00	0.00	228.98	0.00	0.00	0.00	0.00	-420.00	7662.00	43.708
2:38:53	59.9730	0.00	0.00	228.98	0.00	0.00	0.00	0.00	-420.00	7662.00	38.071
2:38:55	59.9780	0.00	0.00	219.98	0.00	0.00	0.00	0.00	-420.00	7663.00	31.019
2:38:57	59.9780	0.00	0.00	219.98	0.00	0.00	0.00	0.00	-420.00	7663.00	31.019
2:38:59	59.9810	0.00	0.00	219.98	0.00	0.00	0.00	0.00	-420.00	7663.00	26.791
2:39:01	59.9810	0.00	0.00	219.98	0.00	0.00	0.00	0.00	-420.00	7664.00	26.791
2:39:03	59.9810	0.00	0.00	219.98	0.00	0.00	0.00	0.00	-420.00	7664.00	26.791
2:39:05	59.9820	0.00	0.00	219.98	0.00	0.00	0.00	0.00	-420.00	7664.00	25.382
2:39:07	59.9840	0.00	0.00	219.98	0.00	0.00	0.00	0.00	-420.00	7665.00	22.558
2:39:09	59.9840	0.00	0.00	219.98	0.00	0.00	0.00	0.00	-420.00	7665.00	22.558
2:39:11	59.9820	0.00	0.00	229.09	0.00	0.00	0.00	0.00	-420.00	7666.00	25.382
2:39:13	59.9790	0.00	0.00	229.09	0.00	0.00	0.00	0.00	-420.00	7666.00	29.610
2:39:15	59.9790	0.00	0.00	229.09	0.00	0.00	0.00	0.00	-420.00	7666.00	29.610
2:39:17	59.9800	0.00	0.00	229.09	0.00	0.00	0.00	0.00	-420.00	7667.00	28.201
2:39:19	59.9780	0.00	0.00	229.09	0.00	0.00	0.00	0.00	-420.00	7668.00	31.019
2:39:21	59.9780	0.00	0.00	229.09	0.00	0.00	0.00	0.00	-420.00	7668.00	31.019
2:39:23	59.9800	0.00	0.00	229.09	0.00	0.00	0.00	0.00	-420.00	7668.00	28.201
2:39:25	59.9800	0.00	0.00	229.66	0.00	0.00	0.00	0.00	-420.00	7669.00	28.201
2:39:27	59.9800	0.00	0.00	229.66	0.00	0.00	0.00	0.00	-420.00	7669.00	28.201
2:39:29	59.9780	0.00	0.00	229.66	0.00	0.00	0.00	0.00	-420.00	7669.00	31.019
2:39:31	59.9720	0.00	0.00	229.66	0.00	0.00	0.00	0.00	-420.00	7670.00	39.480
2:39:33	59.9720	0.00	0.00	229.66	0.00	0.00	0.00	0.00	-420.00	7670.00	39.480
2:39:35	59.9710	0.00	0.00	229.66	0.00	0.00	0.00	0.00	-420.00	7670.00	40.889
2:39:37	59.9740	0.00	0.00	229.66	0.00	0.00	0.00	0.00	-420.00	7671.00	36.661
2:39:39	59.9740	0.00	0.00	229.66	0.00	0.00	0.00	0.00	-420.00	7671.00	36.661
2:39:41	59.9750	0.00	0.00	229.23	0.00	0.00	0.00	0.00	-420.00	7671.00	35.252
2:39:43	59.9720	0.00	0.00	229.23	0.00	0.00	0.00	0.00	-420.00	7672.00	39.480
2:39:45	59.9720	0.00	0.00	229.23	0.00	0.00	0.00	0.00	-420.00	7672.00	39.480
2:39:47	59.9690	0.00	0.00	229.23	0.00	0.00	0.00	0.00	-420.00	7673.00	43.708
2:39:49	59.9740	0.00	0.00	229.23	0.00	0.00	0.00	0.00	-420.00	7673.00	36.661
2:39:51	59.9740	0.00	0.00	229.23	0.00	0.00	0.00	0.00	-420.00	7673.00	36.661
2:39:53	59.9720	0.00	0.00	229.23	0.00	0.00	0.00	0.00	-420.00	7673.00	39.480
2:39:55	59.9720	0.00	0.00	231.41	0.00	0.00	0.00	0.00	-420.00	7673.00	39.480
2:39:57	59.9720	0.00	0.00	231.41	0.00	0.00	0.00	0.00	-420.00	7673.00	39.480
2:39:59	59.9770	0.00	0.00	231.41	0.00	0.00	0.00	0.00	-420.00	7673.00	32.428

2:40:01	59.9780	0.00	0.00	231.41	0.00	0.00	0.00	0.00	-420.00	7673.00	31.019
2:40:03	59.9780	0.00	0.00	231.41	0.00	0.00	0.00	0.00	-420.00	7673.00	31.019
2:40:05	59.9760	0.00	0.00	231.41	0.00	0.00	0.00	0.00	-420.00	7673.00	33.838
2:40:07	59.9740	0.00	0.00	231.41	0.00	0.00	0.00	0.00	-420.00	7673.00	36.661
2:40:09	59.9740	0.00	0.00	231.41	0.00	0.00	0.00	0.00	-420.00	7673.00	36.661
2:40:11	59.9770	0.00	0.00	218.62	0.00	0.00	0.00	0.00	-420.00	7673.00	32.428
2:40:13	59.9780	0.00	0.00	218.62	0.00	0.00	0.00	0.00	-420.00	7673.00	31.019
2:40:15	59.9780	0.00	0.00	218.62	0.00	0.00	0.00	0.00	-420.00	7673.00	31.019
2:40:17	59.9790	0.00	0.00	218.62	0.00	0.00	0.00	0.00	-420.00	7673.00	29.610
2:40:19	59.9770	0.00	0.00	218.62	0.00	0.00	0.00	0.00	-420.00	7673.00	32.428
2:40:21	59.9770	0.00	0.00	218.62	0.00	0.00	0.00	0.00	-420.00	7673.00	32.428
2:40:23	59.9740	0.00	0.00	218.62	0.00	0.00	0.00	0.00	-420.00	7673.00	36.661
2:40:25	59.9710	0.00	0.00	213.54	0.00	0.00	0.00	0.00	-420.00	7673.00	40.889
2:40:27	59.9710	0.00	0.00	213.54	0.00	0.00	0.00	0.00	-420.00	7673.00	40.889
2:40:29	59.9710	0.00	0.00	213.54	0.00	0.00	0.00	0.00	-420.00	7673.00	40.889
2:40:31	59.9680	0.00	0.00	213.54	0.00	0.00	0.00	0.00	-420.00	7673.00	45.122
2:40:33	59.9680	0.00	0.00	213.54	0.00	0.00	0.00	0.00	-420.00	7673.00	45.122
2:40:35	59.9660	0.00	0.00	213.54	0.00	0.00	0.00	0.00	-420.00	7674.00	47.941
2:40:37	59.9710	0.00	0.00	213.54	0.00	0.00	0.00	0.00	-420.00	7675.00	40.889
2:40:39	59.9710	0.00	0.00	213.54	0.00	0.00	0.00	0.00	-420.00	7675.00	40.889
2:40:41	59.9730	0.00	0.00	225.65	0.00	0.00	0.00	0.00	-420.00	7676.00	38.071
2:40:43	59.9690	0.00	0.00	225.65	0.00	0.00	0.00	0.00	-420.00	7677.00	43.708
2:40:45	59.9690	0.00	0.00	225.65	0.00	0.00	0.00	0.00	-420.00	7677.00	43.708
2:40:47	59.9720	0.00	0.00	225.65	0.00	0.00	0.00	0.00	-420.00	7678.00	39.480
2:40:49	59.9730	0.00	0.00	225.65	0.00	0.00	0.00	0.00	-420.00	7679.00	38.071
2:40:51	59.9730	0.00	0.00	225.65	0.00	0.00	0.00	0.00	-420.00	7679.00	38.071
2:40:53	59.9700	0.00	0.00	225.65	0.00	0.00	0.00	0.00	-420.00	7680.00	42.298
2:40:55	59.9740	0.00	0.00	212.57	0.00	0.00	0.00	0.00	-420.00	7681.00	36.661
2:40:57	59.9740	0.00	0.00	212.57	0.00	0.00	0.00	0.00	-420.00	7681.00	36.661
2:40:59	59.9820	0.00	0.00	212.57	0.00	0.00	0.00	0.00	-420.00	7682.00	25.382
2:41:01	59.9850	0.00	0.00	212.57	0.00	0.00	0.00	0.00	-420.00	7684.00	21.149
2:41:03	59.9850	0.00	0.00	212.57	0.00	0.00	0.00	0.00	-420.00	7684.00	21.149
2:41:05	59.9850	0.00	0.00	212.57	0.00	0.00	0.00	0.00	-420.00	7685.00	21.149
2:41:07	59.9890	0.00	0.00	212.57	0.00	0.00	0.00	0.00	-420.00	7687.00	15.512
2:41:09	59.9890	0.00	0.00	212.57	0.00	0.00	0.00	0.00	-420.00	7687.00	15.512
2:41:11	59.9890	0.00	0.00	219.90	0.00	0.00	0.00	0.00	-420.00	7689.00	15.512
2:41:13	59.9870	0.00	0.00	219.90	0.00	0.00	0.00	0.00	-420.00	7690.00	18.331
2:41:15	59.9870	0.00	0.00	219.90	0.00	0.00	0.00	0.00	-420.00	7690.00	18.331
2:41:17	59.9900	0.00	0.00	219.90	0.00	0.00	0.00	0.00	-420.00	7692.00	14.098
2:41:19	59.9960	0.00	0.00	219.90	0.00	0.00	0.00	0.00	-420.00	7692.00	5.642
2:41:21	59.9960	0.00	0.00	219.90	0.00	0.00	0.00	0.00	-420.00	7692.00	5.642
2:41:23	60.0010	0.00	0.00	219.90	0.00	0.00	0.00	0.00	-420.00	7693.00	-1.409
2:41:25	60.0040	0.00	0.00	231.18	0.00	0.00	0.00	0.00	-420.00	7693.00	-5.642
2:41:27	60.0040	0.00	0.00	231.18	0.00	0.00	0.00	0.00	-420.00	7693.00	-5.642
2:41:29	60.0060	0.00	0.00	231.18	0.00	0.00	0.00	0.00	-420.00	7694.00	-8.461
2:41:31	60.0140	0.00	0.00	231.18	0.00	0.00	0.00	0.00	-420.00	7694.00	-19.740

2:41:33	60.0140	0.00	0.00	231.18	0.00	0.00	0.00	0.00	-420.00	7694.00	-19.740
2:41:35	60.0190	0.00	0.00	231.18	0.00	0.00	0.00	0.00	-420.00	7695.00	-26.791
2:41:37	60.0250	0.00	0.00	231.18	0.00	0.00	0.00	0.00	-420.00	7695.00	-35.252
2:41:39	60.0250	0.00	0.00	231.18	0.00	0.00	0.00	0.00	-420.00	7695.00	-35.252
2:41:41	60.0260	0.00	0.00	226.63	0.00	0.00	0.00	0.00	-420.00	7695.00	-36.661
2:41:43	60.0290	0.00	0.00	226.63	0.00	0.00	0.00	0.00	-420.00	7696.00	-40.889
2:41:45	60.0290	0.00	0.00	226.63	0.00	0.00	0.00	0.00	-420.00	7696.00	-40.889
2:41:47	60.0290	0.00	0.00	226.63	0.00	0.00	0.00	0.00	-420.00	7696.00	-40.889
2:41:49	60.0360	0.00	0.00	226.63	0.00	0.00	0.00	0.00	-420.00	7697.00	-50.759
2:41:51	60.0360	0.00	0.00	226.63	0.00	0.00	0.00	0.00	-420.00	7697.00	-50.759
2:41:53	60.0370	0.00	0.00	226.63	0.00	0.00	0.00	0.00	-420.00	7697.00	-52.168
2:41:55	60.0360	0.00	0.00	227.26	0.00	0.00	0.00	0.00	-420.00	7697.00	-50.759
2:41:57	60.0360	0.00	0.00	227.26	0.00	0.00	0.00	0.00	-420.00	7697.00	-50.759
2:41:59	60.0410	0.00	0.00	227.26	0.00	0.00	0.00	0.00	-420.00	7698.00	-57.811
2:42:01	60.0440	0.00	0.00	227.26	0.00	0.00	0.00	0.00	-420.00	7698.00	-62.038
2:42:03	60.0440	0.00	0.00	227.26	0.00	0.00	0.00	0.00	-420.00	7698.00	-62.038
2:42:05	60.0430	0.00	0.00	227.26	0.00	0.00	0.00	0.00	-420.00	7698.33	-60.629
2:42:07	60.0480	0.00	0.00	227.26	0.00	0.00	0.00	0.00	-420.00	7698.66	-67.680
2:42:09	60.0480	0.00	0.00	227.26	0.00	0.00	0.00	0.00	-420.00	7698.66	-67.680
2:42:11	60.0460	0.00	0.00	229.29	0.00	0.00	0.00	0.00	-420.00	7698.99	-64.862
2:42:13	60.0430	0.00	0.00	229.29	0.00	0.00	0.00	0.00	-420.00	7699.32	-60.629
2:42:15	60.0430	0.00	0.00	229.29	0.00	0.00	0.00	0.00	-420.00	7699.32	-60.629
2:42:17	60.0430	0.00	0.00	229.29	0.00	0.00	0.00	0.00	-420.00	7699.65	-60.629
2:42:19	60.0430	0.00	0.00	229.29	0.00	0.00	0.00	0.00	-420.00	7699.98	-60.629
2:42:21	60.0430	0.00	0.00	229.29	0.00	0.00	0.00	0.00	-420.00	7699.98	-60.629

Date:	Monday, October 12, 2009				
Time of T(0)	2:27:21				
ne of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:32:54				
ue A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0417 Hz				
B Post-Perturbation Average Frequency [T(+12 to T(+24)]	59.8823 Hz				
Pre to Post Perturbation Delta Frequency Actual	-0.159 Hz				
re-Perturbation Average Interchange MW [T(-2) to T(-16)]	633.00 MW				
t-Perturbation Average Interchange MW [T(+12 to T(+24)]	0.00 MW				
Pre to Post Perturbation Interchange Delta MW Actual	-633.00 MW				
Net Total Adjustments	44.46 MW				
EPFR for FRO Pre-Perturbation Average	-58.87 MW				
EPFR for FRO Post-Perturbation Average	165.98 MW				
EPFR for FRO Delta	224.84 MW				
EPFR for FRO Adjusted	269.30 MW				
Pre JOU Dynamic Schedules MW	0.00	Pre-Perturbation Bias Setting	-420.000	MW/0.1 Hz	
Pre Non-Conforming Load MW	165.43	Post-Perturbation Bias Setting	-420.000	MW/0.1 Hz	
Pre Pumped Hydro MW	0.00	EPFR for Bias Setting Pre-Perturbation Average	-175.3498	MW	
Pre Ramping Units MW	0.00	EPFR for Bias Setting Post-Perturbation Average	494.3985	MW	
Pre Transferred Frequency Response MW	0.00	EPFR for Bias Setting Delta	669.7483	MW	
Pre Contingent BA Lost Generation MW	0.00	Primary Frequency Response Delivery of Bias	-94.51%		
Sum of Pre Perturbation Adjustments	165.43				
Post JOU Dynamic Schedules MW	0.00	Pre-Perturbation BA Load	7600.196	MW	
Post Non-Conforming Load MW	209.89	Post-Perturbation BA Load	7570.000	MW	
Post Pumped Hydro MW	0.00	Pre to Post Perturbation BA Load Change	-30.196	MW	
Post Ramping Units MW	0.00	Load Dampening Frequency Response	-18.936	MW/0.1 Hz	
Post Transferred Frequency Response MW	0.00	Load Dampening % of Total BA Frequency Response	-4.77%		
Post Contingent BA Lost Generation MW	0.00				
Sum of Post Perturbation Adjustments	209.89				
Net Total Adjustments MW	44.46				

1 second Average Period Evaluation

Initial P.U. Performance for FRO	2.815	P.U.
Initial P.U. Performance Adjusted for FRO	2.351	P.U.

Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Frequency Response Obligation EPFR MW	Expected Net Actual Interchange MW

18 to 30 second Average Period Evalu

Initial P.U. Perfor
Initial P.U. Performance Ac

T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW
T-72 sec	2:26:09		
T-70 sec	2:26:11		
T-68 sec	2:26:13		

Time of Frequency Recovery to 60 Hz or Pre-P
Value A Pre-Perturbation Average Frequency [
Value B Post-Perturbation Average Frequency [T
Pre to Post Perturbation Delta Fre
Value A Pre-Perturbation Average Interchange MW [
Value B Post-Perturbation Average Interchange MW [T
Pre to Post Perturbation Interchange De
Net Tot
EPFR for FRO Pre-Perturl
EPFR for FRO Post-Perturl
EPFI
EPFR fo
Pre JOU Dynamic
Pre Non-Confor
Pre Pump
Pre Ram
Pre Transferred Frequency
Pre Contingent BA Lost G
Sum of Pre Perturbatic
Post JOU Dynamic
Post Non-Confor
Post Pump
Post Ram
Post Transferred Frequency
Post Contingent BA Lost G
Sum of Post Perturbatic
Net Total Ad

												T-66 sec	2:26:15			
												T-64 sec	2:26:17			
												T-62 sec	2:26:19			
												T-60 sec	2:26:21			
												T-58 sec	2:26:23			
												T-56 sec	2:26:25			
												T-54 sec	2:26:27			
												T-52 sec	2:26:29			
												T-50 sec	2:26:31			
												T-48 sec	2:26:33			
												T-46 sec	2:26:35			
												T-44 sec	2:26:37			
												T-42 sec	2:26:39			
												T-40 sec	2:26:41			
												T-38 sec	2:26:43			
												T-36 sec	2:26:45			
												T-34 sec	2:26:47			
												T-32 sec	2:26:49			
												T-30 sec	2:26:51			
												T-28 sec	2:26:53			
												T-26 sec	2:26:55			
												T-24 sec	2:26:57			
												T-22 sec	2:26:59			
												T-20 sec	2:27:01			
												T-18 sec	2:27:03			
60.042	633.000	0.000	165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-16 sec	2:27:05	60.042	633.000	0.000
60.042	633.000	0.000	165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-14 sec	2:27:07	60.042	633.000	0.000
60.042	633.000	0.000	165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-12 sec	2:27:09	60.042	633.000	0.000
60.042	633.000	0.000	165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-10 sec	2:27:11	60.042	633.000	0.000
60.042	633.000	0.000	165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-08 sec	2:27:13	60.042	633.000	0.000
60.042	633.000	0.000	165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-06 sec	2:27:15	60.042	633.000	0.000
60.042	633.000	0.000	165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-04 sec	2:27:17	60.042	633.000	0.000
60.042	633.000	0.000	165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-02 sec	2:27:19	60.042	633.000	0.000
												T+0 sec	2:27:21			
												T+02 sec	2:27:23			
												T+04 sec	2:27:25			
												T+06 sec	2:27:27			
												T+08 sec	2:27:29			
												T+10 sec	2:27:31			
59.882	0.000	0.000	209.885	0.000	0.000	0.000	0.000	-420.000	7570.000	165.977	902.300	T+12 sec	2:27:33			
59.882	0.000	0.000	209.885	0.000	0.000	0.000	0.000	-420.000	7570.000	165.977	902.300	T+14 sec	2:27:35			
59.882	0.000	0.000	209.885	0.000	0.000	0.000	0.000	-420.000	7570.000	165.977	902.300	T+16 sec	2:27:37			
59.882	0.000	0.000	209.885	0.000	0.000	0.000	0.000	-420.000	7570.000	165.977	902.300	T+18 sec	2:27:39	59.884	0.000	0.000
59.882	0.000	0.000	209.885	0.000	0.000	0.000	0.000	-420.000	7570.000	165.977	902.300	T+20 sec	2:27:41	59.884	0.000	0.000
59.882	0.000	0.000	209.885	0.000	0.000	0.000	0.000	-420.000	7570.000	165.977	902.300	T+22 sec	2:27:43	59.884	0.000	0.000
59.882	0.000	0.000	209.885	0.000	0.000	0.000	0.000	-420.000	7570.000	165.977	902.300	T+24 sec	2:27:45	59.884	0.000	0.000

T+26 sec	2:27:47	59.884	0.000	0.000
T+28 sec	2:27:49	59.884	0.000	0.000
T+30 sec	2:27:51	59.884	0.000	0.000
T+32 sec	2:27:53			
T+34 sec	2:27:55			
T+36 sec	2:27:57			
T+38 sec	2:27:59			
T+40 sec	2:28:01			
T+42 sec	2:28:03			
T+44 sec	2:28:05			
T+46 sec	2:28:07			
T+48 sec	2:28:09			
T+50 sec	2:28:11			
T+52 sec	2:28:13			
T+54 sec	2:28:15			
T+56 sec	2:28:17			
T+58 sec	2:28:19			
T+60 sec	2:28:21			
T+62 sec	2:28:23			
T+64 sec	2:28:25			
T+66 sec	2:28:27			
T+68 sec	2:28:29			
T+70 sec	2:28:31			
T+72 sec	2:28:33			
T+74 sec	2:28:35			
T+76 sec	2:28:37			
T+78 sec	2:28:39			
T+80 sec	2:28:41			

Date:	Monday, October 12, 2009				
Time of T(0)	2:27:21				
erturbation Hz	2:32:54				
T(-2) to T(-16)]	60.0417	Hz			
(+18 to T(+30)]	59.8844	Hz			
equency Actual	-0.157	Hz			
T(-2) to T(-16)]	633.00	MW			
(+18 to T(+30)]	0.00	MW			
elta MW Actual	-633.00	MW			
al Adjustments	45.83	MW			
bation Average	-58.87	MW			
bation Average	162.96	MW			
R for FRO Delta	221.82	MW			
r FRO Adjusted	267.65	MW			
Schedules MW	0.00		Pre-Perturbation Bias Setting	-420.000	MW/0.1 Hz
ming Load MW	165.43		Post-Perturbation Bias Setting	-420.000	MW/0.1 Hz
ped Hydro MW	0.00		EPFR for Bias Setting Pre-Perturbation Average	-175.3498	MW
ping Units MW	0.00		EPFR for Bias Setting Post-Perturbation Average	485.3989	MW
Response MW	0.00		EPFR for Bias Setting Delta	660.7487	MW
ieneration MW	0.00		Primary Frequency Response Delivery of Bias	-95.80%	
n Adjustments	165.43				
Schedules MW	0.00		Pre-Perturbation BA Load	7600.196	MW
ming Load MW	211.26		Post-Perturbation BA Load	7570.000	MW
ped Hydro MW	0.00		Pre to Post Perturbation BA Load Change	-30.196	MW
ping Units MW	0.00		Load Dampening Frequency Response	-19.194	MW/0.1 Hz
Response MW	0.00		Load Dampening % of Total BA Frequency Response	-4.77%	
ieneration MW	0.00				
n Adjustments	211.26				
justments MW	45.83				

Date:	Monday, October 12, 2009		
Time of T(0)	2:27:21		
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:32:54		
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0417		
Value B Post-Perturbation Average Frequency [T(+20 to T(+40)]	59.8892		
Pre to Post Perturbation Delta Frequency Actual	-0.153		
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	633.00		
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+40)]	0.00		
Pre to Post Perturbation Interchange Delta MW Actual	-633.00		
Net Total Adjustments	47.23		
EPFR for FRO Pre-Perturbation Average	-58.87		
EPFR for FRO Post-Perturbation Average	156.25		
EPFR for FRO Delta	215.12		
EPFR for FRO Adjusted	262.35		
Pre JOU Dynamic Schedules MW	0.00		
Pre Non-Conforming Load MW	165.43		
Pre Pumped Hydro MW	0.00		
Pre Ramping Units MW	0.00		
Pre Transferred Frequency Response MW	0.00		
Pre Contingent BA Lost Generation MW	0.00		
Sum of Pre Perturbation Adjustments	165.43		
Post JOU Dynamic Schedules MW	0.00		
Post Non-Conforming Load MW	212.66		
Post Pumped Hydro MW	0.00		
Post Ramping Units MW	0.00		
Post Transferred Frequency Response MW	0.00		
Post Contingent BA Lost Generation MW	0.00		
Sum of Post Perturbation Adjustments	212.66		
Net Total Adjustments MW	47.23		

uation

mance for FRO	2.854	P.U.
djusted for FRO	2.365	P.U.

20 to 40 second Average Period Evaluation

Initial P.U. Performance for FRO	2.943	
Initial P.U. Performance Adjusted for FRO	2.413	

Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Frequency Response Obligation EPFR MW	Expected Net Actual Interchange MW

T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW

T-72 sec	2:26:09
T-70 sec	2:26:11
T-68 sec	2:26:13

									T-66 sec	2:26:15						
									T-64 sec	2:26:17						
									T-62 sec	2:26:19						
									T-60 sec	2:26:21						
									T-58 sec	2:26:23						
									T-56 sec	2:26:25						
									T-54 sec	2:26:27						
									T-52 sec	2:26:29						
									T-50 sec	2:26:31						
									T-48 sec	2:26:33						
									T-46 sec	2:26:35						
									T-44 sec	2:26:37						
									T-42 sec	2:26:39						
									T-40 sec	2:26:41						
									T-38 sec	2:26:43						
									T-36 sec	2:26:45						
									T-34 sec	2:26:47						
									T-32 sec	2:26:49						
									T-30 sec	2:26:51						
									T-28 sec	2:26:53						
									T-26 sec	2:26:55						
									T-24 sec	2:26:57						
									T-22 sec	2:26:59						
									T-20 sec	2:27:01						
									T-18 sec	2:27:03						
165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-16 sec	2:27:05	60.042	633.000	0.000	165.430	0.000	
165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-14 sec	2:27:07	60.042	633.000	0.000	165.430	0.000	
165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-12 sec	2:27:09	60.042	633.000	0.000	165.430	0.000	
165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-10 sec	2:27:11	60.042	633.000	0.000	165.430	0.000	
165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-08 sec	2:27:13	60.042	633.000	0.000	165.430	0.000	
165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-06 sec	2:27:15	60.042	633.000	0.000	165.430	0.000	
165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-04 sec	2:27:17	60.042	633.000	0.000	165.430	0.000	
165.430	0.000	0.000	0.000	0.000	-420.000	7600.196	-58.867		T-02 sec	2:27:19	60.042	633.000	0.000	165.430	0.000	
									T+0 sec	2:27:21						
									T+02 sec	2:27:23						
									T+04 sec	2:27:25						
									T+06 sec	2:27:27						
									T+08 sec	2:27:29						
									T+10 sec	2:27:31						
									T+12 sec	2:27:33						
									T+14 sec	2:27:35						
									T+16 sec	2:27:37						
211.256	0.000	0.000	0.000	0.000	-420.000	7570.000	162.955	900.649	T+18 sec	2:27:39						
211.256	0.000	0.000	0.000	0.000	-420.000	7570.000	162.955	900.649	T+20 sec	2:27:41	59.889	0.000	0.000	212.661	0.000	
211.256	0.000	0.000	0.000	0.000	-420.000	7570.000	162.955	900.649	T+22 sec	2:27:43	59.889	0.000	0.000	212.661	0.000	
211.256	0.000	0.000	0.000	0.000	-420.000	7570.000	162.955	900.649	T+24 sec	2:27:45	59.889	0.000	0.000	212.661	0.000	

211.256	0.000	0.000	0.000	0.000	-420.000	7570.000	162.955	900.649	T+26 sec	2:27:47	59.889	0.000	0.000	212.661	0.000
211.256	0.000	0.000	0.000	0.000	-420.000	7570.000	162.955	900.649	T+28 sec	2:27:49	59.889	0.000	0.000	212.661	0.000
211.256	0.000	0.000	0.000	0.000	-420.000	7570.000	162.955	900.649	T+30 sec	2:27:51	59.889	0.000	0.000	212.661	0.000
									T+32 sec	2:27:53	59.889	0.000	0.000	212.661	0.000
									T+34 sec	2:27:55	59.889	0.000	0.000	212.661	0.000
									T+36 sec	2:27:57	59.889	0.000	0.000	212.661	0.000
									T+38 sec	2:27:59	59.889	0.000	0.000	212.661	0.000
									T+40 sec	2:28:01	59.889	0.000	0.000	212.661	0.000
									T+42 sec	2:28:03					
									T+44 sec	2:28:05					
									T+46 sec	2:28:07					
									T+48 sec	2:28:09					
									T+50 sec	2:28:11					
									T+52 sec	2:28:13					
									T+54 sec	2:28:15					
									T+56 sec	2:28:17					
									T+58 sec	2:28:19					
									T+60 sec	2:28:21					
									T+62 sec	2:28:23					
									T+64 sec	2:28:25					
									T+66 sec	2:28:27					
									T+68 sec	2:28:29					
									T+70 sec	2:28:31					
									T+72 sec	2:28:33					
									T+74 sec	2:28:35					
									T+76 sec	2:28:37					
									T+78 sec	2:28:39					
									T+80 sec	2:28:41					

			Date:	Monday, October 12, 2009		
			Time of T(0)	2:27:21		
			Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:32:54		
Hz			Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0417	Hz	
Hz			Value B Post-Perturbation Average Frequency [T(+18 to T(+52)]	59.8879	Hz	
Hz			Pre to Post Perturbation Delta Frequency Actual	-0.154	Hz	
MW			Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	633.00	MW	
MW			Value B Post-Perturbation Average Interchange MW [T(+18 to T(+52)]	0.00	MW	
MW			Pre to Post Perturbation Interchange Delta MW Actual	-633.00	MW	
MW			Net Total Adjustments	47.23	MW	
MW			EPFR for FRO Pre-Perturbation Average	-58.87	MW	
MW			EPFR for FRO Post-Perturbation Average	158.00	MW	
MW			EPFR for FRO Delta	216.87	MW	
MW			EPFR for FRO Adjusted	264.10	MW	
MW	Pre-Perturbation Bias Setting	-420.000 MW/0.1 Hz	Pre JOU Dynamic Schedules MW	0.00	MW	
MW	Post-Perturbation Bias Setting	-420.000 MW/0.1 Hz	Pre Non-Conforming Load MW	165.43	MW	
MW	EPFR for Bias Setting Pre-Perturbation Average	-175.3498 MW	Pre Pumped Hydro MW	0.00	MW	EPFR
MW	EPFR for Bias Setting Post-Perturbation Average	465.4341 MW	Pre Ramping Units MW	0.00	MW	EPFR
MW	EPFR for Bias Setting Delta	640.7839 MW	Pre Transferred Frequency Response MW	0.00	MW	
MW	Primary Frequency Response Delivery of Bias	-98.79%	Pre Contingent BA Lost Generation MW	0.00	MW	Pri
MW			Sum of Pre Perturbation Adjustments	165.43	MW	
MW	Pre-Perturbation BA Load	7600.196 MW	Post JOU Dynamic Schedules MW	0.00	MW	
MW	Post-Perturbation BA Load	7570.000 MW	Post Non-Conforming Load MW	212.66	MW	
MW	Pre to Post Perturbation BA Load Change	-30.196 MW	Post Pumped Hydro MW	0.00	MW	
MW	Load Dampening Frequency Response	-19.792 MW/0.1 Hz	Post Ramping Units MW	0.00	MW	
MW	Load Dampening % of Total BA Frequency Response	-4.77%	Post Transferred Frequency Response MW	0.00	MW	Load Dam
MW			Post Contingent BA Lost Generation MW	0.00	MW	
MW			Sum of Post Perturbation Adjustments	212.66	MW	
MW			Net Total Adjustments MW	47.23	MW	

18 to 52 second Average Period Evaluation

P.U.	Initial P.U. Performance for FRO	2.919	P.U.	
P.U.	Initial P.U. Performance Adjusted for FRO	2.397	P.U.	

Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Frequency Response Obligation EPFR MW	Expected Net Actual Interchange MW		T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz
							T-72 sec	2:26:09							
							T-70 sec	2:26:11							
							T-68 sec	2:26:13							

							T-66 sec	2:26:15							
							T-64 sec	2:26:17							
							T-62 sec	2:26:19							
							T-60 sec	2:26:21							
							T-58 sec	2:26:23							
							T-56 sec	2:26:25							
							T-54 sec	2:26:27							
							T-52 sec	2:26:29							
							T-50 sec	2:26:31							
							T-48 sec	2:26:33							
							T-46 sec	2:26:35							
							T-44 sec	2:26:37							
							T-42 sec	2:26:39							
							T-40 sec	2:26:41							
							T-38 sec	2:26:43							
							T-36 sec	2:26:45							
							T-34 sec	2:26:47							
							T-32 sec	2:26:49							
							T-30 sec	2:26:51							
							T-28 sec	2:26:53							
							T-26 sec	2:26:55							
							T-24 sec	2:26:57							
							T-22 sec	2:26:59							
							T-20 sec	2:27:01							
							T-18 sec	2:27:03							
0.000	0.000	0.000	-420.000	7600.196	-58.867		T-16 sec	2:27:05	60.042	633.000	0.000	165.430		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7600.196	-58.867		T-14 sec	2:27:07	60.042	633.000	0.000	165.430		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7600.196	-58.867		T-12 sec	2:27:09	60.042	633.000	0.000	165.430		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7600.196	-58.867		T-10 sec	2:27:11	60.042	633.000	0.000	165.430		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7600.196	-58.867		T-08 sec	2:27:13	60.042	633.000	0.000	165.430		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7600.196	-58.867		T-06 sec	2:27:15	60.042	633.000	0.000	165.430		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7600.196	-58.867		T-04 sec	2:27:17	60.042	633.000	0.000	165.430		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7600.196	-58.867		T-02 sec	2:27:19	60.042	633.000	0.000	165.430		0.000	0.000	0.000
							T+0 sec	2:27:21							
							T+02 sec	2:27:23							
							T+04 sec	2:27:25							
							T+06 sec	2:27:27							
							T+08 sec	2:27:29							
							T+10 sec	2:27:31							
							T+12 sec	2:27:33							
							T+14 sec	2:27:35							
							T+16 sec	2:27:37							
							T+18 sec	2:27:39	59.888	0.000	0.000	212.662		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+20 sec	2:27:41	59.888	0.000	0.000	212.662		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+22 sec	2:27:43	59.888	0.000	0.000	212.662		0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+24 sec	2:27:45	59.888	0.000	0.000	212.662		0.000	0.000	0.000

0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+26 sec	2:27:47	59.888	0.000	0.000	212.662	0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+28 sec	2:27:49	59.888	0.000	0.000	212.662	0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+30 sec	2:27:51	59.888	0.000	0.000	212.662	0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+32 sec	2:27:53	59.888	0.000	0.000	212.662	0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+34 sec	2:27:55	59.888	0.000	0.000	212.662	0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+36 sec	2:27:57	59.888	0.000	0.000	212.662	0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+38 sec	2:27:59	59.888	0.000	0.000	212.662	0.000	0.000	0.000
0.000	0.000	0.000	-420.000	7570.000	156.253	895.352	T+40 sec	2:28:01	59.888	0.000	0.000	212.662	0.000	0.000	0.000
							T+42 sec	2:28:03	59.888	0.000	0.000	212.662	0.000	0.000	0.000
							T+44 sec	2:28:05	59.888	0.000	0.000	212.662	0.000	0.000	0.000
							T+46 sec	2:28:07	59.888	0.000	0.000	212.662	0.000	0.000	0.000
							T+48 sec	2:28:09	59.888	0.000	0.000	212.662	0.000	0.000	0.000
							T+50 sec	2:28:11	59.888	0.000	0.000	212.662	0.000	0.000	0.000
							T+52 sec	2:28:13	59.888	0.000	0.000	212.662	0.000	0.000	0.000
							T+54 sec	2:28:15							
							T+56 sec	2:28:17							
							T+58 sec	2:28:19							
							T+60 sec	2:28:21							
							T+62 sec	2:28:23							
							T+64 sec	2:28:25							
							T+66 sec	2:28:27							
							T+68 sec	2:28:29							
							T+70 sec	2:28:31							
							T+72 sec	2:28:33							
							T+74 sec	2:28:35							
							T+76 sec	2:28:37							
							T+78 sec	2:28:39							
							T+80 sec	2:28:41							

Date:	Monday, October 12, 2009	
Time of T(0)	2:27:21	
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:32:54	
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.0417	Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.8887	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.153	Hz
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	633.00	MW
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	0.00	MW
Pre to Post Perturbation Interchange Delta MW Actual	-633.00	MW
Net Total Adjustments	47.31	MW
EPFR for FRO Pre-Perturbation Average	-58.87	MW
EPFR for FRO Post-Perturbation Average	156.92	MW
EPFR for FRO Delta	215.79	MW
EPFR for FRO Adjusted	263.11	MW
Pre JOU Dynamic Schedules MW	0.00	MW
Pre Non-Conforming Load MW	165.43	MW
Pre Pumped Hydro MW	0.00	MW
Pre Ramping Units MW	0.00	MW
Pre Transferred Frequency Response MW	0.00	MW
Pre Contingent BA Lost Generation MW	0.00	MW
Sum of Pre Perturbation Adjustments	165.43	MW
Post JOU Dynamic Schedules MW	0.00	MW
Post Non-Conforming Load MW	212.74	MW
Post Pumped Hydro MW	0.00	MW
Post Ramping Units MW	0.00	MW
Post Transferred Frequency Response MW	0.00	MW
Post Contingent BA Lost Generation MW	0.00	MW
Sum of Post Perturbation Adjustments	212.74	MW
Net Total Adjustments MW	47.31	MW

Pre-Perturbation Bias Setting	-420.000	MW/0.1 Hz
Post-Perturbation Bias Setting	-420.000	MW/0.1 Hz
t for Bias Setting Pre-Perturbation Average	-175.3498	MW
for Bias Setting Post-Perturbation Average	470.6329	MW
EPFR for Bias Setting Delta	645.9827	MW
mary Frequency Response Delivery of Bias	-97.99%	
Pre-Perturbation BA Load	7600.196	MW
Post-Perturbation BA Load	7570.000	MW
Pre to Post Perturbation BA Load Change	-30.196	MW
Load Dampening Frequency Response	-19.633	MW/0.1 Hz
npening % of Total BA Frequency Response	-4.77%	

20 to 52 second Average Period Evaluation

Initial P.U. Performance for FRO	2.933	P.U.
Initial P.U. Performance Adjusted for FRO	2.406	P.U.

Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Frequency Response Obligation EPFR MW	Expected Net Actual Interchange MW	T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW
					T-72 sec	2:26:09							
					T-70 sec	2:26:11							
					T-68 sec	2:26:13							

					T-66 sec	2:26:15								
					T-64 sec	2:26:17								
					T-62 sec	2:26:19								
					T-60 sec	2:26:21								
					T-58 sec	2:26:23								
					T-56 sec	2:26:25								
					T-54 sec	2:26:27								
					T-52 sec	2:26:29								
					T-50 sec	2:26:31								
					T-48 sec	2:26:33								
					T-46 sec	2:26:35								
					T-44 sec	2:26:37								
					T-42 sec	2:26:39								
					T-40 sec	2:26:41								
					T-38 sec	2:26:43								
					T-36 sec	2:26:45								
					T-34 sec	2:26:47								
					T-32 sec	2:26:49								
					T-30 sec	2:26:51								
					T-28 sec	2:26:53								
					T-26 sec	2:26:55								
					T-24 sec	2:26:57								
					T-22 sec	2:26:59								
					T-20 sec	2:27:01								
					T-18 sec	2:27:03								
0.000	-420.000	7600.196	-58.867		T-16 sec	2:27:05	60.042	633.000	0.000	165.430		0.000	0.000	0.000	0.000
0.000	-420.000	7600.196	-58.867		T-14 sec	2:27:07	60.042	633.000	0.000	165.430		0.000	0.000	0.000	0.000
0.000	-420.000	7600.196	-58.867		T-12 sec	2:27:09	60.042	633.000	0.000	165.430		0.000	0.000	0.000	0.000
0.000	-420.000	7600.196	-58.867		T-10 sec	2:27:11	60.042	633.000	0.000	165.430		0.000	0.000	0.000	0.000
0.000	-420.000	7600.196	-58.867		T-08 sec	2:27:13	60.042	633.000	0.000	165.430		0.000	0.000	0.000	0.000
0.000	-420.000	7600.196	-58.867		T-06 sec	2:27:15	60.042	633.000	0.000	165.430		0.000	0.000	0.000	0.000
0.000	-420.000	7600.196	-58.867		T-04 sec	2:27:17	60.042	633.000	0.000	165.430		0.000	0.000	0.000	0.000
0.000	-420.000	7600.196	-58.867		T-02 sec	2:27:19	60.042	633.000	0.000	165.430		0.000	0.000	0.000	0.000
					T+0 sec	2:27:21								
					T+02 sec	2:27:23								
					T+04 sec	2:27:25								
					T+06 sec	2:27:27								
					T+08 sec	2:27:29								
					T+10 sec	2:27:31								
					T+12 sec	2:27:33								
					T+14 sec	2:27:35								
					T+16 sec	2:27:37								
0.000	-420.000	7570.000	157.998	897.098	T+18 sec	2:27:39								
0.000	-420.000	7570.000	157.998	897.098	T+20 sec	2:27:41	59.889	0.000	0.000	212.744		0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+22 sec	2:27:43	59.889	0.000	0.000	212.744		0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+24 sec	2:27:45	59.889	0.000	0.000	212.744		0.000	0.000	0.000	0.000

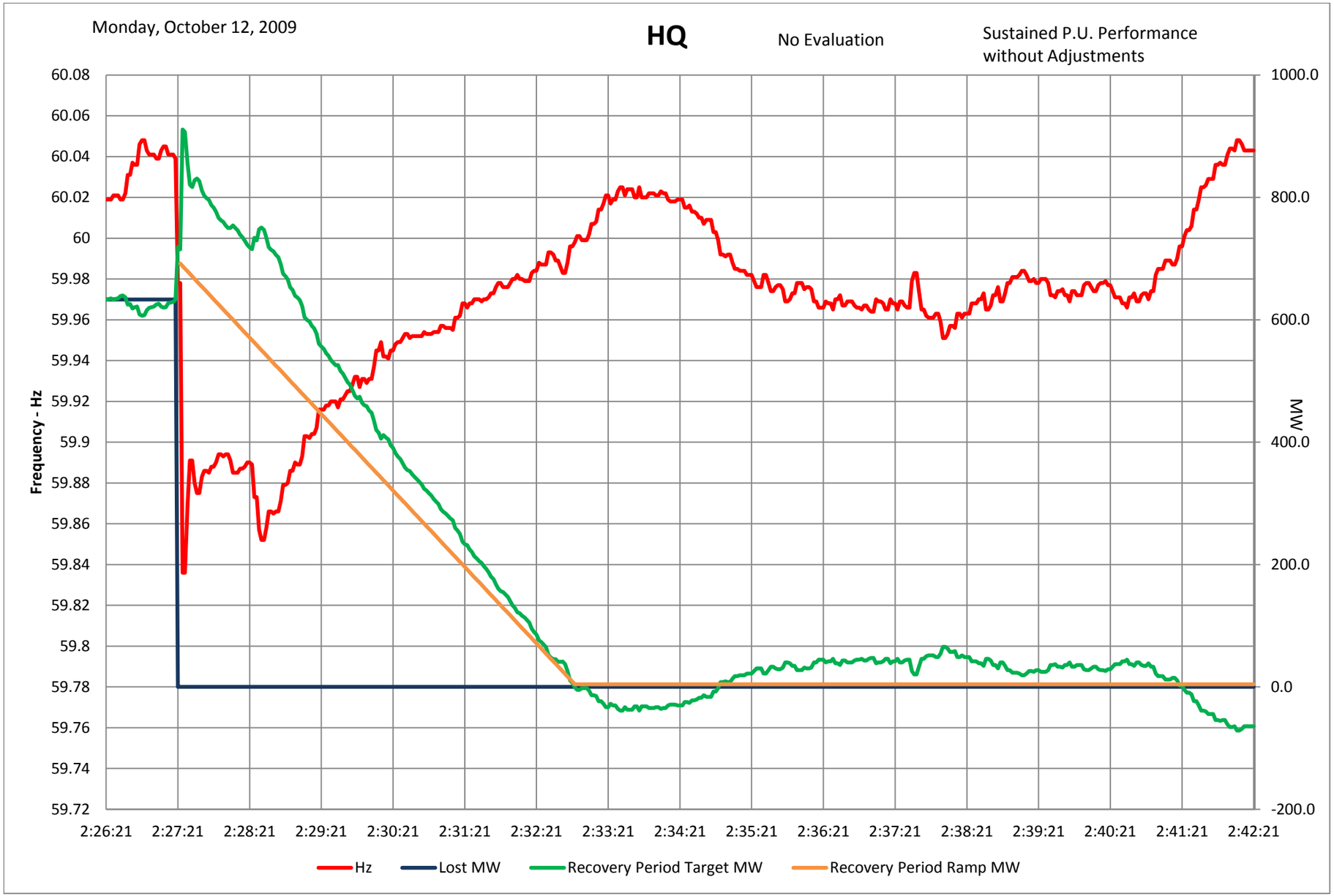
0.000	-420.000	7570.000	157.998	897.098	T+26 sec	2:27:47	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+28 sec	2:27:49	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+30 sec	2:27:51	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+32 sec	2:27:53	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+34 sec	2:27:55	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+36 sec	2:27:57	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+38 sec	2:27:59	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+40 sec	2:28:01	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+42 sec	2:28:03	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+44 sec	2:28:05	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+46 sec	2:28:07	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+48 sec	2:28:09	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+50 sec	2:28:11	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
0.000	-420.000	7570.000	157.998	897.098	T+52 sec	2:28:13	59.889	0.000	0.000	212.744	0.000	0.000	0.000	0.000
					T+54 sec	2:28:15								
					T+56 sec	2:28:17								
					T+58 sec	2:28:19								
					T+60 sec	2:28:21								
					T+62 sec	2:28:23								
					T+64 sec	2:28:25								
					T+66 sec	2:28:27								
					T+68 sec	2:28:29								
					T+70 sec	2:28:31								
					T+72 sec	2:28:33								
					T+74 sec	2:28:35								
					T+76 sec	2:28:37								
					T+78 sec	2:28:39								
					T+80 sec	2:28:41								

erturbation Bias Setting	-420.000	MW/0.1 Hz
erturbation Bias Setting	-420.000	MW/0.1 Hz
e-Perturbation Average	-175.3498	MW
it-Perturbation Average	467.4349	MW
FR for Bias Setting Delta	642.7847	MW
esponse Delivery of Bias	-98.48%	
e-Perturbation BA Load	7600.196	MW
it-Perturbation BA Load	7570.000	MW
bation BA Load Change	-30.196	MW
ng Frequency Response	-19.730	MW/0.1 Hz
BA Frequency Response	-4.77%	

BA Bias Setting	BA Load	Frequency Response Obligation EPFR	Expected Net Actual Interchange
MW/0.1 Hz	MW	MW	MW

-420.000	7600.196	-58.867	
-420.000	7600.196	-58.867	
-420.000	7600.196	-58.867	
-420.000	7600.196	-58.867	
-420.000	7600.196	-58.867	
-420.000	7600.196	-58.867	
-420.000	7600.196	-58.867	
-420.000	7600.196	-58.867	
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107

-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107
-420.000	7570.000	156.925	896.107


Monday, October 12, 2009
HQ
No Evaluation
Sustained P.U. Performance
without Adjustments
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
2:26:21
2:27:21
2:28:21
2:29:21
2:30:21
2:31:21
2:32:21
2:33:21
2:34:21
2:35:21
2:36:21
2:37:21
2:38:21
2:39:21
2:40:21
2:41:21
2:42:21
Hz
Lost MW
Recovery Period Target MW
Recovery Period Ramp MW

Interconnection Performance

Date	A Point Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz
Monday, October 12, 2009	2:27:19	60.0390	60.0417	2:27:21	59.8360

Value B 12 to 24 sec Average Frequency	FR B 12 to 24 sec Average MW	Value B 18 to 30 sec Average Frequency	FR B 18 to 30 sec Average MW	Value B 20 to 40 sec Average Frequency	FR B 20 to 40 sec Average MW	Value B 18 to 52 sec Average Frequency	FR B 18 to 52 sec Average MW	Value B 20 to 52 sec Average Frequency	FR B 20 to 52 sec Average MW
59.8822861	-397.43625	59.8844288	-402.63425	59.888706	-415.16368	59.8879445	-411.95878	59.888706	-413.86163

Value A Data — BA Performance

Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW
60.04175	633.00	0.00	165.43	0.00	0.00	0.00	0.00	-420	7600.196	-175.35

Value B — 12 to 24 second Average Period Evaluation

Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a
59.882286	0.00	0.00	209.89	0.00	0.00	0.00

Value B

18 to 30 second Average Period Evaluation

Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.
0.00	2.351	2.815	No Evaluation	-420	7570	494.3985	59.884429	0.00	0.00	211.26	0.00	0.00	0.00	0.00	2.365

Value B

20 to 40 second Average Period Evaluation

Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.
2.854	No Evaluation	-420	7570	485.3989	59.889182	0.00	0.00	212.66	0.00	0.00	0.00	0.00	2.413	2.943	No Evaluation

Value B

18 to 52 second Average Period Evaluation

Value B

BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz
-420	7570	465.4341	59.887945	0.00	0.00	212.66	0.00	0.00	0.00	0.00	2.397	2.919	No Evaluation	-420	7570	470.6329	59.888706

20 to 52 second Average Period Evaluation

Total Generation Lost MW	JOU Dynamic Schedules n/a	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units n/a	Transferred Frequency Response n/a	Contingent BA Lost Generation n/a	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW
0.00	0.00	212.74	0.00	0.00	0.00	0.00	2.406	2.933	No Evaluation	-420	7570	467.4349

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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2007-12 Frequency Response
Initial Ballot Window and Non-Binding Poll
Now Open: Nov. 30 – Dec. 9, 2011

Available Now

An initial ballot of BAL-003-1 – Frequency Response and Frequency Bias Setting and its associated implementation plan, and a non-binding poll of the associated VRFs and VSLs, are open through 8 p.m. Eastern on Friday, December 9, 2011.

In addition to the standard and implementation plan, the following documents have been posted for stakeholder review and comment:

- Consideration of Comments Report – Provides a summary of the modifications made to the proposed standard and supporting documents based on comments submitted during the formal comment period that ended March 7, 2011
- Frequency Response Standard Background Document – Provides an explanation of each of the proposed requirements; identifies how the proposed standard proposes to address FERC directives from Order 693; and on the last page provides an overview of the field trial (currently in Step 4)
- Attachment A – ERO's Process for assigning a Frequency Response Obligation and Frequency Bias Setting to each Balancing Authority
- Attachment B – ERO's Process for Adjusting Minimum Frequency Bias Setting
- FRS Form 1 (four versions - one for each of the four Interconnections) and FRS Form 2 (seven versions – two to collect data for Interconnections with a single Balancing Authority at two second and three second intervals; five to collect data for Interconnections with multiple Balancing Authorities at two second, three second, four second, five second and six second intervals) – Both Form 1 and Form 2 are proposed for the ERO's use (in conjunction with Attachment A) in determining each Interconnection's necessary amount of Frequency Response for allocation to Balancing Authorities. Instructions are now on the first page of each FRS Form 1 and FRS Form 2
- Mapping Document - Identifies each requirement in the already approved BAL-003-0.1b and identifies how that requirement has been treated in the revisions proposed in BAL-003-1.

- Unofficial comment form in Word format – This is for informal use when compiling responses – the final must be submitted electronically.

Instructions for Balloting

Members of the ballot pools associated with this project may log in and submit their vote for the standard and opinion for the non-binding poll from the following page: https://standards.nerc.net/CurrentBallots.aspx

Instructions for Commenting

A formal comment period is open through 8 p.m. Eastern on Friday, December 9, 2011. Please use this electronic form to submit comments. If you experience any difficulties in using the electronic form, please contact Monica Benson at monica.benson@nerc.net. An off-line, unofficial copy of the comment form is posted on the project page.

Special Instructions for Submitting Comments with a Ballot

Please note that comments submitted during the formal comment period, the ballot for the standard, and the non-binding poll of VRFs and VSLs all use the same electronic form, and it is NOT necessary for ballot pool members to submit more than one set of comments (one through the electronic form, one with the ballot, and one with the non-binding poll). **The drafting team requests that all stakeholders (ballot pool members as well as other stakeholders) submit all comments through the electronic comment form.**

Please use this electronic form to submit comments. If you experience any difficulties in using the electronic form, please contact Monica Benson at monica.benson@nerc.net. An off-line, unofficial copy of the comment form is posted on the project page.

Next Steps

The drafting team will consider all comments and determine what changes to make in response to stakeholder input from the comments.

Background

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. The proposed standard's intent is to collect data needed to accurately analyze existing Frequency Response, set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be analyzed, and the reasons for the decline in Frequency Response

can be identified. Once Frequency Response has been analyzed and confirmed, requirements can be modified to maintain reliability.

Additional information is available on the project webpage.

A stakeholder interested in following the Frequency Response Standard Drafting Team's development of BAL-003-1 may monitor meeting agendas and notes on the team's "Related Files" web page or may submit a request to join the team's "plus" email list to receive meeting agendas and meeting notes as they are distributed to the team. To join the team's "plus" email list, send a note to sarcomm@nerc.net and include the project's name in the subject line.

Standards Development Process

The Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate. For more information or assistance, please contact Monica Benson at monica.benson@nerc.net.

For more information or assistance, please contact Monica Benson, Standards Process Administrator, at monica.benson@nerc.net or at 404-446-2560.

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Standards Announcement

Project 2007-12 Frequency Response

Ballot Pool Windows Now Open: Oct. 25 – Nov. 23, 2011
Formal Comment Period Open: Oct. 25 – Dec. 8, 2011
Initial Ballot and Non-Binding Poll Window: Nov. 29 – Dec. 8, 2011

Available Now

BAL-003-1 – Frequency Response and Frequency Bias Setting, an implementation plan and several additional associated documents (listed below) have been posted for a formal comment period and initial ballot that will end at 8 p.m. Eastern on Thursday, December 8, 2011. Ballot pools are being formed and the ballot pool windows are open through 8 a.m. Eastern on Wednesday, November 23.

The following associated documents have been posted for stakeholder review and comment:

- Consideration of Comments Report – Provides a summary of the modifications made to the proposed standard and supporting documents based on comments submitted during the formal comment period that ended March 7, 2011
- Frequency Response Standard Background Document – Provides an explanation of each of the proposed requirements; identifies how the proposed standard proposes to address FERC directives from Order 693; and on the last page provides an overview of the field trial (currently in Step 4)
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- Mapping Document - Identifies each requirement in the already approved BAL-003-0.1b and identifies how that requirement has been treated in the revisions proposed in BAL-003-1.

- Unofficial comment form in Word format – This is for informal use when compiling responses – the final must be submitted electronically

Instructions for Joining Ballot Pools for BAL-003-1 and Associated VRFs/VSLs

Two separate ballot pools are being formed – one ballot pool for Registered Ballot Body (RBB) members interested in balloting of BAL-003-1, and a second for RBB members interested in casting an opinion during the non-binding poll of VRFs and VSLs associated with BAL-003-1. RBB members who join the ballot pool for the standard **will not** be automatically entered in the ballot pool for the non-binding poll, but must elect to join the second ballot pool.

To join the ballot pool to be eligible to vote in the upcoming ballots and non-binding poll go to: Join Ballot Pool

During the pre-ballot windows, members of the ballot pool may communicate with one another by using their "ballot pool list server." (Once the balloting begins, ballot pool members are prohibited from using the ballot pool list servers.)
The list server for the initial ballot is: bp-2007-12_Freq_Resp_in@nerc.com
Non-Binding Poll list server: bp-2007-12_NB_OCT2011_in@nerc.com

Instructions for Commenting

Please use this electronic form to submit comments. If you experience any difficulties in using the electronic form, please contact Monica Benson at monica.benson@nerc.net. An off-line, unofficial copy of the comment form is posted on the project page.

Next Steps

The drafting team is planning a webinar in November to explain changes to the most recent draft of BAL-003-1. The date and registration information will be announced as soon as the details are finalized. An initial ballot of BAL-003-1 will be conducted beginning on Tuesday, November 29, 2011 through 8 p.m. Eastern on Thursday, December 8, 2011.

Background

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. The proposed standard's intent is to collect data needed to accurately analyze existing Frequency Response, set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be analyzed, and the

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Standards Announcement

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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2007-12 Frequency Response

Initial Ballot and Non-Binding Poll Results

Now Available

An initial ballot and non-binding poll of BAL and its implementation plan concluded on December 9, 2011. Voting statistics are listed below, and the Ballot Results webpage provides a link to the detailed initial ballot results.

Initial Ballot Results

Quorum: 93.92%

Approval: 30.82%

Non-Binding Poll Results

89.49% of those who registered to participate provided an opinion or abstention; 37% of those who provided an opinion indicated support for the VRFs and VSLs that were proposed.

Next Steps

The drafting team will consider all comments received during the comment period and ballot.

Background

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. The proposed standard's intent is to collect data needed to accurately analyze existing Frequency Response, set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be analyzed, and the reasons for the decline in Frequency Response can be identified. Once Frequency Response has been analyzed and confirmed, requirements can be modified to maintain reliability. Additional information is available on the project webpage.

A stakeholder interested in following the Frequency Response Standard Drafting Team's development of

BAL-003-1 may monitor meeting agendas and notes on the team's "Related Files" webpage or may submit a request to join the team's "plus" email list to receive meeting agendas and meeting notes as they are distributed to the team. To join the team's "plus" email list, send a note to sarcomm@nerc.net and include the project's name in the subject line.

Standards Development Process

The Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate.

For more information or assistance, please contact Monica Benson, Standards Process Administrator, at monica.benson@nerc.net or at 404-446-2560.

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002790

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Ballot Results	
Ballot Name:	Project 2007-12 Frequency Response Initial Ballot_in
Ballot Period:	11/29/2011 - 12/9/2011
Ballot Type:	Initial
Total # Votes:	340
Total Ballot Pool:	362
Quorum:	**93.92 % The Quorum has been reached**
Weighted Segment Vote:	30.82 %
Ballot Results:	**The standard will proceed to a successive ballot.**

Summary of Ballot Results

Segment	Ballot Pool	Segment Weight	Affirmative # Votes	Affirmative Fraction	Negative # Votes	Negative Fraction	Abstain # Votes	No Vote
1 - Segment 1.	92	1	23	0.338	45	0.662	13	11
2 - Segment 2.	11	1	2	0.2	8	0.8	1	0
3 - Segment 3.	79	1	19	0.288	47	0.712	10	3
4 - Segment 4.	28	1	7	0.389	11	0.611	8	2
5 - Segment 5.	80	1	16	0.302	37	0.698	22	5
6 - Segment 6.	48	1	14	0.318	30	0.682	4	0
7 - Segment 7.	0	0	0	0	0	0	0	0
8 - Segment 8.	9	0.6	3	0.3	3	0.3	3	0
9 - Segment 9.	6	0.4	0	0	4	0.4	1	1
10 - Segment 10.	9	0.9	3	0.3	6	0.6	0	0
Totals	**362**	**7.9**	**87**	**2.435**	**191**	**5.465**	**62**	**22**

Individual Ballot Pool Results

Segment	Organization	Member	Ballot	Comments
1	Ameren Services	Kirit Shah	Negative	View
1	American Electric Power	Paul B. Johnson		
1	Arizona Public Service Co.	Robert Smith	Negative	
1	Associated Electric Cooperative, Inc.	John Bussman	Affirmative	View
1	Austin Energy	James Armke	Abstain	
1	Avista Corp.	Scott J Kinney	Negative	View
1	Balancing Authority of Northern California	Kevin Smith	Negative	View
1	Baltimore Gas & Electric Company	Gregory S Miller	Abstain	

1	BC Hydro and Power Authority	Patricia Robertson	Abstain	002791
1	Beaches Energy Services	Joseph S Stonecipher	Negative	View
1	Black Hills Corp	Eric Egge		
1	Bonneville Power Administration	Donald S. Watkins	Negative	View
1	Brazos Electric Power Cooperative, Inc.	Tony Kroskey		
1	Central Maine Power Company	Joseph Turano Jr.	Affirmative	
1	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Chang G Choi	Affirmative	
1	Clark Public Utilities	Jack Stamper	Negative	View
1	Colorado Springs Utilities	Paul Morland	Negative	View
1	Consolidated Edison Co. of New York	Christopher L de Graffenried	Negative	View
1	CPS Energy	Richard Castrejana	Abstain	
1	Dairyland Power Coop.	Robert W. Roddy	Affirmative	
1	Dayton Power & Light Co.	Hertzel Shamash	Negative	
1	Dominion Virginia Power	Michael S Crowley		
1	Duke Energy Carolina	Douglas E. Hils	Negative	View
1	East Kentucky Power Coop.	George S. Carruba	Negative	View
1	Empire District Electric Co.	Ralph F Meyer	Affirmative	
1	Entergy Services, Inc.	Edward J Davis	Affirmative	
1	FirstEnergy Corp.	William J Smith	Abstain	View
1	Florida Keys Electric Cooperative Assoc.	Dennis Minton		
1	Florida Power & Light Co.	Mike O'Neil	Affirmative	
1	Gainesville Regional Utilities	Luther E. Fair	Abstain	
1	Great River Energy	Gordon Pietsch	Negative	View
1	Hoosier Energy Rural Electric Cooperative, Inc.	Bob Solomon	Negative	View
1	Hydro One Networks, Inc.	Ajay Garg	Negative	View
1	Hydro-Quebec TransEnergie	Bernard Pelletier	Negative	View
1	Idaho Power Company	Ronald D. Schellberg	Negative	View
1	Imperial Irrigation District	Tino Zaragoza	Affirmative	
1	International Transmission Company Holdings Corp	Michael Moltane		
1	JEA	Ted Hobson	Negative	View
1	Kansas City Power & Light Co.	Michael Gammon	Negative	View
1	Keys Energy Services	Stanley T Rzad		
1	Lakeland Electric	Larry E Watt		
1	Lee County Electric Cooperative	John W Delucca	Abstain	
1	Lincoln Electric System	Doug Bantam	Negative	
1	Manitoba Hydro	Joe D Petaski	Negative	View
1	MEAG Power	Danny Dees	Abstain	
1	MidAmerican Energy Co.	Terry Harbour	Negative	View
1	National Grid	Saurabh Saksena		
1	Nebraska Public Power District	Cole C Brodine	Negative	View
1	New Brunswick Power Transmission Corporation	Randy MacDonald	Negative	View
1	New York State Electric & Gas Corp.	Raymond P Kinney	Negative	
1	Northeast Utilities	David Boguslawski		
1	Northern Indiana Public Service Co.	Kevin M Largura	Affirmative	
1	NorthWestern Energy	John Canavan	Affirmative	
1	Ohio Valley Electric Corp.	Robert Mattey	Negative	
1	Oklahoma Gas and Electric Co.	Marvin E VanBebber	Affirmative	View
1	Omaha Public Power District	Doug Peterchuck	Negative	View
1	Orlando Utilities Commission	Brad Chase	Negative	View
1	PacifiCorp	Ryan Millard	Affirmative	
1	Platte River Power Authority	John C. Collins	Abstain	
1	Portland General Electric Co.	John T Walker	Negative	View
1	Potomac Electric Power Co.	David Thorne	Negative	View
1	PowerSouth Energy Cooperative	Larry D Avery	Affirmative	
1	PPL Electric Utilities Corp.	Brenda L Truhe	Negative	View
1	Progress Energy Carolinas	Brett A Koelsch	Affirmative	View
1	Public Service Company of New Mexico	Laurie Williams	Affirmative	
1	Public Service Electric and Gas Co.	Kenneth D. Brown	Abstain	
1	Public Utility District No. 1 of Okanogan County	Dale Dunckel		
1	Puget Sound Energy, Inc.	Denise M Lietz	Abstain	
1	Raj Rana	Rajendrasinh D Rana	Abstain	
1	Rochester Gas and Electric Corp.	John C. Allen	Negative	View
1	Sacramento Municipal Utility District	Tim Kelley	Negative	View

1	Salmon River Electric Cooperative	Kathryn Spence	Negative	002792 View
1	Salt River Project	Robert Kondziolka	Affirmative	
1	Santee Cooper	Terry L Blackwell	Affirmative	
1	SCE&G	Henry Delk, Jr.	Affirmative	View
1	Seattle City Light	Pawel Krupa	Negative	View
1	Sierra Pacific Power Co.	Rich Salgo	Negative	View
1	Snohomish County PUD No. 1	Long T Duong	Negative	View
1	South California Edison Company	Steven Mavis	Negative	View
1	Southern Company Services, Inc.	Robert Schaffeld	Negative	View
1	Southern Illinois Power Coop.	William Hutchison	Affirmative	
1	Southwest Transmission Cooperative, Inc.	James Jones	Negative	View
1	Southwestern Power Administration	Angela L Summer	Affirmative	
1	Sunflower Electric Power Corporation	Noman Lee Williams	Affirmative	
1	Tampa Electric Co.	Beth Young	Negative	
1	Tennessee Valley Authority	Larry Akens	Affirmative	View
1	Tri-State G & T Association, Inc.	Tracy Sliman	Negative	
1	Tucson Electric Power Co.	John Tolo	Negative	View
1	United Illuminating Co.	Jonathan Appelbaum	Abstain	
1	Westar Energy	Allen Klassen	Affirmative	
1	Western Area Power Administration	Brandy A Dunn	Negative	View
1	Xcel Energy, Inc.	Gregory L Pieper	Negative	View
2	Alberta Electric System Operator	Mark B Thompson	Negative	View
2	BC Hydro	Venkataramakrishnan Vinnakota	Abstain	
2	California ISO	Rich Vine	Negative	View
2	Electric Reliability Council of Texas, Inc.	Charles B Manning	Affirmative	View
2	Independent Electricity System Operator	Barbara Constantinescu	Negative	View
2	ISO New England, Inc.	Kathleen Goodman	Negative	View
2	Midwest ISO, Inc.	Marie Knox	Affirmative	View
2	New Brunswick System Operator	Alden Briggs	Negative	View
2	New York Independent System Operator	Gregory Campoli	Negative	View
2	PJM Interconnection, L.L.C.	Tom Bowe	Negative	View
2	Southwest Power Pool, Inc.	Charles Yeung	Negative	View
3	AEP	Michael E Deloach	Negative	View
3	Alabama Power Company	Richard J. Mandes	Negative	View
3	Ameren Services	Mark Peters	Negative	
3	APS	Steven Norris	Negative	
3	Associated Electric Cooperative, Inc.	Chris W Bolick	Affirmative	View
3	Atlantic City Electric Company	NICOLE BUCKMAN	Negative	View
3	BC Hydro and Power Authority	Pat G. Harrington	Abstain	
3	Bonneville Power Administration	Rebecca Berdahl	Negative	
3	City of Alexandria	Michael Marcotte	Negative	
3	City of Bartow, Florida	Matt Culverhouse	Negative	View
3	City of Clewiston	Lynne Mila	Negative	
3	City of Green Cove Springs	Gregg R Griffin	Negative	
3	City of Redding	Bill Hughes	Negative	View
3	Cleco Corporation	Michelle A Corley	Affirmative	View
3	Colorado Springs Utilities	Charles Morgan	Negative	View
3	Consolidated Edison Co. of New York	Peter T Yost	Negative	View
3	Constellation Energy	CJ Ingersoll	Negative	View
3	Consumers Energy	Richard Blumenstock	Affirmative	
3	CPS Energy	Jose Escamilla	Abstain	
3	Delmarva Power & Light Co.	Michael R. Mayer	Negative	
3	Detroit Edison Company	Kent Kujala	Affirmative	
3	Dominion Resources Services	Michael F. Gildea	Abstain	
3	Duke Energy Carolina	Henry Ernst-Jr	Negative	View
3	East Kentucky Power Coop.	Patrick Woods	Negative	View
3	Entergy	Joel T Plessinger	Affirmative	
3	FirstEnergy Energy Delivery	Stephan Kern	Abstain	View
3	Florida Municipal Power Agency	Joe McKinney	Negative	View
3	Florida Power Corporation	Lee Schuster	Affirmative	View
3	Georgia Power Company	Anthony L Wilson	Negative	View
3	Georgia Systems Operations Corporation	William N. Phinney	Abstain	
3	Grays Harbor PUD	Wesley W Gray		
3	Great River Energy	Brian Glover	Negative	View
3	Gulf Power Company	Paul C Caldwell	Negative	View
3	Hydro One Networks, Inc.	David Kiguel	Negative	View

3	Imperial Irrigation District	Jesus S. Alcaraz	Affirmative	002793
3	JEA	Garry Baker	Negative	View
3	Kansas City Power & Light Co.	Charles Locke	Negative	View
3	Kissimmee Utility Authority	Gregory D Woessner	Negative	
3	Lakeland Electric	Norman D Harryhill	Negative	
3	Lincoln Electric System	Jason Fortik	Negative	View
3	Los Angeles Department of Water & Power	Daniel D Kurowski	Negative	
3	Louisville Gas and Electric Co.	Charles A. Freibert	Negative	View
3	Manitoba Hydro	Greg C. Parent	Negative	View
3	Manitowoc Public Utilities	Thomas E Reed	Abstain	
3	MidAmerican Energy Co.	Thomas C. Mielnik	Negative	View
3	Mississippi Power	Jeff Franklin	Negative	View
3	Modesto Irrigation District	Jack W Savage		
3	Municipal Electric Authority of Georgia	Steven M. Jackson	Abstain	
3	Muscatine Power & Water	John S Bos	Negative	View
3	Nebraska Public Power District	Tony Eddleman	Negative	View
3	New York Power Authority	Marilyn Brown	Negative	
3	Niagara Mohawk (National Grid Company)	Michael Schiavone	Negative	
3	Northern Indiana Public Service Co.	William SeDoris	Affirmative	
3	Ocala Electric Utility	David Anderson	Negative	
3	Orlando Utilities Commission	Ballard K Mutters	Negative	
3	Owensboro Municipal Utilities	Thomas T Lyons	Abstain	
3	Pacific Gas and Electric Company	John H Hagen	Negative	View
3	PacifiCorp	Dan Zollner	Affirmative	
3	Platte River Power Authority	Terry L Baker	Negative	View
3	PNM Resources	Michael Mertz	Affirmative	
3	Potomac Electric Power Co.	Robert Reuter	Negative	
3	Progress Energy Carolinas	Sam Waters	Affirmative	View
3	Public Service Electric and Gas Co.	Jeffrey Mueller	Abstain	
3	Public Utility District No. 1 of Clallam County	David Proebstel	Affirmative	
3	Puget Sound Energy, Inc.	Erin Apperson	Abstain	
3	Sacramento Municipal Utility District	James Leigh-Kendall	Negative	View
3	Salt River Project	John T. Underhill	Affirmative	
3	Santee Cooper	James M Poston	Affirmative	
3	Seattle City Light	Dana Wheelock	Negative	View
3	Seminole Electric Cooperative, Inc.	James R Frauen		
3	Snohomish County PUD No. 1	Mark Oens	Negative	View
3	South Carolina Electric & Gas Co.	Hubert C Young	Affirmative	View
3	Tacoma Public Utilities	Travis Metcalfe	Affirmative	
3	Tampa Electric Co.	Ronald L Donahey	Negative	View
3	Tennessee Valley Authority	Ian S Grant	Affirmative	View
3	Tri-State G & T Association, Inc.	Janelle Marriott	Negative	View
3	Westar Energy	Bo Jones	Affirmative	
3	Wisconsin Electric Power Marketing	James R Keller	Affirmative	
3	Xcel Energy, Inc.	Michael Ibold	Negative	View
4	Alliant Energy Corp. Services, Inc.	Kenneth Goldsmith	Negative	View
4	American Municipal Power	Kevin Koloini	Negative	
4	Blue Ridge Power Agency	Duane S Dahlquist	Affirmative	
4	City of Austin dba Austin Energy	Reza Ebrahimian	Abstain	
4	City of Clewiston	Kevin McCarthy	Negative	
4	City of New Smyrna Beach Utilities Commission	Tim Beyrle	Affirmative	
4	City of Redding	Nicholas Zettel	Negative	View
4	City Utilities of Springfield, Missouri	John Allen	Affirmative	View
4	Consumers Energy	David Frank Ronk	Affirmative	
4	Detroit Edison Company	Daniel Herring		
4	Flathead Electric Cooperative	Russ Schneider	Abstain	
4	Florida Municipal Power Agency	Frank Gaffney	Negative	View
4	Fort Pierce Utilities Authority	Thomas Richards	Negative	View
4	Georgia System Operations Corporation	Guy Andrews	Abstain	
4	Imperial Irrigation District	Diana U Torres	Affirmative	
4	Indiana Municipal Power Agency	Jack Alvey	Abstain	
4	Integrys Energy Group, Inc.	Christopher Plante	Abstain	
4	LaGen	Richard Comeaux	Abstain	
4	Madison Gas and Electric Co.	Joseph DePoorter	Negative	View
4	Northern California Power Agency	Tracy R Bibb	Abstain	
4	Ohio Edison Company	Douglas Hohlbaugh	Abstain	View

4	Public Utility District No. 1 of Douglas County	Henry E. LuBean	Negative	View
4	Public Utility District No. 1 of Snohomish County	John D Martinsen	Negative	View
4	Sacramento Municipal Utility District	Mike Ramirez	Negative	View
4	Seattle City Light	Hao Li	Negative	View
4	South Mississippi Electric Power Association	Steven McElhaney		
4	Tacoma Public Utilities	Keith Morisette	Affirmative	
4	Wisconsin Energy Corp.	Anthony Jankowski	Affirmative	
5	AEP Service Corp.	Brock Ondayko	Negative	View
5	AES Corporation	Leo Bernier	Abstain	
5	Amerenue	Sam Dwyer	Negative	
5	Arizona Public Service Co.	Edward Cambridge	Negative	
5	Avista Corp.	Edward F. Groce	Negative	View
5	BC Hydro and Power Authority	Clement Ma	Abstain	
5	Boise-Kuna Irrigation District/dba Lucky peak power plant project	Mike D Kukla	Negative	
5	Bonneville Power Administration	Francis J. Halpin	Negative	View
5	BP Wind Energy North America Inc	Carla Bayer	Abstain	
5	BrightSource Energy, Inc.	Chifong Thomas	Negative	View
5	City of Austin dba Austin Energy	Jeanie Doty	Abstain	
5	City of Redding	Paul Cummings	Negative	View
5	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Max Emrick	Affirmative	
5	City of Tallahassee	Brian Horton	Negative	
5	City Water, Light & Power of Springfield	Steve Rose		
5	Colorado Springs Utilities	Jennifer Eckels	Negative	View
5	Consolidated Edison Co. of New York	Wilket (Jack) Ng	Negative	View
5	Consumers Energy Company	David C Greyerbiehl	Affirmative	
5	CPS Energy	Robert Stevens	Abstain	
5	Detroit Edison Company	Christy Wicke	Affirmative	
5	Dominion Resources, Inc.	Mike Garton	Abstain	
5	Duke Energy	Dale Q Goodwine	Negative	View
5	East Kentucky Power Coop.	Stephen Ricker	Negative	View
5	Edison Mission Energy	Ellen Oswald		
5	Electric Power Supply Association	John R Cashin	Abstain	
5	FirstEnergy Solutions	Kenneth Dresner	Abstain	View
5	Florida Municipal Power Agency	David Schumann	Negative	View
5	Gainesville Regional Utilities	Karen C Alford	Abstain	
5	Great River Energy	Preston L Walsh	Negative	View
5	Green Country Energy	Greg Froehling	Abstain	
5	Imperial Irrigation District	Marcela Y Caballero	Affirmative	
5	Indeck Energy Services, Inc.	Rex A Roehl		
5	JEA	John J Babik	Negative	View
5	Kissimmee Utility Authority	Mike Blough	Abstain	
5	Lakeland Electric	James M Howard	Negative	View
5	Liberty Electric Power LLC	Daniel Duff	Negative	View
5	Lincoln Electric System	Dennis Florom	Negative	View
5	Los Angeles Department of Water & Power	Kenneth Silver	Negative	
5	Lower Colorado River Authority	Tom Foreman	Affirmative	
5	Luminant Generation Company LLC	Mike Laney	Affirmative	
5	Manitoba Hydro	S N Fernando	Negative	View
5	Massachusetts Municipal Wholesale Electric Company	David Gordon	Abstain	
5	MEAG Power	Steven Grego	Abstain	
5	Michigan Public Power Agency	Gary Carlson	Negative	View
5	MidAmerican Energy Co.	Christopher Schneider	Affirmative	
5	Muscatine Power & Water	Mike Avesing	Negative	View
5	Nebraska Public Power District	Don Schmit	Negative	View
5	New York Power Authority	Gerald Mannarino	Negative	
5	NextEra Energy	Allen D Schriver	Affirmative	
5	Northern California Power Agency	Hari Modi	Abstain	
5	Northern Indiana Public Service Co.	William O. Thompson		
5	Omaha Public Power District	Mahmood Z. Safi	Negative	View
5	Orlando Utilities Commission	Richard Kinas	Abstain	
5	Pacific Gas and Electric Company	Richard J. Padilla	Negative	View
5	PacifiCorp	Sandra L. Shaffer	Affirmative	
5	Platte River Power Authority	Roland Thiel	Abstain	
5	Portland General Electric Co.	Gary L Tingley	Negative	

5	PowerSouth Energy Cooperative	Tim Hattaway	Abstain	002795
5	PPL Generation LLC	Annette M Bannon	Negative	View
5	Progress Energy Carolinas	Wayne Lewis	Affirmative	
5	PSEG Fossil LLC	Tim Kucey	Abstain	
5	Public Utility District No. 1 of Lewis County	Steven Grega	Abstain	
5	Puget Sound Energy, Inc.	Tom Flynn	Abstain	
5	Sacramento Municipal Utility District	Bethany Hunter	Negative	View
5	Salt River Project	William Alkema	Affirmative	
5	Santee Cooper	Lewis P Pierce	Affirmative	
5	Seattle City Light	Michael J. Haynes	Negative	View
5	Seminole Electric Cooperative, Inc.	Brenda K. Atkins	Affirmative	
5	Siemens PTI	Edwin Cano	Affirmative	
5	Snohomish County PUD No. 1	Sam Nietfeld	Negative	View
5	Southern California Edison Co.	Denise Yaffe	Abstain	
5	Southern Company Generation	William D Shultz	Negative	
5	Tampa Electric Co.	RJames Rocha	Negative	
5	Tenaska, Inc.	Scott M Helyer	Abstain	
5	Tennessee Valley Authority	David Thompson	Affirmative	View
5	Tri-State G & T Association, Inc.	Barry Ingold	Negative	
5	U.S. Army Corps of Engineers	Melissa Kurtz	Negative	View
5	Wisconsin Electric Power Co.	Linda Horn	Affirmative	
5	Wisconsin Public Service Corp.	Leonard Rentmeester		
5	Xcel Energy, Inc.	Liam Noailles	Negative	View
6	ACES Power Marketing	Jason L Marshall	Negative	View
6	AEP Marketing	Edward P. Cox	Negative	View
6	Ameren Energy Marketing Co.	Jennifer Richardson	Negative	View
6	APS	RANDY A YOUNG	Negative	
6	Bonneville Power Administration	Brenda S. Anderson	Negative	
6	City of Redding	Marvin Briggs	Negative	View
6	Cleco Power LLC	Robert Hirchak	Affirmative	View
6	Colorado Springs Utilities	Lisa C Rosintoski	Negative	View
6	Consolidated Edison Co. of New York	Nickesha P Carrol	Negative	View
6	Constellation Energy Commodities Group	Brenda Powell	Negative	View
6	Dominion Resources, Inc.	Louis S. Slade	Abstain	
6	Duke Energy Carolina	Walter Yeager	Negative	View
6	Entergy Services, Inc.	Terri F Benoit	Affirmative	
6	FirstEnergy Solutions	Kevin Querry	Abstain	View
6	Florida Municipal Power Agency	Richard L. Montgomery	Negative	View
6	Florida Municipal Power Pool	Thomas Washburn	Negative	View
6	Florida Power & Light Co.	Silvia P. Mitchell	Affirmative	
6	Imperial Irrigation District	Cathy Bretz	Affirmative	
6	Kansas City Power & Light Co.	Jessica L Klinghoffer	Negative	View
6	Lakeland Electric	Paul Shipps	Negative	View
6	Lincoln Electric System	Eric Ruskamp	Negative	View
6	Los Angeles Department of Water & Power	Brad Packer	Negative	
6	Luminant Energy	Brad Jones	Affirmative	
6	Manitoba Hydro	Daniel Prowse	Negative	View
6	MidAmerican Energy Co.	Dennis Kimm	Negative	View
6	Northern Indiana Public Service Co.	Joseph O'Brien	Affirmative	
6	Omaha Public Power District	David Ried	Negative	
6	Orlando Utilities Commission	Claston Augustus Sunanon	Negative	
6	PacifiCorp	Scott L Smith	Affirmative	
6	Platte River Power Authority	Carol Ballantine	Abstain	
6	PPL EnergyPlus LLC	Mark A Heimbach	Negative	View
6	Progress Energy	John T Sturgeon	Affirmative	View
6	PSEG Energy Resources & Trade LLC	Peter Dolan	Abstain	
6	Public Utility District No. 1 of Chelan County	Hugh A. Owen	Negative	
6	Sacramento Municipal Utility District	Diane Enderby	Negative	View
6	Salt River Project	Steven J Hulet	Affirmative	
6	Santee Cooper	Michael Brown	Affirmative	
6	Seattle City Light	Dennis Sismaet	Negative	View
6	Seminole Electric Cooperative, Inc.	Trudy S. Novak	Affirmative	
6	Snohomish County PUD No. 1	William T Moojen	Negative	View
6	South California Edison Company	Lujuanna Medina	Negative	View
6	Southern Company Generation and Energy Marketing	John J. Ciza	Negative	View
6	Tacoma Public Utilities	Michael C Hill	Affirmative	

6	Tampa Electric Co.	Benjamin F Smith II	Negative	002796
6	Tennessee Valley Authority	Marjorie S. Parsons	Affirmative	View
6	Westar Energy	Grant L Wilkerson	Affirmative	
6	Western Area Power Administration - UGP Marketing	Peter H Kinney	Negative	View
6	Xcel Energy, Inc.	David F. Lemmons	Negative	View
8		Edward C Stein	Affirmative	
8		Roger C Zaklukiewicz	Negative	View
8		James A Maenner	Abstain	
8		Robert Blohm	Abstain	View
8	Energy Mark, Inc.	Howard F. Illian	Negative	View
8	JDRJC Associates	Jim Cyrulewski	Negative	View
8	Power Energy Group LLC	Peggy Abbadini	Affirmative	
8	Utility Services, Inc.	Brian Evans-Mongeon	Abstain	
8	Volkmann Consulting, Inc.	Terry Volkmann	Affirmative	
9	California Energy Commission	William M Chamberlain	Negative	View
9	Commonwealth of Massachusetts Department of Public Utilities	Donald Nelson		
9	National Association of Regulatory Utility Commissioners	Diane J Barney	Negative	View
9	New York State Department of Public Service	Thomas Dvorsky	Negative	View
9	Oregon Public Utility Commission	Jerome Murray	Negative	View
9	Public Utilities Commission of Ohio	Klaus Lambeck	Abstain	
10	Florida Reliability Coordinating Council	Linda Campbell	Affirmative	
10	Midwest Reliability Organization	James D Burley	Negative	View
10	New York State Reliability Council	Alan Adamson	Negative	
10	Northeast Power Coordinating Council	Guy V. Zito	Negative	View
10	ReliabilityFirst Corporation	Anthony E Jablonski	Negative	View
10	SERC Reliability Corporation	Carter B. Edge	Affirmative	View
10	Southwest Power Pool RE	Emily Pennel	Affirmative	View
10	Texas Reliability Entity, Inc.	Donald G Jones	Negative	View
10	Western Electricity Coordinating Council	Steven L. Rueckert	Negative	View

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Washington Office: 1120 G Street, N.W. : Suite 990 : Washington, DC 20005-3801

Account Log-In/Register

2007-12 Frequency Response Non-Binding Poll Results

Ballot Results	
Non-Binding Poll Name:	2007-12 Non-binding Poll
Poll Period:	11/29/2011 - 12/9/2011
Total # Opinions:	206
Total Ballot Pool:	333
Summary Results:	89.49% of those who registered to participate provided an opinion or abstention; 36% of those who provided an opinion indicated support for the VRFs and VSLs that were proposed.

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1	Ameren Services	Kirit Shah	Negative	View
1	American Electric Power	Paul B. Johnson		
1	Associated Electric Cooperative, Inc.	John Bussman	Affirmative	View
1	Avista Corp.	Scott J Kinney	Abstain	
1	Balancing Authority of Northern California	Kevin Smith	Negative	
1	Baltimore Gas & Electric Company	Gregory S Miller	Abstain	
1	BC Hydro and Power Authority	Patricia Robertson	Abstain	
1	Beaches Energy Services	Joseph S Stonecipher	Negative	View
1	Bonneville Power Administration	Donald S. Watkins	Negative	
1	Brazos Electric Power Cooperative, Inc.	Tony Kroskey		
1	Central Maine Power Company	Joseph Turano Jr.	Affirmative	
1	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Chang G Choi	Affirmative	
1	Clark Public Utilities	Jack Stamper	Negative	View
1	Colorado Springs Utilities	Paul Morland	Negative	View
1	Consolidated Edison Co. of New York	Christopher L de Graffenried	Negative	View
1	CPS Energy	Richard Castrejana	Abstain	
1	Dairyland Power Coop.	Robert W. Roddy	Affirmative	
1	Dayton Power & Light Co.	Hertzel Shamash	Negative	
1	Deseret Power	James Tucker	Negative	View
1	Dominion Virginia Power	Michael S Crowley		
1	Duke Energy Carolina	Douglas E. Hils	Negative	View
1	East Kentucky Power Coop.	George S. Carruba	Negative	View
1	Empire District Electric Co.	Ralph F Meyer	Affirmative	

1	Entergy Services, Inc.	Edward J Davis	Affirmative	
1	FirstEnergy Corp.	William J Smith	Abstain	View
1	Florida Keys Electric Cooperative Assoc.	Dennis Minton		
1	Florida Power & Light Co.	Mike O'Neil	Affirmative	
1	Gainesville Regional Utilities	Luther E. Fair	Abstain	
1	Great River Energy	Gordon Pietsch	Negative	View
1	Hoosier Energy Rural Electric Cooperative, Inc.	Bob Solomon	Negative	View
1	Hydro One Networks, Inc.	Ajay Garg	Abstain	
1	Hydro-Quebec TransEnergie	Bernard Pelletier		
1	Idaho Power Company	Ronald D. Schellberg	Negative	View
1	Imperial Irrigation District	Tino Zaragoza	Affirmative	
1	International Transmission Company Holdings Corp	Michael Moltane		
1	JEA	Ted Hobson	Negative	View
1	Kansas City Power & Light Co.	Michael Gammon	Negative	View
1	Keys Energy Services	Stanley T Rzad		
1	Lakeland Electric	Larry E Watt		
1	Lee County Electric Cooperative	John W Delucca	Abstain	
1	Lincoln Electric System	Doug Bantam	Negative	
1	Manitoba Hydro	Joe D Petaski	Negative	View
1	MEAG Power	Danny Dees	Abstain	
1	MidAmerican Energy Co.	Terry Harbour	Abstain	
1	National Grid	Saurabh Saksena		
1	Nebraska Public Power District	Cole C Brodine	Abstain	
1	New Brunswick Power Transmission Corporation	Randy MacDonald	Negative	
1	New York State Electric & Gas Corp.	Raymond P Kinney	Affirmative	
1	Northeast Utilities	David Boguslawski		
1	Northern Indiana Public Service Co.	Kevin M Largura	Affirmative	
1	NorthWestern Energy	John Canavan	Affirmative	
1	Ohio Valley Electric Corp.	Robert Mattey	Negative	
1	Omaha Public Power District	Doug Peterchuck	Negative	
1	Orlando Utilities Commission	Brad Chase	Negative	View
1	PacifiCorp	Ryan Millard	Abstain	
1	Platte River Power Authority	John C. Collins	Abstain	
1	Portland General Electric Co.	John T Walker	Negative	View
1	PowerSouth Energy Cooperative	Larry D Avery	Negative	
1	PPL Electric Utilities Corp.	Brenda L Truhe	Negative	View
1	Progress Energy Carolinas	Brett A Koelsch	Affirmative	View
1	Public Service Company of New Mexico	Laurie Williams	Affirmative	
1	Public Service Electric and Gas Co.	Kenneth D. Brown	Abstain	
1	Public Utility District No. 1 of Okanogan County	Dale Dunckel		
1	Puget Sound Energy, Inc.	Denise M Lietz	Abstain	
1	Rochester Gas and Electric Corp.	John C. Allen	Affirmative	
1	Sacramento Municipal Utility District	Tim Kelley	Negative	

1	Salmon River Electric Cooperative	Kathryn Spence		
1	Salt River Project	Robert Kondziolka	Affirmative	
1	Santee Cooper	Terry L Blackwell	Affirmative	
1	SCE&G	Henry Delk, Jr.	Affirmative	
1	Seattle City Light	Pawel Krupa	Negative	View
1	Snohomish County PUD No. 1	Long T Duong	Abstain	
1	South California Edison Company	Steven Mavis	Negative	View
1	Southern Company Services, Inc.	Robert Schaffeld	Negative	
1	Southern Illinois Power Coop.	William Hutchison	Affirmative	
1	Southwest Transmission Cooperative, Inc.	James Jones	Negative	View
1	Sunflower Electric Power Corporation	Noman Lee Williams	Affirmative	
1	Tampa Electric Co.	Beth Young	Negative	
1	Tennessee Valley Authority	Larry Akens	Affirmative	
1	Tri-State G & T Association, Inc.	Tracy Sliman	Negative	
1	Tucson Electric Power Co.	John Tolo	Negative	View
1	United Illuminating Co.	Jonathan Appelbaum	Affirmative	
1	Westar Energy	Allen Klassen	Abstain	
1	Western Area Power Administration	Brandy A Dunn	Negative	
1	Xcel Energy, Inc.	Gregory L Pieper		
2	Alberta Electric System Operator	Mark B Thompson	Abstain	
2	BC Hydro	Venkataramakrishnan Vinnakota	Abstain	
2	California ISO	Rich Vine	Negative	View
2	Electric Reliability Council of Texas, Inc.	Charles B Manning	Affirmative	
2	Independent Electricity System Operator	Barbara Constantinescu	Affirmative	
2	Midwest ISO, Inc.	Marie Knox	Affirmative	
2	New Brunswick System Operator	Alden Briggs	Abstain	
2	New York Independent System Operator	Gregory Campoli	Abstain	
2	PJM Interconnection, L.L.C.	Tom Bowe		
2	Southwest Power Pool, Inc.	Charles Yeung	Abstain	
3	AEP	Michael E Deloach	Abstain	
3	Alabama Power Company	Richard J. Mandes	Negative	
3	Ameren Services	Mark Peters	Negative	
3	APS	Steven Norris	Abstain	
3	Atlantic City Electric Company	NICOLE BUCKMAN	Abstain	
3	BC Hydro and Power Authority	Pat G. Harrington	Abstain	
3	Bonneville Power Administration	Rebecca Berdahl	Negative	
3	City of Bartow, Florida	Matt Culverhouse	Negative	View
3	City of Clewiston	Lynne Mila	Negative	
3	City of Garland	Ronnie C Hoeinghaus	Abstain	
3	City of Green Cove Springs	Gregg R Griffin	Negative	View
3	City of Redding	Bill Hughes	Negative	View
3	Cleco Corporation	Michelle A Corley	Abstain	View
3	Colorado Springs Utilities	Charles Morgan	Negative	View

3	Consolidated Edison Co. of New York	Peter T Yost	Negative	View
3	Constellation Energy	CJ Ingersoll	Abstain	
3	Consumers Energy	Richard Blumenstock	Affirmative	
3	CPS Energy	Jose Escamilla	Abstain	
3	Detroit Edison Company	Kent Kujala	Affirmative	
3	Dominion Resources Services	Michael F. Gildea	Abstain	
3	Duke Energy Carolina	Henry Ernst-Jr	Negative	View
3	Entergy	Joel T Plessinger	Affirmative	
3	FirstEnergy Energy Delivery	Stephan Kern	Abstain	View
3	Florida Municipal Power Agency	Joe McKinney	Negative	View
3	Florida Power Corporation	Lee Schuster	Affirmative	
3	Georgia Power Company	Anthony L Wilson	Negative	
3	Georgia Systems Operations Corporation	William N. Phinney	Abstain	
3	Grays Harbor PUD	Wesley W Gray		
3	Great River Energy	Brian Glover	Negative	View
3	Gulf Power Company	Paul C Caldwell	Negative	
3	Hydro One Networks, Inc.	David Kiguel	Abstain	
3	Imperial Irrigation District	Jesus S. Alcaraz	Affirmative	
3	JEA	Garry Baker	Negative	View
3	Kansas City Power & Light Co.	Charles Locke	Negative	View
3	Kissimmee Utility Authority	Gregory D Woessner	Negative	
3	Lakeland Electric	Norman D Harryhill	Negative	
3	Lincoln Electric System	Jason Fortik	Negative	View
3	Los Angeles Department of Water & Power	Daniel D Kurowski	Negative	
3	Louisville Gas and Electric Co.	Charles A. Freibert		
3	Manitoba Hydro	Greg C. Parent	Negative	View
3	Manitowoc Public Utilities	Thomas E Reed	Abstain	
3	MidAmerican Energy Co.	Thomas C. Mielnik	Abstain	
3	Mississippi Power	Jeff Franklin	Negative	
3	Modesto Irrigation District	Jack W Savage		
3	Municipal Electric Authority of Georgia	Steven M. Jackson	Abstain	
3	Muscatine Power & Water	John S Bos	Negative	View
3	Nebraska Public Power District	Tony Eddleman	Abstain	
3	New York Power Authority	Marilyn Brown	Negative	
3	Niagara Mohawk (National Grid Company)	Michael Schiavone	Affirmative	
3	Northern Indiana Public Service Co.	William SeDoris	Affirmative	
3	Ocala Electric Utility	David Anderson	Negative	
3	Orlando Utilities Commission	Ballard K Mutters	Negative	
3	Owensboro Municipal Utilities	Thomas T Lyons	Abstain	
3	Pacific Gas and Electric Company	John H Hagen	Negative	View
3	PacifiCorp	Dan Zollner		
3	Platte River Power Authority	Terry L Baker	Negative	View
3	PNM Resources	Michael Mertz	Affirmative	
3	Potomac Electric Power Co.	Robert Reuter	Abstain	

3	Progress Energy Carolinas	Sam Waters	Affirmative	View
3	Public Service Electric and Gas Co.	Jeffrey Mueller	Abstain	
3	Public Utility District No. 1 of Clallam County	David Proebstel	Affirmative	
3	Puget Sound Energy, Inc.	Erin Apperson	Abstain	
3	Sacramento Municipal Utility District	James Leigh-Kendall	Negative	
3	Salt River Project	John T. Underhill	Affirmative	
3	Santee Cooper	James M Poston	Affirmative	
3	Seattle City Light	Dana Wheelock	Negative	View
3	Seminole Electric Cooperative, Inc.	James R Frauen		
3	Snohomish County PUD No. 1	Mark Oens		
3	South Carolina Electric & Gas Co.	Hubert C Young	Abstain	
3	Tacoma Public Utilities	Travis Metcalfe	Affirmative	
3	Tampa Electric Co.	Ronald L Donahey	Negative	
3	Tennessee Valley Authority	Ian S Grant	Affirmative	
3	Tri-State G & T Association, Inc.	Janelle Marriott	Negative	View
3	Westar Energy	Bo Jones	Affirmative	
3	Xcel Energy, Inc.	Michael Ibold		
4	Alliant Energy Corp. Services, Inc.	Kenneth Goldsmith	Affirmative	
4	American Municipal Power	Kevin Koloini	Negative	
4	Blue Ridge Power Agency	Duane S Dahlquist	Affirmative	
4	City of Austin dba Austin Energy	Reza Ebrahimian	Abstain	
4	City of Clewiston	Kevin McCarthy	Negative	
4	City of New Smyrna Beach Utilities Commission	Tim Beyrle		
4	City of Redding	Nicholas Zettel	Negative	View
4	City Utilities of Springfield, Missouri	John Allen	Affirmative	View
4	Consumers Energy	David Frank Ronk	Affirmative	
4	Detroit Edison Company	Daniel Herring		
4	Flathead Electric Cooperative	Russ Schneider	Abstain	
4	Florida Municipal Power Agency	Frank Gaffney	Negative	View
4	Fort Pierce Utilities Authority	Thomas Richards	Abstain	
4	Georgia System Operations Corporation	Guy Andrews	Abstain	
4	Imperial Irrigation District	Diana U Torres	Affirmative	
4	Madison Gas and Electric Co.	Joseph DePoorter	Abstain	
4	Northern California Power Agency	Tracy R Bibb	Abstain	
4	Ohio Edison Company	Douglas Hohlbaugh	Abstain	View
4	Public Utility District No. 1 of Douglas County	Henry E. LuBean	Negative	View
4	Public Utility District No. 1 of Snohomish County	John D Martinsen	Abstain	
4	Sacramento Municipal Utility District	Mike Ramirez	Negative	
4	Seattle City Light	Hao Li	Negative	View
4	South Mississippi Electric Power Association	Steven McElhaney		
4	Tacoma Public Utilities	Keith Morisette	Affirmative	
4	Wisconsin Energy Corp.	Anthony Jankowski	Affirmative	
5	AEP Service Corp.	Brock Ondayko	Abstain	

5	AES Corporation	Leo Bernier	Abstain	
5	Amerenue	Sam Dwyer	Negative	
5	Arizona Public Service Co.	Edward Cambridge	Abstain	
5	Avista Corp.	Edward F. Groce	Abstain	
5	BC Hydro and Power Authority	Clement Ma	Abstain	
5	Black Hills Corp	George Tatar	Affirmative	
5	Boise-Kuna Irrigation District/dba Lucky peak power plant project	Mike D Kukla	Negative	
5	Bonneville Power Administration	Francis J. Halpin	Negative	View
5	BrightSource Energy, Inc.	Chifong Thomas	Negative	View
5	City of Austin dba Austin Energy	Jeanie Doty	Abstain	
5	City of Redding	Paul Cummings	Negative	View
5	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Max Emrick	Affirmative	
5	City Water, Light & Power of Springfield	Steve Rose		
5	Colorado Springs Utilities	Jennifer Eckels	Negative	View
5	Consolidated Edison Co. of New York	Wilket (Jack) Ng	Negative	View
5	Consumers Energy Company	David C Greyerbiehl	Affirmative	
5	CPS Energy	Robert Stevens		
5	Detroit Edison Company	Christy Wicke	Affirmative	
5	Dominion Resources, Inc.	Mike Garton	Abstain	
5	Duke Energy	Dale Q Goodwine	Negative	View
5	Edison Mission Energy	Ellen Oswald		
5	Electric Power Supply Association	John R Cashin	Abstain	
5	FirstEnergy Solutions	Kenneth Dresner	Abstain	View
5	Florida Municipal Power Agency	David Schumann	Negative	View
5	Great River Energy	Preston L Walsh	Negative	View
5	Green Country Energy	Greg Froehling	Abstain	
5	Indeck Energy Services, Inc.	Rex A Roehl		
5	JEA	John J Babik	Negative	View
5	Kissimmee Utility Authority	Mike Blough	Abstain	
5	Lakeland Electric	James M Howard	Negative	
5	Liberty Electric Power LLC	Daniel Duff	Abstain	
5	Lincoln Electric System	Dennis Florom	Negative	View
5	Los Angeles Department of Water & Power	Kenneth Silver	Negative	
5	Luminant Generation Company LLC	Mike Laney	Affirmative	
5	Manitoba Hydro	S N Fernando	Negative	View
5	Massachusetts Municipal Wholesale Electric Company	David Gordon	Abstain	
5	MEAG Power	Steven Grego	Abstain	
5	MidAmerican Energy Co.	Christopher Schneider	Affirmative	
5	Muscatine Power & Water	Mike Avesing	Negative	View
5	Nebraska Public Power District	Don Schmit	Abstain	
5	New York Power Authority	Gerald Mannarino	Negative	
5	NextEra Energy	Allen D Schriver	Affirmative	
5	Northern California Power Agency	Hari Modi	Abstain	

5	Northern Indiana Public Service Co.	William O. Thompson		
5	Omaha Public Power District	Mahmood Z. Safi	Negative	View
5	Orlando Utilities Commission	Richard Kinas		
5	Pacific Gas and Electric Company	Richard J. Padilla	Negative	View
5	PacifiCorp	Sandra L. Shaffer	Abstain	
5	Platte River Power Authority	Roland Thiel	Abstain	
5	Portland General Electric Co.	Gary L Tingley	Negative	
5	PPL Generation LLC	Annette M Bannon	Negative	View
5	Progress Energy Carolinas	Wayne Lewis	Affirmative	
5	PSEG Fossil LLC	Tim Kucey	Abstain	
5	Public Utility District No. 1 of Lewis County	Steven Grega	Abstain	
5	Puget Sound Energy, Inc.	Tom Flynn	Abstain	
5	Sacramento Municipal Utility District	Bethany Hunter	Negative	
5	Salt River Project	William Alkema	Affirmative	
5	Santee Cooper	Lewis P Pierce	Affirmative	
5	Seattle City Light	Michael J. Haynes	Abstain	
5	Seminole Electric Cooperative, Inc.	Brenda K. Atkins	Affirmative	
5	Siemens PTI	Edwin Cano	Affirmative	
5	Snohomish County PUD No. 1	Sam Nietfeld	Abstain	
5	Southern California Edison Co.	Denise Yaffe	Abstain	
5	Southern Company Generation	William D Shultz	Negative	
5	Tampa Electric Co.	RJames Rocha	Negative	
5	Tenaska, Inc.	Scott M Helyer	Abstain	
5	Tennessee Valley Authority	David Thompson	Affirmative	
5	Tri-State G & T Association, Inc.	Barry Ingold	Negative	
5	U.S. Army Corps of Engineers	Melissa Kurtz	Negative	View
5	Xcel Energy, Inc.	Liam Noailles		
6	ACES Power Marketing	Jason L Marshall	Negative	View
6	AEP Marketing	Edward P. Cox	Abstain	
6	Ameren Energy Marketing Co.	Jennifer Richardson	Negative	View
6	APS	RANDY A YOUNG	Abstain	
6	Bonneville Power Administration	Brenda S. Anderson	Negative	
6	City of Redding	Marvin Briggs	Negative	View
6	Cleco Power LLC	Robert Hirchak	Abstain	View
6	Colorado Springs Utilities	Lisa C Rosintoski	Negative	View
6	Consolidated Edison Co. of New York	Nickesha P Carrol	Negative	View
6	Constellation Energy Commodities Group	Brenda Powell	Negative	
6	Dominion Resources, Inc.	Louis S. Slade	Abstain	
6	Duke Energy Carolina	Walter Yeager	Negative	View
6	Entergy Services, Inc.	Terri F Benoit	Affirmative	
6	FirstEnergy Solutions	Kevin Querry	Abstain	View
6	Florida Municipal Power Agency	Richard L. Montgomery	Negative	View
6	Florida Municipal Power Pool	Thomas Washburn	Negative	View
6	Florida Power & Light Co.	Silvia P. Mitchell		
6	Imperial Irrigation District	Cathy Bretz	Affirmative	
6	Kansas City Power & Light Co.	Jessica L Klinghoffer	Negative	View

6	Lakeland Electric	Paul Shipps	Negative	View
6	Lincoln Electric System	Eric Ruskamp	Negative	View
6	Los Angeles Department of Water & Power	Brad Packer	Negative	
6	Luminant Energy	Brad Jones	Affirmative	
6	Manitoba Hydro	Daniel Prowse	Negative	View
6	MidAmerican Energy Co.	Dennis Kimm	Abstain	
6	Northern Indiana Public Service Co.	Joseph O'Brien	Affirmative	
6	Omaha Public Power District	David Ried	Negative	
6	Orlando Utilities Commission	Claston Augustus Sunanon	Negative	
6	PacifiCorp	Scott L Smith	Abstain	
6	Platte River Power Authority	Carol Ballantine	Abstain	
6	PPL EnergyPlus LLC	Mark A Heimbach	Negative	View
6	Progress Energy	John T Sturgeon	Affirmative	
6	PSEG Energy Resources & Trade LLC	Peter Dolan	Abstain	
6	Public Utility District No. 1 of Chelan County	Hugh A. Owen	Abstain	
6	Sacramento Municipal Utility District	Diane Enderby	Negative	
6	Salt River Project	Steven J Hulet	Affirmative	
6	Santee Cooper	Michael Brown	Affirmative	
6	Seattle City Light	Dennis Sismaet	Negative	View
6	Seminole Electric Cooperative, Inc.	Trudy S. Novak	Affirmative	
6	Snohomish County PUD No. 1	William T Moojen	Abstain	
6	South California Edison Company	Lujuanna Medina	Negative	
6	Southern Company Generation and Energy Marketing	John J. Ciza	Negative	
6	Tacoma Public Utilities	Michael C Hill	Affirmative	
6	Tampa Electric Co.	Benjamin F Smith II		
6	Tennessee Valley Authority	Marjorie S. Parsons	Affirmative	
6	Westar Energy	Grant L Wilkerson	Affirmative	
6	Western Area Power Administration - UGP Marketing	Peter H Kinney	Negative	
6	Xcel Energy, Inc.	David F. Lemmons		
8		Roger C Zaklukiewicz	Negative	
8		James A Maenner	Abstain	
8		Edward C Stein	Affirmative	
8	Energy Mark, Inc.	Howard F. Illian	Negative	View
8	JDRJC Associates	Jim Cyrulewski	Negative	
8	Power Energy Group LLC	Peggy Abbadini	Affirmative	
8	Utility Services, Inc.	Brian Evans-Mongeon	Abstain	
8	Volkmann Consulting, Inc.	Terry Volkmann	Affirmative	
9	California Energy Commission	William M Chamberlain	Negative	View
9	Commonwealth of Massachusetts Department of Public Utilities	Donald Nelson		
10	Florida Reliability Coordinating Council	Linda Campbell	Affirmative	
10	Midwest Reliability Organization	James D Burley	Abstain	
10	New York State Reliability Council	Alan Adamson	Affirmative	

10	Northeast Power Coordinating Council	Guy V. Zito	Negative	View
10	ReliabilityFirst Corporation	Anthony E Jablonski	Negative	View
10	SERC Reliability Corporation	Carter B. Edge	Abstain	
10	Southwest Power Pool RE	Emily Pennel	Abstain	
10	Texas Reliability Entity, Inc.	Donald G Jones	Affirmative	View
10	Western Electricity Coordinating Council	Steven L. Rueckert	Negative	View

Name (26 Responses)
Organization (26 Responses)
Group Name (17 Responses)
Lead Contact (17 Responses)
Question 1 (36 Responses)
Question 1 Comments (43 Responses)
Question 2 (37 Responses)
Question 2 Comments (43 Responses)
Question 3 (32 Responses)
Question 3 Comments (43 Responses)
Question 4 (32 Responses)
Question 4 Comments (43 Responses)
Question 5 (37 Responses)
Question 5 Comments (43 Responses)
Question 6 (40 Responses)
Question 6 Comments (43 Responses)
Question 7 (36 Responses)
Question 7 Comments (43 Responses)
Question 8 (37 Responses)
Question 8 Comments (43 Responses)
Question 9 (33 Responses)
Question 9 Comments (43 Responses)
Question 10 (0 Responses)
Question 10 Comments (43 Responses)

Southwest Power Pool Regional Entity
Emily Pennel
Yes
Yes
Yes
Yes
Measures are more specific and measurable than seen in the past. This is a positive improvement.
Yes
Hard to follow the language for the VSL for R1. Suggest using formulas for ease of interpretation or provide an example in the Supporting Documentation.
Yes
Yes
Yes
Need to clarify that 2012 Bias setting will be based on 1% of peak load or generation until approval of BAL-003-1 by FERC establishing the .08% of peak load or generation minimum threshold.
Yes
Bonneville Power Administration
Chris Higgins
Yes

No
Regarding R1, BPA believes that adding additional requirements in R1 by referencing Attachment A does not add clarity. FRO should be a calculation that the BA's can do themselves and included within the standard. Can Form 1 be changed outside of the standard drafting process? BPA doesn't believe that Form 1 should be allowed to be changed outside of the standard drafting process. As drafted, Requirement R1 requires Balancing Authorities or Reserve Sharing Groups (RSGs) to achieve an annual Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO). As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. BPA recommends clarifying this concept and possibly including an example in the background document to help explain how this would work. Regarding R2, BPA believes each BA should be able to calculate its own frequency bias setting without ERO validation. The standard can require the BA to use Form 1, if the BA doesn't use Form 1 correctly, then the BA would be in violation of the standard. BPA believes that R3 should include a minimal amount of time (suggesting a couple of hours per year) to allow for testing other modes. Requirement R3 requires each Balancing Authority not receiving Overlap Regulation Service to operate its AGC in Tie Line Bias mode… unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area. There may be occasions in which an entity needs to perform testing or other instances where it is necessary or desirable to operate in a mode other than Tie Line Bias that does not qualify as an Adverse Reliability Impact, but never the less is necessary or desired. BPA recommends including language that would permit operation other than Tie Line Bias mode provided the Reliability Coordinator was notified. BPA seeks clarification from the drafting team as to whether or not there will be any conflicts between proposed Requirement R3 and the requirements of FERC-approved regional reliability standard BAL-004-WECC-1 – Automatic Time Error Correction. BPA agrees with the concept of R4, however, BPA again disagrees with the ERO validation of the frequency bias setting. BPA believes that reducing frequency bias obligation is detrimental to reliability. It seems that lowering the Minimum Frequency Bias Setting from 1% to .8% will result in a lower response, which in turn will lower the natural frequency response. BPA believes that over time, it would seem that this pattern would lead to poorer response. BPA believes that R5 should read "greater than or equal to one of the following" not " at least equal to". The requirement should be a part of Form 1 or included in R2. For variable bias, the minimum percentage should be based on the forecasted month peak.
Yes
No
BPA believes that historian data should be able to be used for evidence.
No
BPA believes that R1 needs to be more clear and concise as to what is being conveyed in the requirement. It is difficult to understand. The proposed VSLs for Requirement R1 treats a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO. BPA believes that conforming changes to the VSLs would need to be made for any changes to the Requirements as suggested in the comments to the standard.
No
BPA believes that Attachment A adds additional requirements to the standard. Confusion exists between Attachment A and the Background Document. Attachment A states peak load allocation is based on "Projected" Peak Loads and Generation, but the Background Document states it will use "historical" Peak Load and Generation. 3a: it may take longer than 8 seconds in some disturbances. This should be 10 seconds. .05 Hz Delta F is not low enough for the Western Interconnection, it should be .075Hz to ensure there is measurable frequency response for the interconnection. Also, under frequency should be set at 59.95 Hz. BPA does not believe there is a reliability need to include over frequency events. 3b: It is unclear if the 18 seconds is setting the B point. If this is the B point, BPA believes it should be changed to 25 seconds for the Western Interconnection. 4. Please define relatively steady and near 60 Hz. 6: For the Western Interconnection, BPA believes this needs to be 10 minutes at the top of the hour. As mid hour scheduling becomes more prevalent, the ramping at

the bottom of the hour will have to be taken into account. FRO for the interconnection: Starting frequency should be the FTL limit. With RBC in place, the frequency is seldom at 60 Hz. BPA understands the theory behind setting the base obligation to the values listed in table 2. BPA would like to know if there were any studies performed to validate setting the FRO for the interconnection to such a low level? BA FRO and frequency bias setting: BPA does not agree with ERO assigning a Frequency Bias setting to each BA. This calculation is indicated as the initial FRO allocation, what is the process for changing it? BPA believes this should go through the standard drafting process for any changes. The calculation should use Peak online capacity, not the installed capacity. This would lead to the denominator being 2 X Peak projected load for the interconnection. BPA has approximately 35,000 MW of installed generation, and has never seen the actual coincidental generation go over 21,000 MW. Again, BPA doesn't believe the ERO should be validating the frequency bias setting. It is unclear to BPA how variable bias is being addressed in the standard.
No
BPA understands the concept and we disagree with it. As the ERO continues to lower the required minimum frequency bias setting for an interconnection, the BA's that have frequency response higher than the 1% will have a higher percentage of the frequency response of the interconnection. Also, this standard is primarily measuring AGC response, not natural frequency response; therefore not lowering the limit is appropriate.
No
BPA believes the form is not easily understood and is overly complicated for what it is trying to accomplish. BPA believes the form might work for an internal evaluation, just not for an external audit. Compliance is based on this form. BPA believes the standard needs to be simplified and possibly returned to a data gathering standard.
BPA believes that an entity is not measuring frequency response from 20 – 52 seconds; rather, that the entity is measuring AGC response which is based on the frequency bias term. This leads to a circular argument, because that entity would be using frequency bias setting in AGC to calculate frequency bias setting for the next year. Also, because an entity is measuring AGC response and net interchange and not taking pre-disturbance ACE into account, a BA frequency response may not be reflected in the spreadsheet. Example: If the BA has a positive ACE of 300 MW and the frequency component of ACE during an event is 200MW. Immediately following the disturbance, natural frequency response will drive net interchange up by 200MW. During the time frame being measured (20-52sec), AGC response will drive the on control generation down by the original 300 MW ACE, which will look like the BA had an opposite response at the interconnections in the amount of 100MW. Form 1: It is unclear in Form 1 how variable bias BA's would implement this standard. There is a note identifying a tab to use, but it is unclear if that is the only requirement for variable bias BA's. In the comment responses to BPA, it was indicated that "the SDT will provide additional and sufficient direction related to variable bias after review of this issue during the field trial." BPA finds this response unacceptable and believes that it needs to be addressed in the standard prior to approval. BPA believes the standard should be easy to understand and implement and should not rely on the judgment of the ERO. BPA believes this standard needs to be simplified. BPA believes this standard is unclear as to if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of Frequency Response expected on a total basis. Balancing Authorities need to know for how many tenths of a hertz they are to respond so they can determine how to plan to meet this requirement. The documents do not appear to provide any boundary on the maximum amount of Frequency Response that a BA will provide, i.e. it is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz or in the Western Interconnection that causes the frequency to drop to less than 59.5 Hz, or if that event is excluded from the list used to calculate the Balancing Authorities' response or is it included with an expectation that it counts the same as any other event. Without a clear statement of what is expected, including whether there is a limit on that expectation or not, it is unclear what is expected of the Balancing Authorities. Lastly, BPA asks, why are there no requirements on governor installation, settings, and operation for a frequency response standard?
Howard F. Illian
Energy Mark, Inc.

Yes
No
Comment 1: The timing requirements for implementing the Frequency Bias Setting are not specified for BAs participating in Overlap Regulation Service. The requirements indicate the value that should be used for the Frequency Bias Setting, but they do not indicate when those settings should be implemented. Comment 2: The term "Tie Line Bias mode" in Requirement R3 is not sufficiently defined to make this requirement enforceable. Any operating mode labeled as "Tie Line Bias mode" on an EMS that uses interchange scheduled and frequency error as inputs will meet the standard requirement as stated. This loop-hole exists because the NERC definition of "Tie Line Bias" fails to define the term in enough detail to actually limit AGC operation to the specified mode of operation. One way to improve this requirement would be to redefine Tie Line Bias in the NERC Glossary as a mode that uses the NERC ACE Equation as defined in BAL-001 as the basis for AGC action when the EMS is in Tie Line Bias mode. Comment 3: The standard is silent on how a BA receiving Overlap Regulation Service should set its Frequency Bias Setting. Unless this is explicitly stated, it will be up to the auditors to determine the value of the Frequency Bias Setting for BAs receiving Overlap Regulation Service. Comment 4: In general, the requirements indicate what the responsible BAs should do and when. The requirements do not indicate what the BAs that are not responsible should do and when, ie. how they are relieved from responsibility. This may create problems when the auditors are required to interpret the standards for BAs that have appropriately shifted responsibilites to others.
No
Comment 5: See comments in the non-binding poll.
Yes
Yes
No
Comment 6: "If the ERO cannot identify in a given evaluation period 25 frequency excursion events satisfying the limits specified in criteria 3 below, then similar acceptable events from the previous evaluation period also satisfying listed criteria will be included with the data set by the ERO for determining FRS compliance." I believe that the better alternative in this case would be to use the lesser number of events. This is partly based on the consideration that if there are fewer events, the risk to the interconnection for that year was less that expected, and as a result, evaluation of fewer events will not compromise interconnection reliability. If fewer than 25 events are available in any year, the selection criteria should be adjusted to select more events. Comment 7: There are a number of problems with the use of "median" Frequency Response of the measured events. These problems make a choice other than median preferable. The following comments list some of those problems. Comment 8: The current standard uses average Frequency Response of selected events. This makes the current standard incompatible with the use of median. Comment 9: If a BA reconfigures during a measurement year, that reconfiguration will create a bi-modal distribution of the Frequency Response events. Median is incapable of representing a bi-modal distribution. The use of median will result in a standard that is incapable of measuring compliance effectively for an BA that is reconfigured during a measurement year (Dec 1 thru Nov 30). Comment 10: Any attempt to purchase additional Frequency Response from another BA for a portion of a measurement year will also cause a bi-modal distribution making the purchase of Frequency Response only effective for entire measurement years. Comment 11: Median is a non-linear measurement method. Because it is a non-linear measurement method, there is no valid way to manage partial year measurements. Comment 12: I will offer an alternative to median to the SDT before the end of the development of responses to these comments. Comment 13: The Minimum Frequency Bias Setting and the Frequency Response Obligation are both based on a method that assigns responsibility based on a Peak Load / Peak Generation share of the interconnection. However, the method used to set the Minimum Frequency Bias Setting is different than the method used to determine the Frequency Response Obligation. Using these two different methods could result in the Minimum Frequency Bias Setting being less that the FRO for a BA. The best way to correct this problem is to use that same allocation methodology for determining the FRO and the Minimum Frequency Bias Setting. This can be easily accomplished by modifying R5 to use the

FRO allocation method to determine the Minimum Frequency Bias Setting. This calculation would divide the numerator from the FRO allocation equation, divide it by two and multiply it by the percentage specified in Attachment B. In fact, the current FRS Form 1 uses this equation with projected rather than historic data. The best alternative would be to modify the R5 in the standard to match the FRO allocation method and modify FRS Form 1 to use historic data instead of projected data. This would result in only one set of Peak Load and Peak Generation data throughout the standard, rather than three different sets of data as currently written. When multiple sets of the same or similar data are used within a single standard, it only creates confusion and errors in the result.
No
Comment 14: Some of the information in this document concerning the Frequency Bias Setting for BAs participating in Overlap Regulation should be moved to the Supporting Document. This change would help in addressing Comments 3 & 4 under Question 2.
Yes
Comment 15: This Yes answer assumes that the SDT addresses Comment 13 under Question 6 in these comments.
Yes
Comment 16: In the Consideration of Comments document, the SDT stated that the regression calculation in FRS Form 1 had been corrected. The regression calculation is still incorrect. Comment 17: Attachment A contains the following statement; "**In the Base Obligation measure for Texas, 1150 MW (Load Resources triggered by Under Frequency Relays at 59.70 Hz) was reduced from its Contingency Protection Criteria level of 2750 MW to get 229 MW/0.1 Hz. This was reduced to accurately account for designed response from Load Resources within 30 cycles." This load triggered by Under Frequency Relays is a unidirectional response. It responds as frequency drops but does not provide the alternative response as frequency recovers. The result is a continuous frequency response that may be insufficient for increasing frequency events. Additionally, it is only available once even for oscillatory frequency events. This type of response is very useful to supplement the continuous, bi-directional response provided by governors, load and other resources, but its overuse can lead to reliability issues when it is relied upon too much. This standard fails to put any limit on the use of this type of unidirectional, single use resource for meeting the Frequency Response requirements in this standard. Since this kind of Frequency Response is significantly less expensive than continuous, bidirectional response, its inclusion without limitations creates a significant reliability loop hole in this standard. Although, it is unlikely that this problem can be corrected within the current standard development timeline, NERC should initiate investigations that will result in the setting of appropriate limits and valuation of the use of these types of resources before there is significant penetration to comply with this standard. Illustrating this problem is easily done by evaluating an interconnection with 100% of its Frequency Response provided by unidirectional, step response resources. An interconnection configured in this manner in unstable and cannot survive even a small disturbance. Failure to close this loophole quickly could compromise interconnection reliability. Comment 18: The problem described in Comment 17 exists partially because the FRR SDT has failed to provide a comprehensive definition of Frequency Response as part of this standard. Without a good definition, the default definition becomes "any response that improves the measurement method" as implemented. As with the previous comment, NERC should address this weakness in a timely manner. Otherwise, it may face the undesirable task of disallowing response that improves the measure or modifying the measure to prevent inappropriate abuse. For example, a step load response that occurs 15 seconds after a frequency event will improve the Frequency Response as measured by this standard, but will not contribute to limiting the Arrested Frequency Response and will have little positive affect on reliability.
Don McInnis
Florida Power & Light Company
Yes
Yes
No

Could not find the Risk Severity Levels in the documents.
No
What is meant by documented formulae for M5? Is a one time snapshoot of the AGC formual sufficien? The concept is ok but this needs clarification of proof.
No
For R1 the low and high level descriptions appear to be identical and the high level is less than the medium risk level. For R3 there should be low, medium, and high levels. One BA not operating to TLB does not jepordize the Interconnection. Additionally, computer failures, database loads etc may require some period where TLB is not in service. Suggestion would be Lower VSL operation off of TLB for more than 5 but < 8 continuous hours or accumlative during the year of more than 8 < 16 hours. Medium VSL would be operation off of TLB for more than 8 but <16 continuous hours or accumlative during the year of more than 16 <24 hours. High VSL would be operation off of TLB for more than 16 <24 continuous hours or accumlative during the year of more than 36 <48 hours. Severe VLS would be >24 continuous hours off of TLB or accumlative of > 48.
No
In the table on page2 the asterick references a statement that the 59.7Hz used in Florida is a special protection scheme. This is incorrect. The special protection scheme setting was 59.82Hz and was done away with in 2005 or earlier. The 59.7Hz setting used within the FRCC is based on FRCC TWG studies that require this level of setting to protect the state in the event of a separation and to protect nuclear equipment. FPL supports the use of the C(N-2) critiera. Additionally, the reference to the FERC714 report that is currently in the background data should be made part of attachment A not separated. FPL fully agrees with Table 1 The formula used to derive the FRO is inconsistant with the definition used for requirement R5. R5 states that the load is " within the BA's metered boundary". The load used in the formulae is taken from FERC714. The yearly peak demand used in R5 should be the peak monthly load from June, July or August as reported on FERC714 to be compatible with the FRO formula.
Yes
No
There is no technical justification provided either in the attachment or background data for the initial starting value of 0.8%. This is acceptable but is arbitary. Additionally, the last sentense on page 1 of Attachment B should be changed to read " the ERO must reduce (in absolute value) the minimum Frequency Bias Settings for BA's within that Interconnection, by 0.1 percentage point from its previous annual value, to better match the Frequency Bias Setting to the natural Frequency Response or provide technical justification for not implementing the reduction
Yes
This standard is an excellent start on a very difficult topic and the technical explainations are very sound. Requirement R1 needs to be modificed somewhat as it currently implies that if a BA is a member of a RSG the frequency response obligation automatically assumed to be a RSG obligation. The RSG role may be strictly for reserves with the members of the BA meeting their own FRO. Perhaps a footnote stating that the FRO and reserve obligations can be separated out.
Carlos J. Macias
FPL
Yes
No
3. – How many seconds of observation for “Delta F”? Does “Point C” in a. refer to “Figure 1 – Classic Frequency Excursion and Recovery” from NERC’s Survey Instructions document dated September 1,

2010? If so it should be included in this document along with the added 8 and 18 second time lines being shown. What is a “narrow range” in item b.? 4. – Better define “relatively steady” (i.e. within a specific range and state it?) Also, “near 60.000 Hz” is not precise enough (i.e. if the event begins below 60.000 Hz, what range or time error correction is to be considered acceptable?) Is the “A” value also part of the figure cited in 3? 5. - Is the “B” value also part of the figure cited in 3? 6. – Change “should be excluded” to “will be excluded”. 7. – Better explain “the cleanest 2 or 3 frequency excursion events” or remove the word “cleanest”. Page 2 paragraph 5: Provide specific dates for the “quarterly postings” and where these will be posted (i.e. Internet address or other). Clarify the December 15 ERO annual post date with the dates stated for same posting on Page 3 paragraph 5 and the BA’s January 10 deadline. The BA posts 30 days from which date? This is confusing. Page 2 Table 2: What of starting event frequencies that are < 60 Hz? Why is the “Highest UFLS” 59.6 when the Florida setting for its load is 59.7? Page 3 FRO equation: Page 4 of the “Frequency Response Standard Background Document, October 2011” also shows this equation but uses different terms. Make the same on both documents. In the Background Document each component of the numerator is explained and reference is made to FERC Form 714 to obtain these values. There is no reference to this form for the denominator values. All of this needs to be made clear with reference to FERC Form 714 on Attachment A.
Yes
Yes
Last paragraph: As stated, would that make the Minimum Frequency Bias Setting 0.7% of peak load or generation? A numerical example shown would help clarify this paragraph.
No
FRS Form 2 – Two-second Sample Data Instructions tab/worksheet: What is referred to as or meant by the ‘master event list’? 4. – Regarding 2 second sample rate for 25 minutes starting 2 minutes before event begins and 15 minutes after it begins, does this add up to 25 minutes or are additional minutes being required for collection? Also, FPL can report frequency at this rate, but can only report load in MW every four seconds. Move to 4 second sample rate. 6-8. – Possible to add button to auto-populate cells C8 and C11 in ‘Entry Data’ tab from the new column C and cell identifying the desired frequency change time and simplify these steps? 10. – Clarify where the “Copy” button is. Is it the one in the ‘Data’ tab or worksheet? Entry Data tab/worksheet: Step 6 should also be or be moved to the “Instructions” worksheet. Are the values in column C in the “Data” worksheet labeled “Total Lost Generation” the same as those in column AQ in the “Evaluation” worksheet? If so, why are they not both labeled “Net Actual Interchange”? What is the definition of “Non Conforming Load” in column E?
FRS Form 1 – Eastern Interconnection Instructions tab/worksheet: Step 4 – Send to whom and to what address at NERC?
Mauricio Guardado
Los Angeles Department of Water and Power
No
LADWP recommends the following change to the definition of Frequency Bias Setting (replace the word "discourage" with the word "prevent"). LADWP believes that this change increases the clarity of the definition: Original A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority’s Area Control Error equation to account for the Balancing Authority’s Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems. Proposed Change A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority’s Area Control Error equation to account for the Balancing Authority’s Frequency Response contribution to the Interconnection, and prevent response withdrawal through secondary control systems
No
LADWP has a concern with Requirement 3. The requirement should provide allowance for legitimate circumstances when an entity cannot run on Tie Line Bias mode and not have an Adverse Reliability Impact on the Balancing Authority’s Area. An entity should not be penalized when these legitimate circumstances occur. LADWP believes that the Frequency Response Standard Background Document, on Page 8, lists examples of legitimate circumstances: - Telemetry problems that lead the operator to believe ACE is significantly in error. - The frequency input to AGC is not reflective of the BA’s true

frequency (such as if the control center were operating a local generator and disconnected from the Interconnection). - During restoration (where one BA might be controlling frequency while another to which it is connected is managing interchange between them). - For training purposes. - Many AGC systems will automatically switch to an alternate mode if the EMS determines Tie Line Bias control could lead to problems. LADWP believes that the language in Requirement 4 needs to be clarified and recommends the following change: - R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation to be equivalent to either (i) the sum of the Frequency Bias Settings of the participating Balancing Authorities as validated by the ERO, or (ii) the Frequency Bias Setting as calculated based on the entire area being combined and thereby represent the Frequency Response for the combined area being controlled. [Risk Factor: Medium][Time Horizon: Operations Planning] LADWP believes the language in Requirement 5 needs to be modified to be consistent with that of the second paragraph of Attachment B. LADWP recommends the addition of “natural frequency response” as a third bullet item to Requirement 5. The revised requirement would read: - R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is at least equal to one of the following: [Risk Factor: Medium][Time Horizon: Operations Planning] • The minimum percentage of the Balancing Authority Area’s estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B. • The minimum percentage of the Balancing Authority Area’s estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as specified by the ERO in accordance with Attachment B. • The natural frequency response
Yes
LADWP agrees with the following VRFs: - R1 - Medium - R2 - Medium - R3 - Medium - R4 - Medium - R5 - Medium
No
LADWP recommends that the Measures for Requirement 3 and Requirement 5 reflect their comments to Question 2.
No
LADWP recommends that either the VSL for Requirement 3 reflects its comments to Question 2, or that these comments be addressed as an exception in the Measure for Requirement 3.
No
LADWP considers the increase in number of events to analyze (now 25) to be excessive. Previous years analyses typically involved 4-6 events; a permanent five-fold increase is not justified. LADWP suggests reducing the baseline number of events from 25 to 12 per year. Analysis of a larger number of events could be requested on a year-by-year basis if conditions warrant, but should not be mandatory for all regions in all years.
Yes
LADWP notes that the document “BAL-003-1 Background Document” seems to be reasonable.
Yes
LADWP notes that Attachment B seems to be reasonable
No
LADWP notes that Form 2 is not compatible with prior versions of Excel—it won’t even open in Excel 2003 (which is still widely used)—and requests that all spreadsheets and calculation tools developed under 2007-12 be revised to support common software of the past 10 years.
LADWP supports project 2007-12’s general approach to frequency response, and is prepared to support the ballot once several problematic details are corrected. LADWP notes that the time allowed to analyze the final “official” set of 25 events for each year, from Dec 15 to Jan 10, is relatively short and coincides with the holiday vacation season. Could this time either be extended by 2-4 weeks or shifted to another part of the year (in addition to reducing the number of events to be analyzed)? LADWP would like to see addressed in the Standard how the case is to be addressed where a BA simply has no frequency response information to provide, as could happen for a small 1-2 generator BA which has its generators out of service for an extended period for maintenance or upgrades. Assuming the BA purchases frequency response services from another entity during this period, is the BA out of compliance with the proposed Standard simply because it has no data report? And how is its next-year obligation to be computed? These issues should be addressed in the Measures or Additional

Compliance information. If these are issues for “lawyers” as the Standards Drafting Team indicated during the November 14, 2011, webinar then the team should engage a NERC lawyer to resolve them prior to releasing the Standard for ballot.
Thomas Washburn
FMPP
Yes
No
• R1. Each Balancing Authority (BA) or Reserve Sharing Group (RSG) shall achieve an annual Frequency Response Measure (FRM) (as detailed in Attachment A and calculated on FRS Form 1) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each BA or RSG to maintain an adequate level of Frequency Response in the Interconnection. [Risk Factor: Medium][Time Horizon: Operations Assessment] The BA does not have control over the frequency responsive generation. There needs to be a requirement that the GOP shall set frequency response for the generators as directed by the BA. • R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is {greater than or (<= add these words)} {at least (<= delete these words)} equal to one of the following: [Risk Factor: Medium][Time Horizon: Operations Planning] • The minimum percentage of the Balancing Authority Area’s estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B. • The minimum percentage of the Balancing Authority Area’s estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as specified by the ERO in accordance with Attachment B.
Yes
Yes
Yes
No
• Item 2 should be changed as follows: The ERO will identify at least 25 frequency excursion events in each Interconnection for calculating the Frequency Bias Setting and the FRM. If the ERO cannot identify in a given evaluation period 25 frequency excursion events satisfying the limits specified in criteria 3 below, then similar acceptable events from the previous evaluation period also satisfying listed criteria will be included with the data set by the ERO for determining FRS compliance. (as written this item could cause double jeopardy for event from the previous period) • Under FRO for the Interconnection the first sentence should be changed as follows: “The ERO {Each Interconnection (delete these words)} will establish target contingency protection criteria for each Interconnection.” (each Interconnection is not a governing entity) • The footnote under Table 2 of Attachment A should be changed as follows: The Eastern Interconnection set point listed is a compromise value for the highest UFLS step setting of 59.5Hz used in the east and the {special protection scheme’s (delete these words)} highest UFLS step setting of 59.7Hz used in Florida. It is extremely unlikely that an event elsewhere in the Eastern Interconnection would cause the Florida UFLS {special protection scheme (delete these words)} to “false trip”. (this is not a special protection system; it is just an UFLS)
Yes
Yes
Yes
Alice Ireland

Xcel Energy
Yes
No
R1- It is not clear what is intended by "Reserve Sharing Group" in this context. As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifiying this concept and possibly include an example in the background document to help explain how this would work. R3 - recommend modifying the language to permit AGC out of TLB mode if the RC is notified; also remove the "to ensure coordinated control" as this is not essential for the requirement. Our reasoning behind the suggested change to notification of the RC is that there are occassions where an entity would need to perform testing, etc and it could be argued that testing would not be sufficient justification for meeting the Adverse Reliability Impact definition. Here is proposed revised language: Each Balancing Authority not receiving Overlap Regulation Service shall operate its Automatic Generation Control (AGC) in Tie Line Bias mode, unless the Balancing Authority's Reliability Coordinator has been informed and the duration is [insert time constraint language here].
No
Based on our suggested changes to R3 in response to Question 2, the drafting team should modify M3 to be consistent with the proposed language.
Yes
No
Confusion exists around the “peak load” in that the Attachment A states the allocation is based on Projected Peak Loads and Generation but the Background Document states it will use a historical Peak and Generation to make the allocation. Also, for the BA installed capacity, where does that value come from and does NERC obtain that from FERC form data or does the BA provide that information somewhere specific to this effort? Additionally, there appears to be a difference in how FRO is calculated in Attachment A and what is described in the Background Document. These differences should be reconciled such that both documents address the same approach. If installed capacity is used in the equation, how are variable/intermittent resources (e.g. wind, solar) accounted for? At full capacity?
No
Same comment here as the one in question 6.
No
There could be some confusion caused by the Attachment B due to the use of the word “initially” when the reference is made to the current standard. The drafting team should change the word “initially” to “currently” or strike it to avoid the potential confusion.
Yes
It would be useful if the drafting team could develop a completed form as an example to help entities better understand the methodologies used in the form.
It is not clear if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of FR expected on a total basis. Balancing Authorities need to know for how many tenths of a hertz they are to respond so they can determine how to plan to meet this requirement. The documents do not appear to provide any boundary on the maximum amount of FR that a BA will provide, i.e. it is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz (e.g. what if freq dips to 59.0? Is the BA expected to provide a limitless amount of frequency response?). Also, is that event excluded from the list used to calculate the Balancing Authorities’ response or is it included with an expectation that it counts the same as any other event. Without a clear statement of what is expected, including whether there is a limit on that expectation or not, the Balancing Authorities can not know what is expected of them and therefore can not plan appropriately.
Kathleen Goodman

ISO New England Inc
No
The FRM definition should not refer to FORM 1. Also, we offer the following alternative wording for frequency bias setting; “A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority’s Area Control Error equation to approximate the frequency response provided by the assets within the respective Balancing Authority’s area.”
No
We do not agree with placing a requirement on Balancing Authorities, as generators are the main supplier of “discretionary” frequency response. Also, the requirement refers to an attached form, which is not part of the standard and therefore not enforceable.
Yes
No
The sampling interval needs to be tuned on a per Interconnection basis to support HQTE’s characteristics
No
The violation severity levels for R1 seem to be reasonable. However, the technical writing needs to be enhanced for clarity
No
We suggest the SDT to first determine if the materials in the revised Attachment A & B are “Guideline” or Technical Background”, or are they “requirements”. If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as-written Attachment A is a mix bag as it on the one hand describes the ERO’s process for supporting the Frequency Response Standard (FRS), in other words, the method and criteria it uses to calculate the frequency bias settings and the FRM, and on the other hand the BA’s obligations to support this process. We strongly disagree that the latter requirements be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which, by the way, is not held responsible for complying with the proposed method. An appendix is not regarded as a mandatory requirement. Additionally, BAL-003-1- Attachment A 1. Criterion 5 needs to be re-written for clarity. 2. Criterion 7 refers to the “cleanest events”. Perhaps a statement of what constitutes a “clean event” is needed to avoid possible controversy in the future. 3. The use of 59.6 Hz as the highest UFLS setting seems flawed. It should either be 59.7 Hz as a deliberate choice to protect Florida interests, or, it should be 59.5 Hz without concern for Florida’s unique settings. 4. In the last 2 sentences at the end of the section on Frequency Response Obligation, it refers to an Interconnection being able to offer “alternate FRO protection criteria”. It seems that the Interconnection should have been an integral part of establishing its obligation. Also, it states that the “ERO will confirm” the “alternate FRO protection criteria”. Does this mean the ERO unconditionally approves it, or evaluates with a right of rejection? Please clarify. 5. In the formula for determining the Balancing Authority’s FRO allocation, installed capacity is used. Does the industry have a clear and consistent definition for installed capacity? Also, with greater wind energy development, the delivered capacity over longer time horizons will be substantially less than nameplate machine ratings. Also, the background document refers to the use of peak generation instead of installed capacity. Which shall be used? Please clarify. 6. Very recent studies have shown that the 18-52 second sampling interval does not work well for the Quebec Interconnection, in part due to the excellent and high level of response found in that Interconnection. The standard needs to be modified such that the sampling interval is that which works the best for each individual interconnection. 7. Attachment A needs to define the point A sampling interval.
No
See first comment in 6 above. Also, Frequency Response Standard Background Document – 1. Cite Attachment B in addition to Attachment A in the discussion of requirement 1. 2. The Balancing Authority allocation method specified in this document does not agree with that in Attachment A. 3. Drop the speculation on page 4 that most Balancing Authorities will be compliant. While it may be a commonly held belief by many that there is adequate frequency response right now, that assessment should be made after a targeted level of reliability has been defined and approved. The same comment applies on page 12. 4. On page 6, drop the inappropriate recommendation of getting

frequency response through supplemental regulation. It is inappropriate to try to substitute a “minute plus” product that is deployed centrally by the Balancing Authority for a “sub-minute” product that is deployed automatically without any Balancing Authority action. When a pseudo-tie is used, changes in the ACE values due to supplemental regulation are unrelated to and not coordinated with the need to deploy frequency response. Not only should this approach not be offered as an alternative, but the FRSDT should actively conduct research to determine if supplemental regulation via a pseudo-tie should be deliberately REMOVED from any actual net interchange calculation that may include it! This comment also applies to the mentioning of supplemental regulation on page 11 as well. 5. On page 7, the reference to a 24 hour window on each side of the frequency bias setting implementation date is inconsistent with the wording of the requirement. The requirement says that any time within the designated date is acceptable. 6. On page 8, the inclusion of “for training purposes” as a reason to not operate in tie line bias control should be dropped. This sort of training can be done in a training simulator. Alternatively, if it is determined that it should be supported, then the requirement needs to be reworded to allow it explicitly. 7. On page 14, the sentence: “This approach would only provide feedback for performance during that specific event and would not provide insight into the depth of response or other limitations” is difficult to understand. The paragraph would read better by simply dropping it.
No
We suggest the SDT to first determine if the materials in the revised Attachment A & B are “Guideline” or Technical Background”, or are they “requirements”. If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as-written Attachment A is a mix bag as it on the one hand describes the ERO’s process for supporting the Frequency Response Standard (FRS), in other words, the method and criteria it uses to calculate the frequency bias settings and the FRM, and on the other hand the BA’s obligations to support this process. We strongly disagree that the latter requirements be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which, by the way, is not held responsible for complying with the proposed method. An appendix is not regarded as a mandatory requirement.
Yes
ISO New England will not vote to approve the standard because it fails to place requirements on generators to provide frequency response. There are four substantive problems: • Using 59.6 Hz as an Eastern Interconnection UFLS instead of an actual value of either 59.5 Hz or 59.7 Hz • Using installed capacity in determining the Frequency Response Obligation • The sampling interval needs to be tuned on a per Interconnection basis to support HQTE’s characteristics • Do not advocate the use of supplemental regulation as a method of procuring frequency response Additionally, the SDT must decide on what the purpose of this standard is. If it is to respond to Order 693 then the standard misses the point of defining how often to run Frequency Response Surveys; it does not crisply define the “Interconnection” obligations. If the SDT does want to focus on performance then the issue of who is the default provider must be addressed. As the IRC has noted previously, all BAs do not own the service providers. To create standards that apply to entities that are dependent on other function entities to comply with a standard requirement is of great concern.
Imperial Irrigation District
Jesus Sammy Alcaraz
Yes
Yes
Yes
Yes
Yes

Yes
Yes
Yes
Yes
No Additonal Comments
Salt River Project
Cindy Oder
Yes
Yes
Yes
Yes
Yes
Yes
Yes
Yes
Yes
John Tolo
Tucson Electric Power
Yes
No
R1: TEP feels that the FRO should be able to be calculated by the BA and that Form 1 changes should be treated via the Standard drafting process. R2: TEP feels that use Form 1 should be required by the Standard. Further, BAs should calculate its own frequency bias setting without ERO intervention. R3: Operating outside Tie Line Bias mode should be allowed during a year to allow for the testing of other modes. R4: Agree with the concept, but without ERO intervention. R5: Should read "greater than or equal to".
Yes
No
It should be clear that historical data may be used to show compliance.
No
VSL's could be clearer and simpler. Allowance for the testing of other AGC modes should be considered.
No

Attachment A creates additional requirements to the BAL-003-1 Standard. The arrested value of frequency observed within 8 seconds may not be long enough in some instances. The delta F in the West should be greater than 0.05 Hz to ensure a measurable frequency response. West Under Frequency should be set at 59.95 Hz. There is no reliability concern for Over Frequency. Does 18 seconds after the start of the disturbance set point B? Pre-disturbance frequency should be relatively steady and near 60.000 Hz is vague. TEP feels that the ERO should not need to validate a BAs frequency bias setting.
Yes
No
Reducing a BAs frequency bias setting may have an adverse impact on recovering from a frequency event once you get past the first 8-10 seconds. A larger bias will allow for actual and sustained AGC generator responses. Industry focus should be on generator governor response within the first 8-10 seconds.
No
TEP feels that Form 2 is a useful tool for internal BA use and should not be used for compliance purposes.
The BAL-003-1 Standard should be simplified and should not rely on the judgement of the ERO. Thanks to the drafting team for their efforts and for taking on this important aspect of Interconnection reliability.
Dennis Sismaet
Seattle City Light
No
LADWP and SCL recommend the following change (in red) to the definition of Frequency Bias Setting. LADWP believes that this change increases the clarity of the definition: Original A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems. Proposed Change A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and discourage prevent response withdrawal through secondary control systems
No
• LADWP and SCL have a concern with Requirement 3. The requirement should provide allowance for legitimate circumstances when an entity cannot run on Tie Line Bias mode and not have an Adverse Reliability Impact on the Balancing Authority's Area. An entity should not be penalized when these legitimate circumstances occur. LADWP believes that the Frequency Response Standard Background Document, on Page 8, lists examples of legitimate circumstances: - Telemetry problems that lead the operator to believe ACE is significantly in error. - The frequency input to AGC is not reflective of the BA's true frequency (such as if the control center were operating a local generator and disconnected from the Interconnection). - During restoration (where one BA might be controlling frequency while another to which it is connected is managing interchange between them). - For training purposes. - Many AGC systems will automatically switch to an alternate mode if the EMS determines Tie Line Bias control could lead to problems. • LADWP and SCL believe that the language in Requirement 4 needs to be clarified and recommends the following change (in red): R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation to be equivalent to either (i) the sum of the Frequency Bias Settings of the participating Balancing Authorities as validated by the ERO, or (ii) calculate the Frequency Bias Setting as calculated based on the entire area being combined and thereby represent the Frequency Response for the combined area being controlled. [Risk Factor: Medium][Time Horizon: Operations Planning] • LADWP and SCL believes the language in Requirement 5 needs to be modified to be consistent with that of the second paragraph of Attachment B. SCL recommends the addition of "natural frequency response" as a third bullet item to Requirement 5 (in red). The revised requirement would read: R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is at least equal to one of the following: [Risk Factor: Medium][Time

Horizon: Operations Planning] • The minimum percentage of the Balancing Authority Area's estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B. • The minimum percentage of the Balancing Authority Area's estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as specified by the ERO in accordance with Attachment B. • The natural frequency response
Yes
LADWP and SCL agree with the following VRFs: - R1 - Medium - R2 - Medium - R3 - Medium - R4 - Medium - R5 - Medium
No
LADWP and SCL recommend that the Measures for Requirement 3 and Requirement 5 reflect their comments to Question 2.
No
LADWP and SCL recommend that either the VSL for Requirement 3 reflects its comments to Question 2, or that these comments be addressed as an exception in the Measure for Requirement 3.
No
• LADWP and SCL consider the increase in number of events to analyze (now 25) to be excessive. Previous years analyses typically involved 4-6 events; a permanent five-fold increase is not justified. SCL suggests reducing the baseline number of events from 25 to 12 per year. Analysis of a larger number of events could be requested on a year-by-year basis if conditions warrant, but should not be mandatory for all regions in all years.
Yes
• LADWP and SCL note that the document "BAL-003-1 Background Document" seems to be reasonable.
Yes
• LADWP and SCL note that Attachment B seems to be reasonable.
No
• LADWP and SCL note that Form 2 is not compatible with prior versions of Excel—it won't even open in Excel 2003 (which is still widely used)—and requests that all spreadsheets and calculation tools developed under 2007-12 be revised to support common software of the past 10 years.
• LADWP and SCL support project 2007-12's general approach to frequency response, and is prepared to support the ballot once several problematic details are corrected. • LADWP and SCL note that the time allowed to analyze the final "official" set of 25 events for each year, from Dec 15 to Jan 10, is relatively short and coincides with the holiday vacation season. Could this time either be extended by 2-4 weeks or shifted to another part of the year (in addition to reducing the number of events to be analyzed)? • LADWP and SCL would like to see addressed in the Standard how the case is to be addressed where a BA simply has no frequency response information to provide, as could happen for a small 1-2 generator BA which has its generators out of service for an extended period for maintenance or upgrades. Assuming the BA purchases frequency response services from another entity during this period, is the BA out of compliance with the proposed Standard simply because it has no data report? And how is its next-year obligation to be computed? These issues should be addressed in the Measures or Additional Compliance information. If these are issues for "lawyers" as the Standards Drafting Team indicated during the November 14, 2011, webinar then the team should engage a NERC lawyer to resolve them prior to releasing the Standard for ballot. • Finally, SCL points out that the proposed Standard introduces a new obligation on applicable entities to maintain frequency responsive reserves. Although this obligation does not appear to be unreasonable or problematic in general, compliance may prove difficult for some entities and in some localized areas.
Progress Energy
Jim Eckelkamp
No
PGN supports the collective comments of SERC members.We feel that the last phrase of the definition of Frequency Bias Setting is more of an explanation of a function rather than a definition. While the SERC OC Standards Review Group understands the statement, we do not feel it belongs in the definition of the Frequency Bias Setting and a period should be inserted after the word "Interconnection". Should the definition for Frequency Response Measure (FRM) be specific to the BA,

similar to the definition for Frequency Response Obligation (FRO)?
No
PGN supports the collective comments of SERC members.We feel that the utilization of the term, “Reserve Sharing Group”, is not consistent with the definition in the NERC Glossary of Terms, and should be deleted, applicability should be clarified or replaced with a new term, such as “Frequency Response Sharing”. R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in “Tie Line Bias” mode
Yes
No
See comments in Question 2 regarding utilization of the term “Reserve Sharing Group”.
No
See comments in Question 2 regarding utilization of the term “Reserve Sharing Group”.
Yes
Yes
No
PGN supports the collective comments of SERC members. We suggest the SDT consider a term other than “Initial’ in the title for Table 1. We suggest “Proposed Frequency Bias Setting” for Table 1
Yes
PGN Supports the collective comments of SERC members. We feel that frequency response is a function of a contingency event and the Purpose Statement should recognize this relationship. We suggest the following Purpose Statement. Purpose: To require sufficient Frequency Response from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations due to a contingency event and supporting frequency until the frequency is restored. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting.
Michael Falvo
Independent Electricity System Operator
No
In our previous comments, we suggested to drop the definitions for the terms FRM and FRO in favor of providing the needed wording in the standard itself to take care of the specific details. The SDT did not adopt our suggestion with the reason that these definitions will be used by other standards in the future. That’s fair enough. However, the FRM definition: “The median of all the Frequency Response observations reported annually on FRS Form 1” is problematic. It references an FRS Form 1 which is not included in the definition itself but is in fact an attachment to a standard. In the current NERC Glossary of Terms, there is no such precedence that a definition must rely on the requirements or details in a standard for completeness. Also, it is very cumbersome that when changes are made to FRS Form 1, the definition must be posted for industry comment and balloting, and vice versa. When other standards begin using the term, there will be cross references between standards. This further complicates the update/maintenance problem without any appreciable value. Once again, we strongly urge the SDT to consider dropping these definitions, and have the details fully specified in the standard body. This will eliminate the cross reference issues. After all, the definition for FRM is a simple sentence and does not provide any clarity or specific details that cannot be addressed by providing the appropriate wording in a requirement. With this cross-reference issue, combined with the issues associated with Attachments A and B (see our comments under Q6, below), we are unable to support this standard at this time.
Yes
Yes

No
M4: This measure does not read quite right. Something seems to be missing in the part that says: "…showing when Overlap Regulation Service is provided including Frequency Bias Setting calculation to demonstrate compliance with Requirement R4." This part might have read something like: "…showing that when it performed Overlap Regulation Service, it modified its Frequency Bias Setting in its ACE calculation or it calculated the Frequency Bias Setting meeting the conditions specified in Requirement R4."
Yes
We do not have any issues with the VSLs, but wonder if the wording for R1 should have been "…Reserve Sharing Group's…". Alternatively, the wording after "interconnection's FRO" could be revised to: "…and the Balancing Authority's or the Reserve Sharing Group's FRM was…"
No
Despite the SDT's good faith effort to convert the previous Attachment A into two separate documents (Attachments A and B), the modified Attachment A is problematic. As many commenters indicated, the previous Attachment A, other than the section providing guidance on event selection, appears to be explanatory, contextual, and instructional in content. These aspects are important, but do not rise up to the level of requirements to drive reliability performance/outcome. Attachment A should include only the event selection process and calculations associated with the requirements, including an explanation of what is necessary if variable Frequency Bias Settings are implemented. If other "requirements" need to be specified, such as the reporting time frame stipulated on page 3 of Attachment A, they should be moved to the standard itself but not imbedded in an attachment. We suggest the SDT to first determine if the materials in the revised Attachment A (and Attachment B) are "Guideline" or "Technical Background", or are they "requirements". If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as-written Attachment A is a mix bag as it on the one hand describes the ERO's process for supporting the Frequency Response Standard (FRS) (in other words, the method and criteria it uses to calculate the frequency bias settings and the FRM), and on the other hand the BA's obligations to support this process. We strongly disagree that the latter requirements be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which, by the way, is not held responsible for complying with the proposed method. Further, there are no measures developed for the requirements stipulated/imbedded in Attachment A so how can the Responsible Entity (BA, in this case) be assessed for compliance? We suggest the SDT to move those requirements on the BA to the main standard, and turn Attachment A into an appendix describing the calculation process. An appendix is not regarded as a mandatory requirement. Similar comments apply to Attachment B. Finally, the two Attachments are listed in Section F – Associated Documents. This Section is generally used to list reference documents that are NOT standard requirements. We suggest the SDT review and revise this listing depending on its final determination of the status of the two Attachments (or their revisions, where appropriate).
We do not have an opinion on whether or not the Background Document provides sufficient clarity to the development of the standard. We do, however, suggest that the SDT consider our comments in Q6 above, and move some of the information from Attachments A and B to or combine with the Background Document, to provide all the technical basis and background behind the elements stipulated in the requirements.
No
Please see our comments under Q6. In brief, we do not agree with including a process description type of document as part of the standard requirement.
No
If we are not mistaken, Form 2 is added as the last sheet in the Form 1 spreadsheet file. Apart from that, however, there are other sheets added to the previous Form 1. But this Comment form makes no mention of the changes, nor is there a question on the additional information requested. We have a concern over this omission of attention or oversight. Compared to the previous version, Form 1 has been significantly expanded to include not only additional sheets but much more comprehensive data requirements even on the Data Entry sheet itself. This makes data submission a very time-consuming task but the justification for requiring detailed data entry has not been provided. We question the need for such expansion on data entry requirements. We have yet to see the reason for expanding Form 1 in assisting a BA to provide the data needed to comply with the standard, hence we do not

see how adding a Form 2 can help in that regard. We suggest the SDT to look at the basic need for data submission that would suffice to support the FRS reporting process. Where the SDT deems additional data entry sheets to be necessary, it should provide the rationale for expanding from a 2 sheet form into a multiple sheet form for additional data collection.
The proposed implementation plan conflicts with Ontario regulatory practice respecting the effective date of the standard. It is suggested that this conflict be removed by appending to the implementation plan wording, after “applicable regulatory approval” in Section 1.3 and 1.4 of the draft standard, and in the two bullets in the draft implementation plan, to the following effect: “, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities.”
Northeast Power Coordinating Council
Guy Zito
No
The FRM definition should not refer to FORM 1. Also, suggest the following wording for frequency bias setting: “A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority’s Area Control Error equation to approximate the frequency response provided by the assets within the respective Balancing Authority’s area.”
No
The requirements should not be directed at Balancing Authorities, as generators are the main supplier of “discretionary” frequency response. Requirement R1 refers to an attached form, which is not part of the standard and therefore not enforceable.
Yes
No
The sampling interval needs to be tuned on a per Interconnection basis to support HQTE’s characteristics.
No
The violation severity levels for R1 are reasonable. The technical writing needs to be enhanced for clarity.
No
The SDT has to first determine if the materials in the revised Attachment A & B are “Guideline” or Technical Background”, or are they “requirements”. If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as written Attachment A is confusing as it describes the ERO’s process for supporting the Frequency Response Standard (FRS) (the method and criteria it uses to calculate the frequency bias settings and the FRM), and at the same time the BA’s obligations to support this process. The latter requirements should not be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which is not held responsible for complying with the proposed method. An appendix is not regarded as a mandatory requirement. Additionally, regarding BAL-003-1- Attachment A 1. Criterion 5 needs to be re-written for clarity. 2. Criterion 7 refers to “cleanest events”. A statement of what constitutes a “clean event” is needed to avoid possible controversy in the future. 3. The use of 59.6 Hz as the highest UFLS setting is flawed. It should either be 59.7 Hz as a deliberate choice to protect Florida interests, or it should be 59.5 Hz without concern for Florida’s unique settings. 4. In the last 2 sentences at the end of the section on Frequency Response Obligation, it refers to an Interconnection being able to offer “alternate FRO protection criteria”. The Interconnection should have been an integral part of establishing its obligation. It is stated that the “ERO will confirm” the “alternate FRO protection criteria”. Does this mean the ERO unconditionally approves it, or evaluates with a right of rejection? Please clarify. 5. In the formula for determining the Balancing Authority’s FRO allocation, installed capacity is used. Does the industry have a clear and consistent definition for installed capacity? Also, with greater wind energy development, the delivered capacity over longer time horizons will be substantially less than nameplate machine ratings. The background document refers to the use of peak generation instead of installed capacity. Which shall be used? Please clarify. 6. Recent studies have shown that the 18-52 second sampling interval does not work well for the Quebec Interconnection, in part due to the excellent and high level of response found in that Interconnection. The standard needs to be modified such that the sampling interval is that which works the best for each individual interconnection. 7. Attachment A needs to define the point A

sampling interval.
No
Refer to the first comment in Question 6. For the Frequency Response Standard Background Document – 1. Cite Attachment B in addition to Attachment A in the discussion of requirement R1. 2. The Balancing Authority allocation method specified in this document does not agree with that in Attachment A. 3. Drop the speculation on page 4 that most Balancing Authorities will be compliant. While it may be a commonly held belief by many that there is adequate frequency response right now, that assessment should be made after a targeted level of reliability has been defined and approved. The same comment applies on page 12. 4. On page 6, drop the inappropriate recommendation of getting frequency response through supplemental regulation. It is inappropriate to try to substitute a “minute plus” product that is deployed centrally by the Balancing Authority for a “sub-minute” product that is deployed automatically without any Balancing Authority action. When a pseudo-tie is used, changes in the ACE values due to supplemental regulation are unrelated to and not coordinated with the need to deploy frequency response. Not only should this approach not be offered as an alternative, but the FRSDT should actively conduct research to determine if supplemental regulation via a pseudo-tie should be deliberately REMOVED from any actual net interchange calculation that may include it. This comment also applies to the mentioning of supplemental regulation on page 11 as well. 5. On page 7, the reference to a 24 hour window on each side of the frequency bias setting implementation date is inconsistent with the wording of the standard. The standard states that any time within the designated date is acceptable. 6. On page 8, the inclusion of “for training purposes” as a reason to not operate in tie line bias control should be dropped. This training can be done in a training simulator. If it is determined that it should be supported, then the requirement needs to be reworded to allow it explicitly. 7. On page 14, the sentence: “This approach would only provide feedback for performance during that specific event and would not provide insight into the depth of response or other limitations” is difficult to understand. The paragraph would read better by simply deleting the sentence.
No
Refer to the first comment in Question 6.
Yes
This standard as written does not place requirements on generators to provide frequency response. There are four substantive problems: • Using 59.6 Hz as an Eastern Interconnection UFLS instead of an actual value of either 59.5 Hz or 59.7 Hz. • Using installed capacity in determining the Frequency Response Obligation. • The sampling interval needs to be tuned on a per Interconnection basis to support HQTE’s characteristics. • Do not advocate the use of supplemental regulation as a method of procuring frequency response. It must be decided as to what the purpose of this standard is. If it is to respond to Order 693 then the standard misses the target of defining how often to run Frequency Response Surveys; it does not crisply define the “Interconnection” obligations. If performance is the focus, then the issue of who is the default provider must be addressed. All BAs do not own the service providers. To create standards that apply to entities that are dependent on other functional entities to comply with a standard requirement is of great concern. FRS Form 1 is listed as being an Associated Document. Will it be attached to the standard? The acronym FRS is used in the standard. FRS should be spelled out before its acronym is used. If FRS Form 1 will not be an appendix or an attachment to the document, then a link should be provided to it, or instructions given on how to find it.
John Bussman
Associated Electric Cooperative Inc
Yes
The FRO definition incorrectly applies the historically narrow Balancing Authority scope of responsibility, while the FRM definition does not address applicability at all. But the BAL-003-1 Standard itself identifies RSGs (where applicable) and BAs as the Responsible Entities within scope of this standard. For consistency, AECI recommends using “Responsible Entities (e.g. Reserve Sharing Groups - where applicable, and Balancing Authorities)” in both the FRO and FRM definitions. Rationale: This change should help future-proof the definition, should more specific “frequency response” or “spinning reserve” sharing groups later surface within our industry. AECI agrees with the Frequency Bias Setting definition’s inclusion of a bit more functionality than typical. We however recommend replacing “to account for the Balancing Authority’s Frequency Response contribution to

the Interconnection, and discourage response withdrawal through secondary control systems", with "to support their Frequency Response contribution to the Interconnection". Rationale: Readability, and clarity on the "discouraging withdrawal…" phrase, which should reside in the Background document.
Yes
Yes
Yes
Yes
The VSLs appear reasonable for the risk and particularly where they assess higher severity when the BA or RSG Interconnection's performance was sub-standard as well.
Yes
Yes
Yes
This is a very important document, providing bounds and rationale for and future changes, as well as initial settings going into ballot. As such, it is AECI's understanding that, upon going into effect, this BAL-003-1 will utilize these initial settings.
No
AECI believes the SDT could spare our industry both confusion and inconsistency, by specifying that identified Interconnection Disturbances include both Point A and Point B to the hour, minute, and second. While this introduces some risk of Entities over-automating their data-reports, the benefits for Eastern Interconnection respondents would be tremendous. Cautions and disclaimers should be placed on both Form 1 and Form 2, to assure respondents manually inspect their frequency data and pinpoint the specific inflection-point samples.
SDT Webinar responses, this standard still needs to address: 1) anticipated shifts in an Entity's FRO, due to large changes in base generation or load, and 2) likely non-compliance for single-unit generation-only BAs (R5.2?) Please address prior to second ballot.
Rich Salgo
NV Energy
Yes
No
Requirement 1 seems to be the only one that has any applicability to an RSG; however, it is unclear under what circumstances this requirement applies to an RSG. Suggest changing the R1 to be addressed solely to BA's or alternatively, explain under Applicability section 1.2 what "where applicable" means.
Yes
Medium appears to be reasonable and appropriate.
Yes
No
For R1, suggest that the VSL's not be dependent upon the aggregate performance of the BA's within an interconnection.
No
It is not clear whether the calculation of FRO is to utilize projections of BA load as in Att A, or past data reported in FERC Form 1 as per the Background Document.
Yes
This is a good reference; however see response to Question 6 in that there appears to be a

discprepancy between Att A and the Background Document with regard to FRO calculation.
No
In Attachment B, it seems unclear whether the initial FB setting is supposed to be 1% of BA peak load or 0.8% as shown in the table. In general, I was extremely confused about what the required FB setting should be. R5 indicates a percentage of load found in Att B, but Att B indicates the greater of Natural Frequency Response or 1% of peak, and then the table that follows indicates 0.8%. At this point, I have no idea what is being stated for the requirement.
Yes
Thad Ness
American Electric Power
No
R1: Clarification is needed regarding the responsibility of a BA that is a member of a Reserve Sharing Group. R2 and R3: What does “coordinated control” mean? There no leverage for the BA to require the generator to carry their burden of addressing governor settings or droop settings, yet the BA is obligated to meet some performance measures. This revision adds new performance measure responsibilities on the BA who likely has no direct control over every resource affecting their performance within their footprint. We are not necessarily challenging the performance measures themselves, nor their underlying objectives, however AEP views this as a gap in responsibilities which potentially effects reliability.
Yes
No
It is not clear for R1 what the exact delineations are among Lower, Medium, High, and Severe VSL’s.
Yes
A frequency response observation should not be used spanning multiple years, or if there does, there should at least be a reset period.
Yes
Yes
Arizona Public Service Company
Janet Smith, Regulatory Affairs Supervisor
1. The specified time interval from 20 seconds to 52 seconds for SEFRD measurement ignores the primary frequency response which happens in first 20 seconds and is responsible for arresting the frequency dip. We suggest using the average over the complete interval of 0 to 52 seconds. 2. The difference between Low and High VSL for R1 is not clear. Similarly the difference between Medium

and Severe is not clear.
RoLynda Shumpert
South Carolina Electric and Gas
No
The last phrase of the definition of Frequency Bias Setting is more of an explanation of a function rather than a definition. Therefore, we do not feel it belongs in the definition of the Frequency Bias Setting and a period should be inserted after the word “Interconnection”. Should the definition for Frequency Response Measure (FRM) be specific to the BA, similar to the definition for Frequency Response Obligation (FRO)?
No
The utilization of the term, “Reserve Sharing Group”, is not consistent with the definition in the NERC Glossary of Terms, and should be deleted, applicability should be clarified or replaced with a new term, such as “Frequency Response Sharing”. R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in “Tie Line Bias” mode.
Yes
No
See comments in Question 2 regarding utilization of the term “Reserve Sharing Group”.
No
See comments in Question 2 regarding utilization of the term “Reserve Sharing Group”.
Yes
Yes
No
We suggest the SDT consider a term other than “Initial’ in the title for Table 1. We suggest “Proposed Frequency Bias Setting” for Table 1
Yes
We feel that frequency response is a function of a contingency event and the Purpose Statement should recognize this relationship. We suggest the following insertion in the Purpose Statement. Purpose: To require sufficient Frequency Response from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations (due to a contingency event) and supporting frequency until the frequency is restored. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting.
Louis C. Guidry
Cleco Corporation
Yes
Yes
No
Please note Cleco does not use the VRFs therefore we feel too much energy and time is spent on the VRFs. The SDT needs to concentrate on the requirements and measurements.
Yes
No
The VSLs for R2 are based on 5, 15 and 25 days. What was the justification for these values? Could we just as well use 10, 20 and 30 or some other set of values? In R3, we understand that brief periods of operation outside of TLB control are allowable providing 1) continued operation in TLB control would create ARI on the Interconnection or 2) that justification is provided for the periods

when TLB is not used. For example, if something happens within our EMS that disables TLB control we are compliant if we document the period as an EMS malfunction?
Yes
We appreciate the effort of the SDT in developing Attachment A. It was very helpful in weeding through BAL-003.
Yes
We appreciate the effort of the SDT in developing the Background Document. It provided insight on how the SDT got the proposed standard to where it is with this posting.
Yes
Yes
Requirement 5, bullet 2 does not make any allowance for a single generator generator-only BAs. If that BAs generator is out-of-service, the BA cannot satisfy this requirement. This could also apply to other generation-only BAs which have a very limited number of generating units. Also, RSGs/BAs which experience resource changes throughout the year have no mechanism for adjusting their FRO.
MRO NSRF
Will Smith
No
The FRM definition: “The median of all the Frequency Response observations reported annually on FRS Form 1” is problematic. It references an FRS Form 1 which is not included in the definition itself but is in fact an attachment to a standard. In the current NERC Glossary of Terms, there is no such precedence that a definition must rely on the requirements or details in a standard for completeness. Additionally, the definition of Frequency Bias Setting should focus on what it is. Balancing Authorities do not supply energy. Suggest revising it to: Frequency Bias Setting A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority’s Area Control Error equation to approximate the expected natural response provided by the assets within the respective Balancing Authority’s area.
No
R1- It is not clear what is intended by "Reserve Sharing Group" in this context. As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifiying this concept and possibly include an example in the background document to help explain how this would work. R2 - Please add the word “range” in-between the words “date” and “specified”. The background document specifies that there is a 72-hour period to implement the FBS setting (See Background document Page 7). R2, as written, does not reflect the period for which an entity may implement the ERO validated Bias into ACE. Also see our comment on #7 as to the length of the comment period. Question 7 comment is provided to assist the SDT; Note from question 7: (Page 7 (3rd paragraph) of the Background document states “Given the fact that BA’s can encounter staffing or EMS change issues coincident with the date the ERO sets for new Frequency Bias Setting implementation, the standard provides a 24 hour window on each side of the target date. 1. The Standard itself does not state this provision (24 hour window on each side of target date) as indicated. 2. The SDT accurately addresses the fact that BA’s could have EMS or staffing issues during implementation of the ERO validated FBS. The current stated 72-hour window is not long enough for implementation of the FBS as there may be a host of issues that could impact implementation. We suggest that a seven day window be used for implementation of the FBS.) R3 – Recommend the term “Adverse Reliability Impact” be removed from Requirement 3. Based on the NERC definition of the term, a smaller entity could never operate its AGC outside of TLB mode due to their impact on the BES not likely to result in “instability or Cascading”. To ensure a more consistent and equitable approach when applying this Requirement, recommend the drafting team incorporate the reliability reasons listed within the Background Document into the actual Requirement. Additionally, the phrase “effectively coordinated control” should be removed as this is not essential to the Requirement and introduces ambiguity in its application. To this end, the following revisions are proposed: R3. Each Balancing Authority not receiving Overlap Regulation Service shall operate its Automatic Generation Control (AGC) in Tie Line Bias mode to ensure effectively coordinated control, unless such operation would have an Adverse Reliability Impact on the Balancing Authority’s Area

meets one or more of the following conditions. • Telemetry problems that lead the operator to believe ACE is significantly in error. • The frequency input to AGC is not reflective of the BA's true frequency (such as if the control center were operating a local generator and disconnected from the Interconnection). • During restoration (where one BA might be controlling frequency while another to which it is connected is managing interchange between them). • For training purposes. • Many AGC systems will automatically switch to an alternative mode if the EMS determines Tie Line Bias control could lead to problems. • For single BA Interconnections, Flat Frequency and Tie Line Bias are equivalent. • The Reliability Coordinator has been informed and the duration is [insert time constraint language here]. R5 – Recommend to delete the phrase "In order to ensure control response". Such phrases can be needless causes of debate. If a BA uses one of the bulleted methods but does not get "adequate response" then is the BA non-compliant? What is "adequate response"? Who decides if the response is adequate? Please clarify.
Yes
No
Based on suggested changes to R3 in response to Question 2, the drafting team should modify M3 to be consistent with the proposed language. Additionally, M1 should be revised to not reference a specific Form. The Form may be the format of choice but it should not be an implied requirement. Measures 3 and 4 identify the use of "operating logs" as evidence. Measure 2 identifies hard copy and electronic evidence, "or other evidence". We suggest calling out specifically "operator logs" for M2 also, in case there are system problems in capturing hard copy or electronic evidence during the short time window for implementation.
No
The proposed VSLs for Requirement R1 treats a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet the FRO.
No
Confusion exists around the "peak load" in that Attachment A states the allocation is based on Projected Peak Loads and Generation but the Background Document states it will use a historical Peak and Generation to make the allocation. Also, for the BA installed capacity, where is that value derived from and does NERC obtain that from FERC form data or does the BA provide that information somewhere specific to this effort? Additionally, there appears to be a difference in how FRO is calculated in Attachment A and what is described in the Background Document. These differences should be reconciled such that both documents address the same approach. If installed capacity is used in the equation, how are variable/intermittent resources (e.g. wind, solar) accounted for? At full capacity? Please clarify. We suggest the SDT clarify if the materials in the revised Attachment A (and Attachment B) are "Guideline" or "Technical Background", or "requirements
No
the MRO NSRF has restated the same answer as in question 6 on purpose. Confusion exists around the "peak load" in that Attachment A states the allocation is based on Projected Peak Loads and Generation but the Background Document states it will use a historical Peak and Generation to make the allocation. Also, for the BA installed capacity, where is that value derived from and does NERC obtain that from FERC form data or does the BA provide that information somewhere specific to this effort? Additionally, there appears to be a difference in how FRO is calculated in Attachment A and what is described in the Background Document. These differences should be reconciled such that both documents address the same approach. If installed capacity is used in the equation, how are variable/intermittent resources (e.g. wind, solar) accounted for? At full capacity? Please clarify. Page 7 (3rd paragraph) of the Background document states "Given the fact that BA's can encounter staffing or EMS change issues coincident with the date the ERO sets for new Frequency Bias Setting implementation, the standard provides a 24 hour window on each side of the target date. 1) The Standard itself does not state this provision (24 hour window on each side of target date) as indicated. 2) The SDT accurately addresses the fact that BA's could have EMS or staffing issues during implementation of the ERO validated FBS. The current stated 72-hour window is not long enough for implementation of the FBS as there may be a host of issues that could impact implementation. We

suggest that a seven day window be used for implementation of the FBS.
No
: There could be some confusion caused by the Attachment B due to the use of the word “initially” when the reference is made to the current standard. The drafting team should change the word “initially” to “currently” or strike it to avoid the potential confusion. The second paragraph of Attachment B (which contains the two bullets): The words “initially 1%” in the second bullet contradict with the Table 1 on Attachment B, which states “Initial” and “0.8%”. Suggest deleting the parenthetical in the second bullet as when BAL-003-1 is effective it would be referencing an old Standard version. If the initial minimum is intended to be 1% say so in the Table 1.
Yes
: It would be useful if the drafting team could develop a completed form as an example to help entities better understand the methodologies used in the form
It is not clear if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of FR expected on a total basis. Balancing Authorities need to know for how many tenths of a hertz they are to respond so they can determine how to plan to meet this requirement. The documents do not appear to provide any boundary on the maximum amount of FR that a BA will provide, i.e. it is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz (e.g. what if freq dips to 59.0? Is the BA expected to provide a limitless amount of frequency response?). Also, is that event excluded from the list used to calculate the Balancing Authorities’ response or is it included with an expectation that it counts the same as any other event. Without a clear statement of what is expected, including whether there is a limit on that expectation or not, the Balancing Authorities cannot know what is expected of them and therefore cannot plan appropriately. In the first paragraph of R5 delete “at least” and replace with “greater than or”. This phrase would now read “…absolute value is greater than or equal to one of the following:” “Equal to or greater than” accurately identifies the expectation, the current phrasing will lead to confusion and mis-interpretation. Bullet #1 of R5: The minimum % is based upon the “estimated yearly Peak Demand”. During the NERC webinar it was mentioned that this minimum would move to being based on historical reporting of Peak Demand. Where does the SDT stand on this item? Please provide clarification.
SERC OC Standards Review Group
Gerald Beckerle
No
We feel that the last phrase of the definition of Frequency Bias Setting is more of an explanation of a function rather than a definition. While the SERC OC Standards Review Group understands the statement, we do not feel it belongs in the definition of the Frequency Bias Setting and a period should be inserted after the word “Interconnection”. Should the definition for Frequency Response Measure (FRM) be specific to the BA, similar to the definition for Frequency Response Obligation (FRO)?
No
We feel that the utilization of the term, “Reserve Sharing Group”, is not consistent with the definition in the NERC Glossary of Terms, and should be deleted, applicability should be clarified or replaced with a new term, such as “Frequency Response Sharing”. R2 exempts BAs participating in Overlap Regulation Service from implementing the Frequency Bias Setting on the date specified by the ERO, and R4 states how the BA performing Overlap Regulation Service will modify its Frequency Bias Setting but does not state when the setting will be implemented. The exemption for BAs participating in Overlap Regulation Service should either be deleted from R2 or language stating the implementation date of the frequency bias setting needs to be included in R4. R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in “Tie Line Bias” mode.
Yes
No
See comments in Question 2 regarding utilization of the term “Reserve Sharing Group”.
No

See comments in Question 2 regarding utilization of the term “Reserve Sharing Group”. VSL for R1: The draft VSLs for R1 uses the summation of FRM for all BAs within an Interconnection as a factor in determining the applicable VSL. This does not seem consistent with R1. R1 is about a single BA and the individual BA’s frequency response performance as measured by the FRM for that specific BA. Including the FRM summation of the Interconnection expands R1. It appears that a BA that is non-compliant with R1 could end up with either a Low/Medium or High/Severe VSL based upon the FRO performance of the Interconnection. The FRM performance of the Interconnection is beyond the knowledge and control of a single BA and should not be a determinate of the applicable VSL. Is there a technical basis for selection of the 1%, 30% and 15MW/.1 Hz VSL breakpoints? Does the Lower VSL give a 1% dead band to a BA’s FRO? If so, will this be acceptable to NERC/FERC? VSL for R2: The VSL should reflect the language used in the requirement. R2 says a BA “not participating in Overlap Regulation service shall ….”, while the VSL says a BA “not receiving Overlap Regulation Service…..” The VSL language is not consistent with the requirement. VSLs for R5: Since Frequency Bias Setting is expressed as a negative value, the terms “absolute value” and “less than” must be used carefully. Wouldn’t the “absolute value” of a BA’s Frequency Bias Setting always be positive and thus it could never be less than the minimum specified by the ERO (a negative value)?
No
The definition of Single Event Frequency Response Data (SEFRD) was struck from the draft standard but still appears in Attachment A. Since R1 of the standard references Attachment A, would the definition of SEFRD still be applicable? If the definition is to be totally struck, we don’t think the term should be used in Attachment A.
No
Portions of the Background Document do not appear to be complete or finished. The Background Document should be edited to be consistent with changes made to the standard or other related documents (eg. elimination of the definition of SEFRD and any revisions to the draft BAL-003-1).
No
We suggest the SDT consider a term other than “Initial’ in the title for Table 1. We suggest “Proposed Frequency Bias Setting” for Table 1
Yes
We feel that frequency response is a function of a contingency event and the Purpose Statement should recognize this relationship. We suggest the following insertion (in quotation marks) in the Purpose Statement: Purpose: To require sufficient Frequency Response from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations “due to a contingency event” and supporting frequency until the frequency is restored. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting.
Southern Company
Antonio Grayson
No
We suggest adding BA to the definition of Frequency Response Measure (FRM), similar to the definition for Frequency Response Obligation (FRO).
Yes
No
VSL for R2: We suggest the language in the VSL be consistent with the language used in the Requirement. The VSL for R2 says a BA ‘not receiving Overlap Regulation Service…….’ R2 says a BA ‘not participating in Overlap Regulation service shall …….’ VSLs for R5: Since Frequency Bias Setting is expressed as a negative value, the terms “absolute value” and “less than” must be used carefully. This VSL uses “absolute value” when referring to the BA’s Frequency Bias Setting, but does not use “absolute value” when referring to the Frequency Response Obligation, or minimum value specified by the ERO. Consider revising this VSL so that a true comparison can be made.
No

We suggest increasing the delta f for the East to be the same value as the West or larger. The reason for this is that the 0.04Hz suggested is too close to the governor deadbands of .036Hz. This would potentially omit frequency response that some units may provide for a larger excursion but not for those close to the deadband.
No
We suggest the Background Document should be edited to be consistent with changes made to the standard or other related documents (eg. Any revisions to draft BAL-003-1 and removal of the definition of SEFRD).
No
We suggest using the words, 'Proposed Frequency Bias Setting' in the Title of Table 1 instead of the word, 'Initial'.
Yes
We suggest adding the words, 'due to a contigency event', after the word, 'deviations', in the Purpose statement because we feel that frequency response occurs due to a contigency event.
SPP Standards Review Group
Robert Rhodes
Yes
Yes
Yes
Yes
No
The VSLs for R2 are based on 5, 15 and 25 days. What was the justification for these values? Could we just as well use 10, 20 and 30 or some other set of values? In R3, we understand that brief periods of operation outside of TLB control are allowable providing 1) continued operation in TLB control would create ARI on the Interconnection or 2) that justification is provided for the periods when TLB is not used. For example, if something happens within our EMS that disables TLB control are we compliant if we document the period as an EMS malfunction?
Yes
We appreciate the effort of the SDT in developing Attachment A. It was very helpful in weeding through BAL-003.
Yes
We also appreciate the effort of the SDT in developing the Background Document. It provided insight on how the SDT got the proposed standard to where it is with this posting.
Yes
Yes
Requirement 5, bullet 2 does not make any allowance for a single generator, generator-only BA. If that BA's generator is out-of-service, the BA cannot satisfy this requirement. This could also apply to other generation-only BAs which have a very limited number of generating units. Also, RSGs/BAs which experience resource changes (permanently removing generation from service) throughout the year have no mechanism for adjusting their FRO during the year.
H. Steven Myers
ERCOT
No
RE: Frequency Response Obligation (FRO) definition: ERCOT suggests changing "Balancing

Authority's" to "Balancing Authority Area's" as follows: The Balancing Authority Area's share of the required Frequency Response needed for the reliable operation of an Interconnection. A BA that does not own generation resources cannot provide Frequency Response, it can only schedule and dispatch available resources capable of such; . The BA should be responsible for taking action to schedule resources that are capable of frequency response, and monitoring to assure frequency response performance. The GOP (possibly the LSE when demand side performance is involved) must be accountable for performing. However, there is nothing in this requirement to encourage the owner of a resource who chooses not to provide frequency response to come to the table. There is nothing in this standard that uniformly requires all frequency response providers to perform. This is likely to be detrimental to the performance of a BAA and unfairly sanctions those willing to perform to to assure reliability while others are not required to perform.
No
Measure should be modified to align with revised Requirements per ERCOT's comments on #1.
No
Refer to comments in #1.
No
While there is no problem with the calculation involved, it is unclear why the SDT elected to assign a grid performance element in this standard to the ERO, who has no functional (registered) role in grid performance. Since this is a cook-book calculation and transfer of data on frequency performance, why not assign it to the BA?
Kasia Mihalchuk
Manitoba Hydro
No
It is not clear why the term "Single Event Frequency Response Data (SEFRD)" has been removed from the standard but is still used and defined in the Background Document and Attachment A.
No
Regarding R1: 1. Neither R1 nor the referenced Attachment A clarifies the FRM requirements for an RSG to comply versus a BA. In particular (i) At p.3, Attachment A states that the ERO is responsible for "annually assigning an FRO and Frequency Bias Setting to each BA." No mention is made of RSGs. (ii) Attachment A only references RSGs in the context of reporting obligations for Form 1 (at p.4) and (iii) Compared to BAL-002-0 R1.1, which clearly states that the BA may elect to fulfill its obligation through an RSG and that in such cases the RSG has the same responsibilities as each BA (that is a participant in the RSG). 2. It should be clarified that this requirement applies to a BA, where the BA doesn't belong to an RSG, OR to an RSG. As it is currently drafted, the standard applies to each BA and each RSG. It is redundant in that each BA would need to comply, whether or not they are a member of an RSG that would also be required to comply. Further, the NERC Glossary definition of an RSG is a group of BAs that collectively maintain, allocate and supply operating reserves. No mention is made of the agreement including the sharing or delegation of responsibility related to FRM. Accordingly, the standard should only reference a BA being able to delegate responsibility to an RSG if the RSG Agreement allows for such delegation. 3. R1 does not specify where or how the FRO is determined. Presumably this would be determined by the ERO pursuant to Attachment A. 4. The phrase "to ensure that sufficient Frequency Response …" should be separated from the requirement as it is (i) not descriptive of the required actions; (ii) redundant with the stated purpose at the beginning of the standard. In general, such a drafting technique should be avoided as it may allow Responsible Entities to argue that a violation has not occurred where the specific action that is described has not been taken, but the purpose referenced in the requirement has been met. Regarding R2: 1. It is not clear from R2 who determines the Frequency Bias Setting for "validation" by the ERO and how the FBS is determined. (Presumably done by the BA in accordance with

Attachment B). Based on Background document, should refer to those “published” by ERO. The BA’s FBS may not be validated, and may be modified before posting. 2. Attachment B does not refer to the ERO “validating” FBS. 3. Attachment B refers to an RSG calculating FBS, but the standard does not.
Yes
No
It should be clarified that R1 requirement applies to a BA, where the BA doesn’t belong to an RSG, or to an RSG. As it is currently drafted, the standard applies to each BA and each RSG. It is redundant in that each BA would need to comply, whether or not they are a member of an RSG that would also be required to comply. Further, the NERC Glossary definition of an RSG is a group of BAs that collectively maintain, allocate and supply operating reserves. No mention is made of the agreement including the sharing or delegation of responsibility related to FRM. Accordingly, the standard should only reference a BA being able to delegate responsibility to an RSG if the RSG Agreement allows for such delegation.
No
The Violation Severity Levels for R1 penalize entities more severely depending on how the interconnection as a whole has performed. MH believes that BAs should only be held accountable for issues within their control and that the VSLs for R1 should be revised accordingly.
No
1. p.2 refers to each “Interconnection” establishing target contingency protection criteria. However, an “Interconnection” as defined in the NERC Glossary is an electrical system, not a Responsible Entity. This should be revised to clarify which Responsible Entities must establish the protection criteria. 2. Table 2, although entitled “Interconnection Frequency Response Obligations” does not use the term FRO in the Table itself. This terminology should be consistent. 3. There is no clear statement in Attachment A identifying the significance of Table 2. The previous paragraph identifies Table 2 as listing “default targets”, but how does this relate to the FRO referenced in R1? 4. The “Note” on p.2 regarding the ERO being able to use additional events that don’t satisfy the criteria is unreasonable as drafted. Since these events are used to calculate the Frequency Bias Setting and FRM (as per p.1, s.2), the selection of events should not be at the unfettered discretion of the ERO. As drafted, no grounds or criteria must be satisfied.
Yes
Please see MH’s response to Question 1 regarding the term Single Event Frequency Response Data. Additionally, the discussion in this document is useful in clarifying the intent of the drafting team, but some of this clarification would best be incorporated into the Standard itself. Ex. RSG requirement on page 6. Also on page 7 Attachment A does not specify what validation is and how it is done. Attachment A refers to BA providing FBS data to ERO which then validates and publishes. This should be reflected in R2.
Yes
Yes
The Applicability of BAL-003-1 should be clarified. Specifically, Section 1.2 should be changed from “Reserve Sharing Groups (where applicable)” to “Reserve Sharing Group whose intent includes meeting Frequency Response Obligations”. Regarding Data Retention: 1. As the standard is currently drafted, both the BA and the RSG would be required to retain data or evidence to show compliance with requirements R1 and M1. It is unclear whether this is the intention, or whether it would be acceptable that just one or the other would maintain such records. 2. In the first and second paragraph, the reference to ‘three calendar years’ should be specified to be the ‘previous three calendar years’. 3. In the third paragraph, it should be clarified who is required to keep information related to non compliance if the BA belongs to an RSG – the BA or the RSG or both. 4. In the fourth paragraph, it should be clarified for what length of time the last audit records must be retained.
Western Electricity Coordinating Council
Steve Rueckert
Yes

No
Agree with the changes made to this latest version of BAL-003-1. However, additional clarity could be added by addressing the following: R1- It is not clear what is intended by "Reserve Sharing Group". As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifiying this concept and possibly include an example in the background document to help explain how this would work. R3 - There may be occasions in which an entity has a legitimate reason or a need to operate in a mode other than Tie Line Bias but that does not qualify as an Adverse Reliability Impact. Recommend including language that would permit limited operation in a mode other than Tie Line Bias mode provided the Reliability Coordinator was notified. R3 – Has the drafting team considered whether or not the language of Requirement R3 will have any conflict or coordination issue with the FERC-approved regional reliability standards BAL-004-WECC-1 – Automatic Time Error Correction? R5 – Suggest changing the language “at least equal to” to “greater than or equal to” for clarity.
No
The proposed VSLs for Requirement R1 treat a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO.
No
There is disagreement between Attachment A and the Background Document. Attachment A states peak load allocation is based on “Projected” Peak Loads and Generation, but the Background Document states it will use “historical” Peak Load and Generation. The allocation methodology of FRO among the BAs in the equation on page 3 of Attachment A favors BAs with more load than more installed capacity. Peak load is served but not all installed capacity is always dispatched.
No
See response to question 6.
Reducing frequency bias obligation is detrimental to reliability. Lowering the Minimum Frequency Bias Setting from 1% to .8% (as identified in Table 1, Attachment B) will result in a lower value being used by those Balancing Authorities with a natural frequency response below the current required 1%, which in turn will lower the natural frequency response. Over time it seems this pattern would lead to poorer response. Is there an upper limit to the amount of frequency response expected of the Balancing Authorities? How many tenths of a hertz is a Balancing Authority or Reserve Sharing Group expected to respond to. The documents do not appear to provide any boundary on the maximum amount of Frequency Response that a BA will provide. It is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz or in the Western Interconnection that causes the frequency to drop to less than 59.5 Hz. Will that event be excluded from the list used to calculate the Balancing Authorities’ response? Will it be included with an expectation that it counts the same as any other event? Without a clear statement of what is expected, including whether there is a limit on that expectation or not, it is unclear what is expected of the Balancing Authorities. As Drafted, is there the possibility that a Balancing Authority may fail to meet their FRO if surrounding BAs provide significantly more than required. Can over performers cause average performers to fail when they would have otherwise met their requirement. The documents do not provide guidance on how intermittent or variable generation is to be treated Referencing Attachment A may be adding requirements. You may wish to consider adding language in Requirement R1 that specifically requires the completion of the Attachments or Forms. There are no requirements on governor installation, settings, or operation. Addition of governor operation requirements seems essential for a frequency response standard. Without some sort of governor response to require the individual generators to perform, a Balancing Authority with significant amounts of generation for which it has no control over is at a disadvantage.
Curtis Crews

Texas Reliability Entity
Yes
We suggest that the Severe VSL for R3 is confusing and should be clarified as follows: “A Balancing Authority not receiving Overlap Regulation service failed to operate AGC in Tie Line Bias mode, when operation in Tie Line Bias mode would not have had an Adverse Reliability Impact on the Balancing Authority’s Area.”
No
We have a number of concerns regarding Attachment A which are set forth below: 1. Regarding the formula for “Initial FRO Allocation” on page 3 of Attachment A, the terms for “BA installed capacity” and “Interconnection installed capacity” are undefined and could be subject to manipulation and dispute. We suggest that this formula be revised to mirror the calculation based on well-established FERC Form 714 data that is discussed in the Background document, which is based on actual generation output. 2. In Attachment A, all references to “Texas” should be changed to “ERCOT” as a reference to the Interconnection or the Region (including tables). 3. Regarding the Event Selection Criteria in Attachment A: in item 2, consider whether certain events, such as DCS events, should be required to be included in the FRM analysis. 4. Regarding the Event Selection Criteria in Attachment A: item 7 provides that the selected frequency excursion events are to be selected so that they are evenly distributed seasonally. Consider adding the seasonal distribution concept to item 2, particularly if it becomes necessary to include events from the previous evaluation period. 5. In Attachment A, page 1 says the ERO is to post the final list of frequency excursion events by December 15, but on page 3 it suggests that the list will be posted by December 10. These references should be made consistent. 6. Attachment A states, on page 3, “the ERO will use FRS Form 1 data to post the following information for each Balancing Authority for the upcoming year: Frequency Bias Setting and Frequency Response Obligation (FRO).” What is meant by “the upcoming year”? Is the BA supposed to implement the new FBS immediately, or wait until the beginning of the next evaluation period on December 1? Note that if the new FRO and FBS are implemented immediately (e.g. in March), then the FRO will change in the middle of an evaluation period. This will complicate the comparison of FRM and FRO as required by R1.
No
There is an inconsistency between the Background Document and Attachment A. Attachment A only proposes event criteria based on “the largest category C (N-2) event identified,” but the Background Document says: “Attachment A proposes the following Interconnection event criteria as a basis to determine an Interconnection’s Frequency Response Obligation: - Largest category C loss-of-resource (N-2) event; - Largest total generating plant with common voltage switchyard; - Largest loss of generation in the interconnection in the last 10 years.”
No
1. In Attachment B, we suggest removing the paragraph beginning “The BA calculates . . .” because it appears to be background information that conflicts with the methods provided in this version of the standard for determining minimum bias settings. 2. Attachment B, Table 1, refers to “0.8% of peak load or generation.” If a BA has both load and generation, will its minimum Frequency Bias Setting be based on its load, its generation, or can it pick the value that it prefers to use?
Mark B Thompson
Alberta Electric System Operator
No
The FRO definition is specific to BAs. The Appendix 1, which is incorporated in the standard, uses this definition in relation to requirements of the Interconnection. The SDT should consider a revision of this definition that accounts for the requirements of the Interconnection versus the BA obligation to the Interconnection.

No
The language used in the requirements is superfluous. This could result in confusion and incorrect assumptions being made. In R1, the comment within brackets “(as detailed in Attachment A and calculated on FRS Form 1)”, is not necessary as it is already part of the FRM definition. We suggest removing this bracketed text from the requirement. Also in R1, the phrase “to ensure that sufficient Frequency Response is provided by each BA or RSG to maintain an adequate level of Frequency response in the Interconnection” is a high level objective that does not add clarity to this requirement. We suggest removing this from the requirement. R2, R3 and R5 use similar language e.g. “to ensure effectively coordinated Tie Line Bias control”, “to ensure adequate control response” etc. Although it provides background information, this does not add clarity to the requirement. We suggest removing these from the requirements.
No
These documents not only provide additional clarity but also specify additional requirements, such as FRS Form 1 annual reporting by January 10. All the enforceable requirements should be included in the body of the standard. 1. Attachment A uses the terms "delta F (change in frequency)", "arresting frequency (Point C)", "B Value", "A Value". These terms are not properly defined or described in this document as drafted. The AESO suggests adding a description or definitions for clarity in this document. 2. The standard gives 2 sets of values for Interconnection Frequency Response Obligation in Table 2, (1) Base Obligation and (2) the obligation including 25% Safety Margin (which seems to be implied by the "contingency protection criterion"). The Attachment A does not specifiy whether the Base Obligation or the 25% Safety Margin value will be used to allocate the Interconnection FRO to the BAs. Please clarify which value will be used to calculate the BA Frequency Response Obligation (FRO) in the Interconnection FRO allocation formula in Attachment A. 3. The "initial FRO allocation" formula in Attachment A uses Peak Load. The term Peak Load is not used in the standard nor is it a defined term in the NERC Glossary. The standard uses Peak Demand, which is defined in the Glossary Is "Peak Load" synonymous with "Peak Demand"? If so, Peak Demand should be used in the formula instead. Otherwise Peak Load should be clearly defined in this document. 4. Is "Projected" in the FRO allocation formula synonymous with "Forecasted"? If so, Forecasted should be used for consistency. Otherwise "Projected" or the context in which it appears must be defined.
No
The Background Document uses BA Peak Generation in the BA FRO allocation formula. Attachment A uses BA Installed Capacity. The AESO suggests making the two formulae consistent.
Besides the standard, the posting has two attachments, supporting material and two forms. It is not clear how enforcement will be applied given the array of explicit and implicit requirements throughout this package, and the use of undefined terminology, which will be subject to interpretations. In the SDT response to our comments to the first draft of this standard it was stated that “The expectation is events will be selected by the Balancing Authorities. The Balancing Authority may exclude events from consideration for specific conditions such as data quality issues. “ Based on the SDT’s response, it is our understanding that, for the purpose of the FRM calculation, BAs could exclude or include events based on specific conditions consideration, such as data quality or event suitability (e.g. BA separation from the Interconnection). However, the standard as currently drafted, does not have any provisions to this effect. Please include such provisions in the body of the standard.
Anthony Jablonski
ReliabilityFirst
No

ReliabilityFirst thanks the SDT for their effort on this project. ReliabilityFirst has a number of concerns/questions related to the draft BAL-003-1 VSLs which include the following: 1. General VSL Comment – For consistency with other standards, each VSL should begin with the phrase “The Responsible Entity…” or “The Balancing Authority”. This is consistent with the language of the requirement and correctly pinpoints the appropriate responsible entity. 2. VSL R1 Comment – Based on the FERC Guideline #3 “Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement”. ReliabilityFirst suggests the following modification: a. Lower VSL - The Responsible Entity achieved an annual FRM within an Interconnection that was equal to or more negative than the Interconnection’s FRO and the Responsible Entity’s FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO b. Medium VSL - The Responsible Entity achieved an annual FRM within an Interconnection that was equal to or more negative than the Interconnection’s FRO and the Responsible Entity’s FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO c. High VSL - The responsible entity failed to achieve an annual FRM that is equal to or more negative than its FRO and the Responsible Entity’s, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO d. Severe VSL - The responsible entity failed to achieve an annual FRM that is equal to or more negative than its FRO and the Responsible Entity’s FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO 3. VSL R4 Comment – Based on the FERC Guideline #3 “Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement”. ReliabilityFirst suggests the following modification: a. Example for Lower VSL which should be carried throughout all four VSLs - The Balancing Authority incorrectly modified the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting-error less than 5% of the validated or calculated value 4. VSL R5 Comment – Based on the FERC Guideline #3 “Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement”. ReliabilityFirst suggests the following modification: a. Example for Lower VSL which should be carried throughout all four VSLs - The Balancing Authority used a monthly average Frequency Bias Setting whose absolute value was less than or equal to 5% below the minimum specified by the ERO.
ReliabilityFirst thanks the SDT for their effort on this project. ReliabilityFirst has a number of concerns/questions related to the draft BAL-003-1 standard which include the following: 1. General Comment – ReliabilityFirst is unsure how a Reserve Sharing Group (RSG) would be capable of establishing a correct Frequency Response Measure (FRM) and Frequency Response Obligation (FRO) as a RSG. Frequency Response and Frequency Bias are unique values established for each Balancing Authority (BA), is the intent to require a RSG response to establish and maintain a certain frequency response based upon the members and size of the RSG? From a monitoring perspective and without more guidance it is unclear what or how these values will be determined. 2. General Comment – ReliabilityFirst believes the proposed definitions for Frequency Response Measure (FRM) and Frequency Response Obligation (FRO) are unclear. For example, ReliabilityFirst is unclear what is meant by the term “observations” in the FRM definition. ReliabilityFirst also believes the terms “reliable operation of an Interconnection” is ambiguous and seeks further clarification to its meaning. 3. General Comment – ReliabilityFirst recommends including Attachment A, Attachment B, FRS Form 1 and FRS Form 2 into the standard itself. These attachments and forms are referenced in the requirements (and definitions) and therefore should be appropriately embodied within the standard. 4. General Comment – ReliabilityFirst believes the last fragment of words in Requirement R1 through R4 (and first fragment of words in Requirement R5) is more of a justification for the requirement rather than a requirement itself. ReliabilityFirst believes this justification should be moved to a “Rationale Text Box”. For example, the first set of words in Requirement R5 states: “In order to ensure adequate control response”. This language is really explaining why this requirement is needed. ReliabilityFirst believes this should be removed, further expanded upon and placed in a “Rationale Text Box”.
Florida Municipal Power Agency

Frank Gaffney
No
We thank the SDT for their hard work and diligence in moving this Project forward. However, we have some concerns that cause us to not support the standard in its current form. In general, we believe that there has not been sufficient prudency review for the standard, especially R1, to justify a performance based standard around a Frequency Response Measure. We also believe that the proposed standard does not meet all of the conditions of the Final SAR and Supplemental SAR. The "Final SAR" was to develop methods by which a performance based standard would eventually be developed. The Final SAR states: "The proposed standard's intent is to collect data needed to accurately model existing Frequency Response. There is evidence of continuing decline in Frequency Response in the three Interconnections over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be modeled, and the reasons for the decline in Frequency Response can be identified. Once the reasons for the decline in Frequency Response are confirmed, requirements can be written to control Frequency Response to within defined reliability parameters." BAL-003-1 does not seem to complete the scope of this "Final SAR". For instance, "the reasons for the decline in Frequency Response" were not confirmed to our knowledge; and the field trial is not completed to our knowledge. The Supplemental SAR adds to the scope of the Final SAR: "To provide a minimum Frequency Response Obligation for the Balancing Authority to achieve, methods to obtain Frequency Response and provide a consistent method for calculating the Frequency Bias Setting for a Balancing Authority. In addition, the standard will specify the optimal periodicity of Frequency Response surveys." The Supplemental SAR does not eliminate the pre-requisite contained in the Final SAR to determine the reasons for the decline in frequency response and confirm them before establishing "defined reliability parameters". In addition, the standard does not complete the requirement of the Supplemental SAR to identify "methods to obtain Frequency Response". For instance, neither the BA nor the RSG have authority over governor and other generator settings. There should be a requirement for GOPs to incorporate setting changes directed by the BA, otherwise the standard establishes requirements that BAs and RSGs may not have the authority to achieve. There is no consideration of "footprint" changes of the BA resulting in different allocation from the ERO during a year. The standard and Attachments seem to specify an annual process with due dates in December and January with no allowance for mid-year changes and associated allocation changes. If a standard has a requirement for the ERO, who will audit the ERO for compliance? If the ERO does not meet its obligations, can an entity still be found non-compliant, especially on a schedule basis? Wasn't there an issue of assigning standards to RROs, e.g., the fill-in-the-blank standards? Are there similar issues with assigning requirements to the ERO? Is the ERO a "user, owner or operator" of the BPS under Section 215, e.g., at (b)(1)"… All users, owners and operators of the bulk-power system shall comply with the reliability standards that take effect under this section." We question how this would work from a compliance perspective.
No
On Event Selection Criteria, bullet 2, if 25 events cannot be identified then the ERO can go back in time to the previous year. This creates a double jeopardy to R1 of the standard. It also may include irrelevant data if there have been changes from one year to the next in FRO or Bias settings assigned by the ERO. On Frequency Response Obligation, first paragraph states that "Each Interconnection will establish target contingency protection criteria"; however, the Interconnection is not a decision-making body. Does this really mean the ERO will establish FRO for each Interconnection? The single asterisk note for the table on page 2 states: "It is extremely unlikely that an event elsewhere in the Eastern Interconnection would cause the Florida UFLS special protection scheme to "false trip".", "Special protection scheme" should be stricken from this sentence, Florida has just a regional difference in its UFLS program.
No
The document does not discuss how the new reliability parameter will affect BAs

On R5, the wording should be changed from “absolute value is at least equal to” to “absolute value is greater than or equal to”
Brenda Powell
Constellation Energy Commodities Group
No
The Frequency Response Obligation has two components based on Attachment 1 - an Interconnection FRO and a BA FRO. The proposed definition captures only the BA FRO.
No
R1 should accommodate agreements between multiple BAs and RSGs in achieving the annual Frequency Response Measure. See proposed modification below: R1. Each Balancing Authority shall achieve an annual Frequency Response Measure (FRM) (as detailed in Attachment A and calculated on FRS Form 1) that is equal to or more negative than its Frequency Response Obligations (FRO) to ensure that sufficient Frequency Response is provided by each BA. Either the Balancing Authority individual FRM, multiple Balancing Authority’s FRM per written agreement, or the FRM of the Reserve Sharing Group must be equal to or more negative than the applicable Frequency Response Obligations (FRO) for a single Balancing Authority or the aggregate of multiple Balancing Authorities or RSGs. -In R2, “Each Balancing Authority not participating in Overlap Regulation Service” should state “Each Balancing Authority, not receiving Overlap Regulation, shall implement the appropriate Frequency Bias Setting (fixed or variable,) validated by the ERO, into its Area Control Error (ACE) calculation beginning on the date specified by the ERO to ensure effectively coordinated Tie Line Bias control”. -In R3, the explanatory language about why to operate in Tie Line Bias mode should be deleted. See proposed modification below: R3. Each Balancing Authority not receiving Overlap Regulation Service shall operate its Automatic Generation Control (AGC) in Tie Line Bias mode, unless such operation would have an Adverse Reliability Impact on the Balancing Authority’s Area. -R5 should be modified to state only that the FBS is specified by the ERO in accordance with Attachment B. As drafted the Requirement is in conflict with Attachment B because the Requirement mandates a minimum and does not allow for a reduction to the minimum but it references Attachment B which is titled “Process for Adjusting Minimum Frequency Bias Setting”. See proposed modification below: R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is as specified by the ERO in accordance with Attachment B. -There should be a Requirement specifically stating there is an obligation to complete and submit FRS Form 1 by January 10th each year for clarity. -The requirements should be re-ordered to reflect the chronology of the process for frequency calculation, implementation and performance measurement. The recommended order is as follows: R5 which defines the minimum Frequency Bias Setting (FBS) for a Balancing Authority R4 which describes how the minimum FBS may be altered through Overlap Regulation Service R2 which identifies the coordination required around implementation R3 which requires operation in Tie Line Bias mode R1 which establishes the performance obligation
Yes
No
Based on language modifications proposed to the Requirements, the measures should be revisited.
No
The language in the VSLs for R1 should be revisited based on the proposed language modifications above and should also clearly look to the FRM of a BA, group of BAs or RSG against the BA FRO not an Interconnection FRO.
Yes
Additional information relating to defining the FRO for the Interconnection would be helpful as would an example for calculating the BA FRO.
Yes
Should be revisited based on the propposed modifications to the requirements.
No
Should be revisited based on the proposed modifications to the requirements.

Yes
JEA Electric Compliance
Thomas McElhinney
No
We thank the SDT for their hard work and diligence in moving this Project forward. However, we have some concerns that cause us to not support the standard in its current form. In general, we believe that there has not been sufficient prudency review for the standard, especially R1, to justify a performance based standard around a Frequency Response Measure. We also believe that the proposed standard does not meet all of the conditions of the Final SAR and Supplemental SAR. The “Final SAR” was to develop methods by which a performance based standard would eventually be developed. The Final SAR states: “The proposed standard’s intent is to collect data needed to accurately model existing Frequency Response. There is evidence of continuing decline in Frequency Response in the three Interconnections over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be modeled, and the reasons for the decline in Frequency Response can be identified. Once the reasons for the decline in Frequency Response are confirmed, requirements can be written to control Frequency Response to within defined reliability parameters.” BAL-003-1 does not seem to complete the scope of this “Final SAR”. For instance, “the reasons for the decline in Frequency Response” were not confirmed to our knowledge; and the field trial is not completed to our knowledge. The Supplemental SAR adds to the scope of the Final SAR: “To provide a minimum Frequency Response Obligation for the Balancing Authority to achieve, methods to obtain Frequency Response and provide a consistent method for calculating the Frequency Bias Setting for a Balancing Authority. In addition, the standard will specify the optimal periodicity of Frequency Response surveys.” The Supplemental SAR does not eliminate the pre-requisite contained in the Final SAR to determine the reasons for the decline in frequency response and confirm them before establishing “defined reliability parameters”. In addition, the standard does not complete the requirement of the Supplemental SAR to identify “methods to obtain Frequency Response”. For instance, neither the BA nor the RSG have authority over governor and other generator settings. There should be a requirement for GOPs to incorporate setting changes directed by the BA, otherwise the standard establishes requirements that BAs and RSGs may not have the authority to achieve. There is no consideration of "footprint" changes of the BA resulting in different allocation from the ERO during a year. The standard and Attachments seem to specify an annual process with due dates in December and January with no allowance for mid-year changes and associated allocation changes. If a standard has a requirement for the ERO, who will audit the ERO for compliance? If the ERO does not meet its obligations, can an entity still be found non-compliant, especially on a schedule basis? Wasn’t there an issue of assigning standards to RROs, e.g., the fill-in-the-blank standards? Are there similar issues with assigning requirements to the ERO? Is the ERO a “user, owner or operator” of the BPS under Section 215, e.g., at (b)(1)”… All users, owners and operators of the bulk-power system shall comply with the reliability standards that take effect under this section.” We question how this would work from a compliance perspective.
No
The proposed VSLs for Requirement R1 treats a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO.
No
On Event Selection Criteria, bullet 2, if 25 events cannot be identified then the ERO can go back in time to the previous year. This creates a double jeopardy to R1 of the standard. It also may include irrelevant data if there have been changes from one year to the next in FRO or Bias settings assigned

by the ERO. On Frequency Response Obligation, first paragraph states that "Each Interconnection will establish target contingency protection criteria"; however, the Interconnection is not a decision-making body. Does this really mean the ERO will establish FRO for each Interconnection? The single asterisk note for the table on page 2 states: "It is extremely unlikely that an event elsewhere in the Eastern Interconnection would cause the Florida UFLS special protection scheme to “false trip”.", "Special protection scheme" should be stricken from this sentence, Florida has just a regional difference in its UFLS program.
No
The document does not discuss how the new reliability parameter will affect BAs
On R5, the wording should be changed from “absolute value is at least equal to” to “absolute value is greater than or equal to”
Kirit Shah
Ameren
No
The Frequency Response Measure (FRM) definition should include which Entity(ies) it applies to, similar to the definition of the FRO.
No
R1.While we agree with the concept of the entire requirement and the determination of the Interconnection Frequency Response Obligation, we believe that the accurate measurement of individual BA's FRM has not yet been demonstrated. This requirement should not be part of the standard (even with the additional 12 months in the effective date) until the field trial demonstrates that each BA's FRM can be consistently calculated to a level that will not create false non-compliance to this requirement. While the calculation methodology in FRS Form 1 looks promising, with the A-value and B-value average periods, we believe successful completion of the field trial is prudent. R5. We were not sure if it was intended for this comment question to include Requirement R5, but have decided to include our comments here. While we agree with the requirement of R5, it should not be at the expense of changing the value of L10 in BAL-001, R2, which has been accepted by FERC in Order 693. An accommodation should be made so that any changes to the Frequency Bias Setting according to BAL-003, R5, should not affect the value of L10 used in BAL-001, R2.
No
This is problematic since for a single BA interconnection these could be argued to be appropriate VRFs, but is different for a multiple BA interconnection, where the risk that a single BA would pose to the interconnection would be Lower.
Yes
With the understanding that any suggested changes to the proposed requirements would come with corresponding changes to their measure.
No
It is not clear how the VSL for R1 uses the "Summation of the BA's FRM", when the requirement is BA or RSG specific.
Yes
Yes
Yes
Considering the comments made regarding R5, in question 2, above, which are: R5. While we agree with the requirement of R5, it should not be at the expense of changing the value of L10 in BAL-001, R2, which has been accepted by FERC in Order 693. An accommodation should be made so that any changes to the Frequency Bias Setting according to BAL-003, R5, should not affect the value of L10 used in BAL-001, R2.
Yes
We agree that the spreadsheet is meaningful, but still needs to be vetted through the field trial

process, with improvements made based on experience in its use.
While we are in general support of this standard and its requirements we have concerns regarding the following: •The FRM methodology has not been fully vetted through the field trial process. •Adjusting the minimum of the Frequency Bias Setting, while an appropriate adjustment for AGC control in the ACE equation, should not be at the expense of L10 as used in BAL-001, R2. •The absence of any resource specific frequency response requirement in NERC standards is an issue that must be addressed somewhere. As the resource portfolio of our industry changes(expedited by recent EPA rulemaking), the resources used for traditional primary frequency response are becoming a lower percentage of the mix. New resources and existing resources that have not provided primary frequency response need to be incorporated into the available frequency response discussion
Michael Brytowski
Great River Energy
Yes
No
R1: Including the Reserve Sharing Group (RSG) in the Frequency Response Obligation is outside of the boundaries of a RSG. Where or how would a Frequency Bias be determined for an RSG to determine their Frequency Response Obligation? Although it is apparent that frequency responds during the implementation of reserves, the intention of a RSG is not to share frequency response, but rather to share Reserves. Additionally, if the Frequency Response Obligation is not met by the RSG how are penalties assessed? Should they be assessed to the group as a whole or strictly to the generators that did not meet their individual obligation? R3: Needs to include verbiage for those circumstances when it would be necessary to run AGC out of TLB such as during necessary testing. The BA should have the option to operate out of TLB for a predetermined amount of time if needed when notification and coordination with the RC has been established.
Yes
Yes
No
The VSLs on for Requirement R1 set a previously un-established precedent of relying on the performance of other registered entities to establish the severity level of the violation. This is not appropriate. The VSLs should be rewritten to provide further gradations of the violation severity based on the BA's own performance
No
Under item 3 of the Event Selection Criteria section, the delta F and Point C should be described either in this attachment or the "Frequency Response Standard Background Document". While many in industry may understand what these terms mean, history has a way of getting lost with personnel turnover. Furthermore, this would help ensure that the auditors and industry have a duplicate understanding. In the Frequency Response Obligation section on page 2, several items require more description. Further description of why an N-2 event was chosen for the Contingency Protection Criteria should be provided and which N-2 event was selected so that industry can help validate if the correct MW value was selected. Furthermore, the document should clarify if the Contingency Protection Criteria contains the "safety margin". There is a statement in the paragraph before the table that states it does but then the table lists out a separate 25% "Safety Margin". Thus, it is not clear if the "Safety Margin" is included in the Contingency Protection Criteria value listed in the table or not. "Safety margin" should be changed to "reliability margin". Safety has a specific meaning in the electric industry and its use here is not appropriate. The Base Obligation should be explained. The explanation should include its purpose and origin.
No

We can find no document titled “BAL-003-1 Background Document”. We assume this question is referring to the “Frequency Response Standard Background Document” dated October 2011. We do not believe the document provides sufficient clarity. No explanation is provided for why RSG was added to Requirement R1. There are typos contained in the document. On page 6 in NIA, the A should be in subscript. On page 7 in bullet 4 in the first sentence, “The” should be in lowercase
Yes
Yes
The Data Retention section requires the BA to retain data or evidence for up to four years. No data that exceeds the audit cycle should be required to be retained. The audit cycle is three years.
Si Truc PHAN
Hydro-Quebec TransEnergie
No
The FRM and FRO definitions should precise that it is expressed in MW/0.1Hz. As for the Frequency Bias Setting definition, as written, would apply only to a multiple BA Interconnection. In a single BA Interconnection, the Frequency Bias translates the frequency error into a MW value that must be dispatched to bring back Frequency to desired value. Since Tie Lines are not controlled through AGC, there is no response withdrawal issue
No
The objective of R2 is that all BA’s implement their new Bias Setting at the same time, based on the previous year’s data, so that control stays the most effective throughout the Interconnection (Tie-Line Bias). In addition, the new Bias will be in effect all year long. The process is quite simple and straightforward for a fixed Bias Setting. As for Variable Bias Setting, this process is not applicable before the fact since the Bias equation can depend on real-time values that are not known in advance. In addition, the simultaneous Bias implementation is not an issue for a single BA Interconnection. Therefore, we suggest that Requirement 2 applies only to Fixed Bias Setting.
Yes
Yes
Yes
No
The Event Selection Criteria should be modified for the Quebec Interconnection. In Table 1, the change in frequency (Delta f) used for Quebec’s Event Selection Criteria should be 0,3Hz (from point “A” to point “C”) and must last for at least 7 seconds so that we don’t measure AGC action. In addition, a criterion should be added by saying that events that recovered within the 20-52 second average period for point “B” should be excluded from analysis.
Yes
No
The methodology proposed to compute the Minimum Frequency Bias Setting (in MW/0,1Hz) could be adverse for the Quebec Interconnection. Hydro-Quebec uses a variable Bias that is calculated based upon which generator is online and it’s droop setting. Under light load condition, we might have a Bias setting that would be under (in absolute value) than the FRM which is the median value, even though the Bias setting would reflect the grid’s frequency response. This method, as proposed, would mandate us to have a larger Bias that what is really needed. Unlike Eastern Interconnection, we are not over biased. By implementing this new methodology, it would make us over biased. Having a too large Bias could lead to system instability, based on the results of studies from our control specialists. The Minimum Frequency Bias Setting should take into account the wide load span that we can face. For the variable bias, we could express the Minimum Frequency Bias Setting as a function of monthly peak loads, and remove the Natural Frequency Response term. In addition, there is a gap between

Attachment B and the text in R5. See comment 10 for explanation.
Yes
There is a gap between R5, Attachment B and Form 1 next year's Bias Setting equation. Requirement 5 states that the average Frequency Bias shall be at least equal to the minimum percentage of BA's peak load or generation. In Attachment B and Form 1, the required Frequency Bias is the maximum (absolute value) between FRM, FRO and peak load+peak gen /2. As stated in comment 8, Hydro-Quebec is not in favor of adding the FRM into the minimum Frequency Bias requirement, at least for Variable Bias Setting. Due to a good frequency response, this would lead us to have a too high AGC Bias and causing potential reliability problems. In other words, this would lead us to be over-biased, which would not be a good thing for a single BA Interconnection. For a Single BA Interconnection, performance measure CPS1 tracks the performance of the variable Bias, which is enough to ensure reliability through the Interconnection. Hydro-Quebec therefore recommends the drafting team that Requirement 5 only applies to Multiple BA Interconnection. Another option is that Minimum Frequency Bias Setting could be expressed as a function of monthly peak loads, and remove the Natural Frequency Response term in the minimum Bias setting equation.
Greg Rowland
Duke Energy
No
Duke Energy would suggest removing "usually" from the Frequency Bias Setting definition, as the value in the ACE equation must be in terms of MW/0.1Hz in order for ACE to be correctly calculated. We apologize for missing this point in the last round of comments. Though some would argue that the last phrase of the definition is more of an explanation of a function rather than a definition, we support keeping the phrase inserted, as it should be recognized that the intent is to account for the frequency response contribution AND keep the FBS slightly larger (in magnitude) than the average estimated response, to better discourage withdrawal, which was also recognized by Nathan Cohn. Should the definition for Frequency Response Measure (FRM) be specific to the BA, similar to the definition for Frequency Response Obligation (FRO)?
No
Duke Energy supports the concept of a group of BAs forming a group to share in Frequency Response however it should be clear that it is an option. We feel that the utilization of the term, "Reserve Sharing Group", is not consistent with the definition in the NERC Glossary of Terms which is specific to sharing of contingency reserves, and should be replaced with a new term, such as "Frequency Response Sharing Group". R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in "Tie Line Bias" mode. Though comments are provided below on the Attachments, Duke Energy believes that all NERC Reliability Standards' requirements must reside within the standard itself (which is vetted by the Industry and subject to FERC approval), and not within Attachments that may be revised without Industry review and approval. As noted below and in prior comments, given the secondary control implications of changing the minimum Frequency Bias Setting (FBS), Duke Energy believes that subsequent revisions to the minimum FBS should be vetted through the Standards process. Duke Energy would suggest moving the details of the minimum FBS for each Interconnection into the Standard, and having the implementation plan include annual submittal of a revised minimum FBS based upon the methodology presented in Attachment B for ballot approval by the Industry.
Yes
No
See comments in Question 2 regarding utilization of the term "Reserve Sharing Group".
No
See comments in Question 2 regarding utilization of the term "Reserve Sharing Group".
No
On page 3 of the document it states "For a multiple Balancing Authority Interconnection, the Interconnection Frequency Response Obligation is allocated based upon either the Balancing Authority Peak Demand or peak generation", however, the initial FRO allocation equation shows that the BA

allocation is based upon the sum of the Projected BA Peak Load plus installed capacity, times the Interconnection FRO, and divided by the sum of the Projected Interconnection Peak Load plus Interconnection installed capacity. Is the statement in quotes correct, or is the allocation equation correct? In addition, the equation in Attachment A referencing "installed capacity" conflicts with the equation in the BAL-003-1 Background Document entitled "Frequency Response Standard Background Document" where "Peak Gen" is used. In summary, is the FRO allocation based upon an equation which a) sums the Projected BA Peak Load plus peak generation, b) sums the Projected BA Peak Load plus installed capacity, or c) uses either Projected BA Peak Load OR peak generation? All three options are currently represented in the documentation. Calculation of the FRO for the Eastern Interconnection: Duke Energy agrees with the criteria suggested for the event to be protected (4500 MW), and at this time also agrees with the "compromise" low limit of 59.6 Hz. However, knowing that another Standard is under development which may require hourly assessment of available "frequency responsive reserves", we are trying to determine what impact the choice of this methodology will have on the amount of frequency responsive reserves the industry will have to maintain – enough to cover frequency swings that only occasionally reach down to perhaps 59.9 Hz as we see on the Interconnection today (essentially the allocated FRO for a 0.1Hz deviation), enough to cover a 4500 MW loss, or whatever we deem appropriate as long as we are compliant to the FRM? We recognize that the Standard Drafting Team cannot answer this question, as the Standard under development is not within the scope of this team, however our comment is meant to illustrate the point that similar to our response to question 8, it should be recognized that elements of this Standard are tightly coupled to other current and potential Standards, and the impacts must be considered by the Industry.

No

Please see our comments to Question 6. In addition, Duke Energy disagrees with the statement on page 9 that Attachment B will "ensure there is no negative impact on other Standards" – please see our response to Question 8 for additional information.

No

Duke Energy suggests that the SDT consider a term other than "Initial' in the title for Table 1. We suggest "Proposed Frequency Bias Setting" for Table 1. Notwithstanding our suggestion that the criteria/requirements of the minimum FBS in the Attachment be incorporated into the Standard, Duke Energy has the following concerns with what is proposed: As cited in our comments to Question 8 in the last posting (extensive, so not repeated here), the secondary control measures of CPS1, CPS2 and the draft Balancing Authority ACE Limit (BAAL) are tightly coupled to the Frequency Bias Setting (FBS), and a reduction of the FBS will impact the secondary control requirements placed upon the BA. Noted in our response to Question 7 above, the statement on page 9 in the "BAL-003-1 Background Document"is not correct in stating that Attachment B will "ensure there is no negative impact on other Standards". The gradual reduction of the FBS will proportionally tighten the secondary control limits for each Balancing Authority. Even if the "natural" Frequency Response in the Eastern Interconnection remains unchanged for the next several years, under the process described allowing the ERO to annually adjust the minimum FBS for the Interconnection, the FBS will eventually be reduced to a value approximately 10% above the calculated response in magnitude, cutting the current CPS1, CPS2 and BAAL limits in the Eastern Interconnection on average by more than half. The current FBS for the Eastern Interconnection is approximately minus 6500 MW/0.1Hz, estimated "natural" Frequency Response is perhaps around minus 2400 MW/0.1Hz. Unlike CPS1 and BAAL where the measures are based upon the FBS of the BA only, CPS2 (dependent upon the FBS of the BA and the Interconnection) will be significantly limiting to the degree that no change in a BA's own Frequency Response could significantly change its CPS2 limit if the Interconnection FBS drops over time as indicated. At least under CPS1 and the draft BAAL, the BA would have an option of improving its Frequency Response, allowing it to increase its FBS and proportionally the CPS1 and BAAL bounds using the FBS. Conclusion from our last comments submitted: Duke Energy does not believe there is a reliability need pushing the industry to tighten secondary control to the degree discussed above simply as a result of reducing the Frequency Bias Setting. If the calculated Frequency Response of the Interconnection stayed at its current level, what would be the justification for tightening the secondary control requirements of CPS1, CPS2 and the proposed BAAL? Duke Energy supports taking more of the error out of the ACE equation by having the FBS closer to the estimated Frequency Response of the Balancing Authority, however, Duke Energy does not believe the result should be a significant increase in secondary control costs to meet the CPS1, CPS2, or draft BAAL requirements. Duke Energy understands the position placed upon this Standard Drafting Team- the secondary

control and reserve requirements are not under the scope of the team, however, proper consideration has not been given in Attachment B to the impact lowering the FBS will have on the industry in terms of the requirements placed upon the BA for secondary control and reserve requirements – especially for meeting CPS2. The research discussed in our comments to the last posting support that reducing the FBS while under CPS1 and the draft BAAL may be achievable, however a CPS2 bound cut potentially in half or lower will place unreasonable bounds on a BA, requiring control actions even when the BA may be operating in support of the Interconnection frequency. Given the significant impacts discussed, Duke Energy believes that additional provisions must be in place for the Industry to approve each subsequent revision to the calculation of the minimum Frequency Bias Setting, rather than leave it as a decision made only by the ERO.

Yes

Duke Energy appreciates the significant work of the Standard Drafting Team in putting together the draft Standard and extensive supporting documentation. Upon further consideration of the comments above, Duke Energy has concluded that the work of this Standard Drafting Team and that of the Balancing Authority Reliability-Based Control Standard Drafting Team under Project 2010-14 developing the Balancing Authority ACE Limit to replace CPS2, need to presented to the Industry as a package – there is too much at stake to have one Standard impact other Standards to this degree. Done in a vacuum the Industry is faced with the possibility of secondary control bounds being cut in half or more, though there is no reliability need driving such performance requirements. Thank you.

ISO/RTO Council Standards Review Committee

Al DiCaprio

No

(1) In our previous comments, we suggested to drop the definitions for the terms FRM and FRO in favor of providing the needed wording in the standard itself to take care of the specific details. The SDT did not adopt our suggestion with the reason that these definitions will be used by other standards in the future. That's fair enough. However, the FRM definition: "The median of all the Frequency Response observations reported annually on FRS Form 1" is problematic. It references an FRS Form 1 which is not included in the definition itself but is in fact an Attachment to a standard. In the current NERC Glossary of Terms, there is no such precedence that a definition must rely on the requirements or details in a standard for completeness. Also, it is very cumbersome that when changes are made to FRS Form 1, the definition must be posted for industry comment and balloting, and vice versa. When other standards begin using the term, there will be cross references between standards. This further complicates the update/approval process without any appreciable value. Once again, we strongly urge the SDT to consider dropping these definitions, and have the details fully specified in the standard body itself. This will eliminate that cross reference issue. After all, the definition for FRM is a simple sentence and does not provide any clarity or specific details that cannot be presented by using appropriate wording in a requirement. (2) The definition of Frequency Bias Setting, if retained, should focus on what it is. Balancing Authorities do not supply energy. We suggest to revise it to: Frequency Bias Setting A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's (BA's) Area Control Error (ACE) equation to approximate the expected natural response provided by the assets within the respective Balancing Authority's area.

No

General Comments The SRC offers the following general comment with regard to the SDT's proposed revisions: Gerry Cauley's Results based initiative calls for requirements that focus on performance (i.e. WHAT must be accomplished NOT on WHY it is required or HOW it should be accomplished). The SRC has found that such explanatory statements as the SDT is proposing lead to ambiguities and confusion in the compliance application. Compliance Enforcement agents must consider not just the results but must decide if the action was taken for the given reason. To avoid such confusion, the Results based approach uses reference documents to address such background material while leaving the requirement as a direct mandate. The SRC notes: • All NERC Reliability Standards' requirements must reside within the standard itself (which is vetted by the Industry and subject to FERC approval). • Data requirements are better handled through NERC's Rules of Procedure Section 1600 than by mandating that ad hoc Forms be submitted. • Definitions should be generic, and should be self-contained (i.e. should not reference an external document). • The decisions regarding alternative

methodologies should be decided by the Industry not by the SDT. The SDT should make its case and ask the Industry for its approval. Regarding Order 693 directives, the SRC notes that there are three directives as follows: (1) To include Levels of Non-Compliance; (2) To determine the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other requirements of the Reliability Standard are being met, and to modify Measure M1 based on that determination and (3) To define the necessary amount of Frequency Response needed for Reliable Operation for each balancing authority with methods of obtaining and measuring that the frequency response is achieved. The SRC suggests that Directive 2 be handled directly as a mandate that the ERO conduct a fixed number of Frequency Response Surveys for randomly selected events. Discussion of the number and the methodology can be explained in a reference document and leave the specifics to the requirement. Directive 3 is critical to the Industry as it relates to who is the Applicable Entity. The SDT addresses Directive 3 by mandating Balancing Authorities meet an objective. The directive is to define that Objective, but there is no requirement associated with that Objective. There is an attachment and there are discussions of what "may" be done, but there is no requirement in the Standard itself. The reference to the BA as the provider of Frequency Response (i.e. Primary Control response) runs counter to other FERC directives that mandate obligated entities be able to self-serve or to interchange provision of services. In this case the BA per se has no assets and cannot self-serve, moreover the primary response service providers have no obligations to provide the service, thus the BA potentially could face a situation where there is no physical service to be purchased but there is a federally mandated standard to comply with. The idea of creating a Primary Response Market as some have proposed does not work without an obligation on some entity to physically provide that service. One final note, the SRC points out that the ACE is an error signal used to drive secondary response; it is not a signal to drive primary response. Thus the use of the Frequency Bias setting is not for control, it is for "adjusting" the error measure that is analyzed after the fact. This standard needs: • a requirement on the ERO to compute the Obligation on each Interconnection • a requirement on the ERO to conduct Frequency Response surveys (note the SRC does not support this requirement but believes that it is needed to meet the FERC directive) • a requirement on energy supply assets (both generation and load) to provide primary response (as a function of the Interconnection obligation in the first bullet) The above will allow NERC to comply with the FERC directives in a fashion consistent with the processes and procedures approved by FERC. Specific recommendations: The SRC proposes that R1 be deleted based on the facts that: • It imposes an obligation on an entity that has no capability to comply • There is an internal conflict with imposing penalties on a deterministic basis (compliance with a fixed set of events) for a statistical service (primary response is a function of the assets operating state and not a fixed service of the asset). In any case, all of the words after FRO should be deleted. The words are not needed for the requirement and if left in can become a source of contention between auditors and registered entities. R3 – delete the added phrase "mode to effectively coordinate control". The phrase "would have an Adverse Impact on the BA's area" needs further discussion. Who makes the decision that operating on AGC will have adverse impact must be defined. R5 – delete the phrase "In order to ensure control response". Such phrases can be needless causes of debate. If a BA uses one of the bulleted methods but does not get "adequate response" then is the BA non-compliant? What is "adequate response"? Who decides if the response is adequate?
Yes
No
M1: The measure should not be tied to a specific Form. If a BA has the evidence but does not provide it on a given Form, how is the reliability of the Power System impacted? The Form may be the format of choice but it should not be an implied requirement. M4: This measure does not read quite right. Something seems to be missing in the part that says: "…showing when Overlap Regulation Service is provided including Frequency Bias Setting calculation to demonstrate compliance with Requirement R4." This part might have read something like: "…showing that when it performed Overlap Regulation Service, it modified its Frequency Bias Setting in its ACE calculation or it calculated the Frequency Bias Setting meeting the conditions specified in Requirement R4."
Yes
We do not have any issues with the VSLs, but wonder if the wording for R1 should have been "…Reserve Sharing Group's…". Alternatively, the wording after "interconnection's FRO" could be revised to: "…and the Balancing Authority's or the Reserve Sharing Group's FRM was…"

No
Despite the SDT's good faith effort to convert the previous Attachment A into two separate documents (Attachments A and B), the modified Attachment A is problematic. As many commenters indicated, the previous Attachment A, other than the section providing guidance on event selection, appears to be explanatory, contextual, and instructional in content. These aspects are important, but do not rise up to the level of requirements to drive reliability performance/outcome. Attachment A should include only the event selection process and calculations associated with the requirements, including an explanation of what is necessary if variable Frequency Bias Settings are implemented. If other "requirements" need to be specified, such as the reporting time frame stipulated on P. 3 of Attachment A, they should be moved to the standard itself but not imbedded in an attachment. We suggest that the SDT first determine if the materials in the revised Attachment A (and Attachment B) are "Guideline" or Technical Background", or are they "requirements". If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as-written Attachment A is a mix bag as it on the one hand describes the ERO's process for supporting the Frequency Response Standard (FRS), in other words, the method and criteria it uses to calculate the frequency bias settings and the FRM, and on the other hand the BA's obligations to support this process. We strongly disagree that the latter requirements be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which is not held responsible for complying with the proposed method. Further, there are no measures provided for the requirements stipulated/imbedded in Attachment A so how can the Responsible Entity (BA, in this case) be assessed for compliance? We suggest the SDT move those requirements on the BA to the main standard, and turn Attachment A into an appendix describing the calculation process. An appendix is not regarded as a mandatory requirement. Similar comments apply to Attachment B. Moreover, if the Attachments are to be integral to the standards, the terminology "may" must be replaced with "shall". Finally, the two Attachments are listed in Section F – Associated Documents. This Section is generally used to list reference documents that are NOT standard requirements. We suggest the SDT review and revise this listing depending on its final determination of the status of the two Attachments (or their revisions, where appropriate).
We do not have an opinion on whether or not the Background Document provides sufficient clarity to the development of the standard. We do, however, suggest that the SDT consider our comments in Q6, above, and move some of the information from Attachments A and B to or combine with the Background Document, to the Background Document to provide all the technical basis and background behind the elements stipulated in the requirements.
No
Please see our comments under Q6. In brief, we do not agree with including a process description type of document as part of the standard requirement. Process description should be regarded guideline document and not a part of the standard requirement.
No
If we are not mistaken, Form 2 is added as the last sheet in the Form 1 spreadsheet file. Apart from that, however, there are other sheets added to the previous Form 1. But this Comment form makes no mention of the changes, nor is there a question in the Comment Form asking whether the additional information should be requested. We believe this is a significant change to the standard and many commenters may have missed the opportunity to comment on it. Compared to the previous version, Form 1 has been significantly expanded to include not only additional sheets but much more comprehensive data requirements even on the Data Entry sheet itself. This makes data submission a very time-consuming task but the justification for requiring detailed data entry has not been provided. We question the need for such expansion on data entry requirements. We have yet to see the reason for expanding Form 1 in assisting a BA to provide the data needed to comply with the standard, hence we do not see how adding a Form 2 can help in that regard. We suggest the SDT to keep data requirements to only what is minimally needed to support the FRS reporting process. Where the SDT deems additional data entry sheets to be necessary, it should provide the rationale for expanding from a 2 sheet form into a multiple sheet form for additional data collection. Where the SDT deems the additional data sheet or information not necessary to support FRS reporting, then we suggest the SDT to hide those pages not required for the standard so as to avoid confusion, and/or to remove those analytical pages not directly used in the standard.
Finally, we ask the SDT to clarify what the primary purpose of this standard is. If it is to respond to Order 693 then the standard misses the point of defining how often to run Frequency Response

Surveys; it does not crisply define the “Interconnection” obligations. If the SDT wants to focus on AGC (which it seems to try to do) then the focus should be on the equations and variables and not on the response performance. If the SDT does want to focus on performance then the issue of who is the default provider must be addressed. As the SRC has noted previously, BAs do not own any generating facilities or service providers. To create standards that apply to entities that are completely dependent on other functional entities (facility owners or service providers) to comply with a requirement is simply improper. The Industry structure has changed but these requirements have not and still assume old industry relationships between BAs and GOs. This issue of who needs to be held responsible for performing the required reliability tasks and services/products must be explicitly cited in the standards and posted for the industry to debate and decide.
ACES Power Marketing Standards Collaborators
Jason L. Marshall
Yes
No
Requirement 1 should not apply to a Reserve Sharing Group. Reserve Sharing Groups (RSG) are designed to share Contingency Reserves and/or Operating Reserves not Frequency Response. While these reserves may be frequency responsive, they are not being shared for the purpose of expanding frequency response. Furthermore, while reserve sharing groups may calculate a joint ACE by summing its individual BA ACE values, RSGs do not have a Frequency Bias Setting which is necessary to assess a Frequency Response Obligation.
Yes
Yes
No
The VSLs on for Requirement R1 set a previously un-established precedent of relying on the performance of other registered entities to establish the severity level of the violation. This is not appropriate. The VSLs should be rewritten to provide further gradations of the violation severity based on the BA’s own performance.
No
Under item 3 of the Event Selection Criteria section, the delta F and Point C should be described either in this attachment or the “Frequency Response Standard Background Document”. While many in industry may understand what these terms mean, history has a way of getting lost with personnel turnover. Furthermore, this would help ensure that the auditors and industry have a duplicate understanding. In the Frequency Response Obligation section on page 2, several items require more description. Further description of why an N-2 event was chosen for the Contingency Protection Criteria should be provided and which N-2 event was selected so that industry can help validate if the correct MW value was selected. Furthermore, the document should clarify if the Contingency Protection Criteria contains the “safety margin”. There is a statement in the paragraph before the table that states it does but then the table lists out a separate 25% “Safety Margin”. Thus, it is not clear if the “Safety Margin” is included in the Contingency Protection Criteria value listed in the table or not. “Safety margin” should be changed to “reliability margin”. Safety has a specific meaning in the electric industry and its use here is not appropriate. The Base Obligation should be explained. The explanation should include its purpose and origin.
No
We can find no document titled “BAL-003-1 Background Document”. We assume this question is referring to the “Frequency Response Standard Background Document” dated October 2011. We do not believe the document provides sufficient clarity. No explanation is provided for why RSG was added to Requirement R1. There are typos contained in the document. On page 6 in NIA, the A should be in subscript. On page 7 in bullet 4 in the first sentence, “The” should be in lowercase.
Yes

The Data Retention section requires the BA to retain data or evidence for up to four years. No data that exceeds the audit cycle should be required to be retained. The audit cycle is three years.
Robert Blohm
Keen Resources Asia Ltd.
No
In the Standard, the definition of Frequency Response Measure (FRM) is statistically wrong. The median is an improper statistical measure of Frequency Response because --it truncates large excursions which are the specific subject of Frequency Response control, not normal operating frequency errors which are self-correcting and are the subject of CPM control; --it is non-linear; and therefore --it is non-summable over the interconnection; in other words, the individual BA medians don't add up to the interconnection median, in complete incompatibility with CPM control which requires summability of BA performances into the interconnection's performance. Moreover, it is mathematically impossible to sum the medians of the BAs in a Reserve Sharing Group (RSG) into the RSG's median: in other words, the RSG's median cannot represent the sum of the medians of its members. The last paragraph on page 5 of the Background Document is patently wrong, invented, and supported in no probability & statistics literature whatsoever. As a practicing statistician, I hereby give testimony to the utter falsehood of the statement that "In general, statisticians use the median as the best measure of central tendency when a population has outliers." (See http://www.robertblohm.com/BestStatistic.doc for an explanation of "best statistic" which is a highly technical and central topic in modern probability theory and statistics.) Also, "outliers" are falsely and rhetorically claimed to be "noise" when in fact they are the "events" that are the specific subject of Frequency Response. It is well known that they do not "fit" a normal distribution. They are distinct from the normal operating errors that are the subject of CPM control. The paragraph does correctly conclude that the linear regression more accurately incorporates outliers than the median does, although the paragraph uses rhetoric by calling this improvement "skew" as if it is distortionary when, in fact, the median distorts the reality.
Yes
Yes
Yes
Yes
No
The sample pre-selection described in Attachment A, Event Selection, Criteria 2 & 7, violates the fundamental statistical procedure of unbiased sampling. A population is governed by a single "process" which, when stationary, is represented by a fixed probability distribution. In this case the population is several years of events (which are the subject of Frequency Response), not of normal operating control errors which are the subject of CPM control. A sample is governed by a single process that approximates the process governing the population as the sample gets larger, in this case if it includes several years of data. Samples are measured "as they come", no triage/filtering allowed, and they are called "stratified" when their distribution approximates the population distribution. Unlike normal operating errors, samples of events are not evenly distributed over a year. The attempt in criteria 2 & 7 to pre-select only certain events, and not others, in such a way that the selected events occur evenly throughout the year, is papently wrong because it is trying to "fit" events into a process (even distribution over time) that does not govern events, but that instead governs normal operating errors that are the subject of CPM control, not of this Frequency Response standard. In other words, criteria 2 & 7 confuse Frequency Response with CPM, and events with normal operating errors. The result is a false, biased sample which destroys the integrity of this standard. Paragraph 4 on page 5 of the Background Document, on the other hand, provides a statistically correct description of event selection without sample pre-selection and should followed instead of the erroneous criteria 2 & 7 in Attachment A.
Yes
Paragraph 4 on page 5 of the Background Document provides a statistically correct description of

event selection without sample pre-selection and should followed instead of the erroneous criteria 2 & 7 in Attachment A. The risk-based approach to determining FRM, that the Background Document mentions in paragraph 4 of page 4 is being evaluated by the drafting team for application in this standard, should be considered for deployment as soon as possible to replace the administered method currently proposed in this standard, because the administered method lacks any technical justification. No such justification was ever attempted in the development of this standard. The administrative method of determining FRM is therefore but a highly dubious "quick fix" until the risk-based method is evaluated and implemented. The administrative method is in fact perverse because it discourages BAs from reducing their contribution to frequency error by refusing to reduce the BA's FRO accordingly, and because it encourages BAs to contribute to frequency error without increasing their FRO.

Yes

Yes

As a qualified professional statistician I attest that this standard commits two violations of fundamental statistical best practices: use of a median, and biased sample-preselection, as detailed in my answers to questions 1 and 6.

Sacramento Municipal Utility District (SMUD)

Joe Tarantino

No

As drafted, requirement R1 requires Balancing Authorities or Reserve Sharing Groups (RSGs) to achieve an annual Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO). As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifying this concept and possibly including an example in the background document to help explain how this would work. As drafted, in requirement R3, each Balancing Authority not receiving Overlap Regulation Service to operate its AGC in Tie Line Bias mode… unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area. There may be occasions in which an entity needs to perform testing or other instances where it is necessary or desirable to operate in a mode other than Tie Line Bias that does not qualify as an Adverse Reliability Impact, but never the less is necessary or desired. Recommend including language that would permit operation other than Tie Line Bias mode provided the Reliability Coordinator was notified. We seek clarification from the drafting team as to whether or not there will be any conflicts between proposed Requirement R3 and the requirements of FERC-approved regional reliability standard BAL-004-WECC-1 – Automatic Time Error Correction.

No

The standard is unclear as to if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of Frequency Response expected on a total basis. Balancing Authorities need to know for how many tenths of a hertz they are to respond so they can determine how to plan to meet this requirement. The documents do not appear to provide any boundary on the maximum amount of Frequency Response that a BA will provide, i.e. it is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz or in the Western Interconnection that causes the frequency to drop to less than 59.5 Hz, or if that event is excluded from the list used to calculate the Balancing Authorities' response or is it included with an expectation that it counts the same as any other event. Without a clear statement of what is expected, including whether there is a limit on that expectation or not, it is unclear what is expected of the Balancing Authorities.

No
In addition to the requirements, reducing frequency bias obligation results in generation tripping closer to the set point. It seems that Lowering the Minimum Frequency Bias Setting from 1% to .8% will result in a lower response, which in turn will lower the natural frequency response. Over time it seems this pattern would lead to poorer response.
As a final comment we believe there needs to have consideration for a coordinated response rather than a setting threshold. Coordinated response thresholds values will provide for a desired and anticipated frequency response.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Consideration of Comments

Project 2007-12 Frequency Response

The Frequency Response Drafting Team thanks all commenters who submitted comments on the first formal posting for Project 2007-12 Frequency Response. This standard was posted for a 45-day public comment period from October 25, 2011 through December 9, 2011. Stakeholders were asked to provide feedback on the standard and associated documents through a special electronic comment form. There were 43 sets of comments, including comments from approximately 133 different people from approximately 86 companies representing all 10 of the Industry Segments as shown in the table on the following pages.

Based on the comments received and the drafting team's discussion of those comments, the drafting team made the following changes to the proposed Standard, definitions, and associated documents:

- Modified the definition for Frequency Response Measure (FRM)
- Modified the definition of Frequency Bias Setting
- Removed the references to Reserve Sharing Groups (RSGs) and replaced them with Frequency Response Sharing Group
- Created a definition for Frequency Response Sharing Group (FRSG)
- Modified Requirement R2 to provide clarity and incorporate Requirement R5
- Created a new Requirement R3 for entities using variable Frequency Bias
- Removed the requirement for operating in Tie Line Bias mode as duplicative of other requirements in other standards
- Removed Requirement R5 and combined it into revised Requirement R2 and new Requirement R3
- Modified Attachment A to provide additional clarity
- Created a Procedure to provide instructions for the ERO to follow in supporting the standard
- Made conforming changes to Measures, Evidence Retention, and VSLs to align with language in the revised requirements
- Re-wrote the Background Document to incorporate additional language for justification of requirements and provide additional clarity
- The SDT is now using the method detailed in the Frequency Response Initiative Report dated September 30, 2012 to calculate the Interconnection Frequency Response Obligation.

There were some minority issues that the team was unable to resolve, including the following:

- A few stakeholders questioned a Requirement for the BA to provide Frequency Response when they typically do not own generation. The SDT explained that the NERC Functional Model and FERC cited the BA as the responsible party for providing Frequency Response and that this was outside the scope of the industry approved SAR. The SDT also stated that there were several different methods available to the BA to provide Frequency Response and that the SDT had included these in the Background Document. The SDT further stated that any entity could submit a SAR addressing this issue to the SC for consideration and that the SDT supported this option.
- A couple of the commenters felt that the median was not the proper method to use for the calculation of the FRM and that the RSG was not fully explained. The SDT stated that the statisticians note that the median is a more accurate measure of central tendency than the mean when analyzing a sample that is small and or where scores vary widely. This is the case when estimating a BA's Frequency Response. The SDT also noted that while the median was not perfect, the median approaches a BA's typical performance after 15-20 observations and that more observations give a higher confidence in the estimate of the BA's performance.
- Some commenters disagreed with proceeding through development of the standard before the proposed measures have been thoroughly field tested. The SDT stated that it was responding to FERC Directives from Order 693 as well as the FERC Order dated March 18, 2010 which mandated development of a standard addressing the Order 693 directives within six months. FERC later granted an extension to provide a standard addressing these issues by the end of May 2012.

All comments submitted may be reviewed in their original format on the standard's project page:

http://www.nerc.com/filez/standards/Frequency_Response.html

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process! If you feel there has been an error or omission, you can contact the Vice President and Director of Standards, Mark Lauby, at 404-446-2560 or at mark.lauby@nerc.net. In addition, there is a NERC Reliability Standards Appeals Process.[1]

[1] The appeals process is in the Standard Processes Manual: http://www.nerc.com/files/Appendix_3A_StandardsProcessesManual_20120131.pdf

Index to Questions, Comments, and Responses

The Industry Segments are:

1 — Transmission Owners
2 — RTOs, ISOs
3 — Load-serving Entities
4 — Transmission-dependent Utilities
5 — Electric Generators
6 — Electricity Brokers, Aggregators, and Marketers
7 — Large Electricity End Users
8 — Small Electricity End Users
9 — Federal, State, Provincial Regulatory or other Government Entities
10 — Regional Reliability Organizations, Regional Entities

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
1.	Group	Chris Higgins	Bonneville Power Administration	X		X		X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	James Murphey	BPA	WECC	1
2.	Bart McManus	BPA	WECC	1
3.	David Kirsch	BPA	WECC	1

2.	Group	Jesus Sammy Alcaraz	Imperial Irrigation District	X		X	X	X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	Tino Zaragoza	IID	WECC	1
2.	Jesus Sammy Alcaraz	IID	WECC	3
3.	Diana Torres	IID	WECC	4
4.	Marcela Caballero	IID	WECC	5

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10
5. Cathy Bretz	IID	WECC 6										
3. Group	Guy Zito	Northeast Power Coordinating Council										X

	Additional Member	Additional Organization	Region	Segment Selection
1.	Alan Adamson	New York State Reliability Council, LLC	NPCC	10
2.	Greg Campoli	New York Independent System Operator	NPCC	2
3.	Sylvain Clermont	Hydro-Quebec TransEnergie	NPCC	1
4.	Chris de Graffenried	Consolidated Edison Co. of New York, Inc.	NPCC	1
5.	Gerry Dunbar	Northeast Power Coordinating Council	NPCC	10
6.	Brian Evans-Mongeon	Utility Services	NPCC	8
7.	Mike Garton	Dominion Resources Services, Inc.	NPCC	5
8.	Kathleen Goodman	ISO - New England	NPCC	2
9.	Chantel Haswell	FPL Group, Inc.	NPCC	5
10.	David Kiguel	Nydro One Networks Inc.	NPCC	1
11.	Michael R. Lombardi	Northeast Utilities	NPCC	1
12.	Randy MacDonald	New Brunswick Power Transmission	NPCC	9
13.	Bruce Metruck	New York Power Authority	NPCC	6
14.	Lee Pedowicz	Northeast Power Coordinating Council	NPCC	10
15.	Robert Pellegrini	The United Illuminating Company	NPCC	1
16.	Si-Truc Phan	Hydro-Quebec TransEnergie	NPCC	1
17.	David Ramkalawan	Ontario Power Generation, Inc.	NPCC	5
18.	Saurabh Saksena	National Grid	NPCC	1
19.	Michael Schiavone	National Grid	NPCC	1
20.	Wayne Sipperly	New York Power Authority	NPCC	5
21.	Tina Teng	Independent Electricity System Operator	NPCC	2
22.	Donald Weaver	Neqw Brunswick System Operator	NPCC	2
23.	Ben Wu	Orange and Rockland Utilities	NPCC	1
24.	Peter Yost	Consolidated Edison Co. of New York, Inc.	NPCC	3

4.	Group	Will Smith	MRO NSRF										X

	Additional Member	Additional Organization	Region	Segment Selection
1.	MAHMOOD SAFI	OPPD	MRO	1, 3, 5, 6
2.	CHUCK LAWRENCE	ATC	MRO	1

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10

3.	TOM WEBB	WPS	MRO	3, 4, 5, 6
4.	JODI JENSON	WAPA	MRO	6
5.	KEN GOLDSMITH	ALTW	MRO	4
6.	ALICE IRELAND	NSP (XCEL)	MRO	1, 3, 5, 6
7.	DAVE RUDOLPH	BEPC	MRO	1, 3, 5, 6
8.	ERIC RUSKAMP	LES	MRO	1, 3, 5, 6
9.	JOE DEPOORTER	MGE	MRO	3, 4, 5, 6
10.	SCOTT NICKELS	RPU	MRO	4
11.	TERRY HARBOUR	MEC	MRO	1, 3, 5, 6
12.	MARIE KNOX	MISO	MRO	2
13.	LEE KITTELSON	OTP	MRO	1, 3, 4, 5
14.	SCOTT BOS	MPW	MRO	1, 3, 5, 6
15.	TONY EDDLEMAN	NPPD	MRO	1, 3, 5
16.	MIKE BRYTOWSKI	GRE	MRO	1, 3, 5, 6
17.	RICHARD BURT	MPC	MRO	1, 3, 5, 6

5.	Group	Gerald Beckerle	SERC OC Standards Review Group	X		X							

	Additional Member	Additional Organization	Region	Segment Selection
1.	Andy Burch	EEI	SERC	5
2.	Bob Dalrymple	TVA	SERC	1, 3, 5, 6
3.	Brad Gordon	PJM	SERC	2
4.	Vicky Budreau	SCPSA	SERC	1, 3, 5, 6
5.	Sam Holeman	Duke	SERC	6, 1, 3, 5
6.	Cindy Martin	Southern Co	SERC	1, 5
7.	Scott Brame	NCEMC	SERC	1, 3, 4, 5
8.	Wayne Van Liere	LGE-KU	SERC	3
9.	Larry Akens	TVA	SERC	1, 3, 5, 6
10.	John Troha	SERC Reliability Corp.	SERC	10

6.	Group	Robert Rhodes	SPP Standards Review Group		X								

	Additional Member	Additional Organization	Region	Segment Selection
1.	John Allen	City Utilities of Springfield	SPP	1, 3, 5
2.	David Dockery	Assocoated Electric Cooperative	SERC	1, 3, 5

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10
3. Lisa Duffey	Cleco Power	SPP 1, 3, 5										
4. Jonathan Hayes	SPP	SPP 2										
5. Steve Haun	Lincoln Electric System	MRO 1, 3, 5										
6. Tony McMurtry	Lafayette Utilities System	SPP NA										
7. Dave Milliam	Kansas City Power & Light	SPP 1, 3, 5, 6										
8. Terri Pyle	Oklahoma Gas & Electric	SPP 1, 3, 5										
9. Katie Shea	Westar Energy	SPP 1, 3, 5, 6										
7. Group	Steve Rueckert	Western Electricity Coordinating Council										X
No additional members listed.												
8. Group	Frank Gaffney	Florida Municipal Power Agency	X		X	X	X	X	X			
Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1. Timothy Beyrle	City of New Smyrna Beach	FRCC	4									
2. Greg Woessner	Kissimmee Utility Authority	FRCC	3									
3. Jim Howard	Lakeland Electric	FRCC	3									
4. Lynne Mila	City of Clewiston	FRCC	3									
5. Joe Stonecipher	Beaches Energy Services	FRCC	1									
6. Cairo Vanegas	Fort Pierce Utility Authority	FRCC	4									
7. Randy Hahn	Ocala Utility Services	FRCC	3									
9. Group	Thomas McElhinney	JEA Electric Compliance	X		X		X					
Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1. John Babik	JEA Electric Compliance	FRCC	5									
2. Ted Hobson	JEA Electric Compliance	FRCC	1									
3. Garry Baker	JEA System Operations	FRCC	3									
10. Group	Al DiCaprio	ISO/RTO Council Standards Review Committee		X								
Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1. Charles Yeung	SPP	SPP	2									
2. Kathleen Goodman	ISO-NE	NPCC	2									
3. Gary DeShazo	CAISO	WECC	2									
4. Greg Campoli	NYISO	NPCC	2									
5. Steve Myers	ERCOT	ERCOT	2									

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
6.	Don Weaver	NBSO	NPCC 2										
7.	Mark Thompson	AESO	WECC 2										
8.	Ben Li	IESO	NPCC 2										
11.	Group	Jason L. Marshall	ACES Power Marketing Standards Collaborators						X				
	Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1.	Mark Ringhausen	Old Dominion Electric Cooperative	RFC	3, 5, 6									
2.	James Jones	Arizona Electric Power Cooperative/Southwest Transmission Cooperative	WECC	1, 5, 6									
3.	Erin Woods	East Kentucky Power Cooperative	SERC	1, 3, 5, 6									
12.	Group	Joe Tarantino	Sacramento Municipal Utility District (SMUD)	X		X	X	X	X				
	Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1.	Kevin Smith	Balancing Authority of Northern California (BANC)	WECC	1									
13.	Individual	Emily Pennel	Southwest Power Pool Regional Entity										X
14.	Individual	Cindy Oder	Salt River Project	X		X		X	X				
15.	Individual	Jim Eckelkamp	Progress Energy	X		X		X	X				
16.	Individual	Janet Smith, Regulatory Affairs Supervisor	Arizona Public Service Company	X		X		X	X				
17.	Individual	Antonio Grayson	Southern Company	X		X		X	X				
18.	Individual	Howard F. Illian	Energy Mark, Inc.								X		
19.	Individual	Don McInnis	Florida Power & Light Company	X		X		X					
20.	Individual	Carlos J. Macias	FPL	X		X		X	X				
21.	Individual	Mauricio Guardado	Los Angeles Department of Water and Power	X		X		X	X				
22.	Individual	Thomas Washburn	FMPP						X				
23.	Individual	Alice Ireland	Xcel Energy	X		X		X	X				
24.	Individual	Kathleen Goodman	ISO New England Inc		X								
25.	Individual	John Tolo	Tucson Electric Power	X									

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
26.	Individual	Dennis Sismaet	Seattle City Light	X		X	X	X	X				
27.	Individual	Michael Falvo	Independent Electricity System Operator		X								
28.	Individual	John Bussman	Associated Electric Cooperative Inc	X		X		X	X				
29.	Individual	Rich Salgo	NV Energy	X		X		X					
30.	Individual	Thad Ness	American Electric Power	X		X		X	X				
31.	Individual	RoLynda Shumpert	South Carolina Electric and Gas	X		X		X	X				
32.	Individual	Louis C. Guidry	Cleco Corporation	X		X		X	X				
33.	Individual	H. Steven Myers	ERCOT		X								
34.	Individual	Kasia Mihalchuk	Manitoba Hydro	X		X		X	X				
35.	Individual	Curtis Crews	Texas Reliability Entity										X
36.	Individual	Mark B Thompson	Alberta Electric System Operator		X								
37.	Individual	Anthony Jablonski	ReliabilityFirst										X
38.	Individual	Brenda Powell	Constellation Energy Commodities Group						X				
39.	Individual	Kirit Shah	Ameren	X		X		X	X				
40.	Individual	Michael Brytowski	Great River Energy	X		X		X	X				
41.	Individual	Si Truc PHAN	Hydro-Quebec TransEnergie	X									
42.	Individual	Greg Rowland	Duke Energy	X		X		X	X				
43.	Individual	Robert Blohm	Keen Resources Asia Ltd.								X		

1. **The SDT has made minor modifications to the proposed definitions to provide additional clarity. Do you agree that these modifications provide sufficient clarity? If not, please explain in the comment area.**

Summary Consideration: The majority of the commenters felt that the SDT should use the term "prevent" instead of "discourage" in the definition of FRM. The SDT explained that it did not want to use the word "prevent" since the SDT believes that the word would imply that you could stop withdrawal. The SDT does not believe that you can totally stop the withdrawal but you can discourage it.

Many of the commenters did not agree with requiring the BA to provide Frequency Response. The NERC Functional Model and FERC cite the BA as the responsible party for providing Frequency Response. There are several different methods available to the BA to provide Frequency Response and these are included in the Background Document.

A couple of the commenters felt that the median was not the proper method to use for the calculation of the FRM and that the RSG was not fully explained. Statisticians note that the median is a more accurate measure of central tendency than the mean when analyzing a sample that is small and or where scores vary widely. This is the case when estimating a BA's Frequency Response. While the median is not perfect, the median approaches a BA's typical performance after 15-20 observations and more observations give a higher confidence in the estimate of the BA's performance.

Some commenters had concerns about the use of the RSG as a means to provide Frequency Response, and in response the SDT modified the Background Document to further explain how an RSG (now FRSG) could be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

Organization	Yes or No	Question 1 Comment
Seattle City Light	Negative	Answer: No. Comments: LADWP and SCL recommend the following change to the definition of Frequency Bias Setting. LADWP believes that this change increases the clarity of the definition: Original A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the

Organization	Yes or No	Question 1 Comment
		Interconnection, and discourage response withdrawal through secondary control systems. Proposed Change A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and prevent response withdrawal through secondary control systems
Response: The SDT disagrees with your definition. The SDT considered using the term "prevent" but decided to use the term "discourage" instead. The SDT believes that the word "prevent" would imply that you could stop withdrawal. The SDT does not believe that you can totally stop the withdrawal but you can discourage withdrawal.		
Alliant Energy Corp. Services, Inc.	Negative	The definition of Frequency Bias Setting should focus on what it is. balancing Authorities do not supply energy. seggest rivising it to "A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to approximate the expected natural response provided by the assets within the respective Balancing Authority's area."
Response: The SDT agrees that the Balancing Authority does not directly supply energy. However, the NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not**		

Organization	Yes or No	Question 1 Comment
outweigh the effort and cost. **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **The SDT also believes that the definition you have suggested is basically saying the same thing as the definition the SDT has chosen to use.**		
Potomac Electric Power Co.	Negative	The proposed new Definitions do not stand alone and are also linked to Attachments.
Response: The SDT has modified the definitions to no longer reference any other documents.		
ISO/RTO Council Standards Review Committee	No	(1) In our previous comments, we suggested to drop the definitions for the terms FRM and FRO in favor of providing the needed wording in the standard itself to take care of the specific details. The SDT did not adopt our suggestion with the reason that these definitions will be used by other standards in the future. That's fair enough. However, the FRM definition: "The median of all the Frequency Response observations reported annually on FRS Form 1" is problematic. It references an FRS Form 1 which is not included in the definition itself but is in fact an Attachment to a standard. In the current NERC Glossary of Terms, there is no such precedence that a definition must rely on the requirements or details in a standard for completeness. Also, it is very cumbersome that when changes are made to FRS Form 1, the definition must be posted for industry comment and balloting, and vice versa. When other standards begin using the term, there will be cross references between standards. This further complicates the update/approval process without any appreciable value.Once again, we strongly urge the SDT to consider dropping these definitions, and have the details fully specified in the standard body itself. This will eliminate that cross reference issue. After all, the definition for FRM is a simple

Organization	Yes or No	Question 1 Comment
		sentence and does not provide any clarity or specific details that cannot be presented by using appropriate wording in a requirement. (2) The definition of Frequency Bias Setting, if retained, should focus on what it is. Balancing Authorities do not supply energy. We suggest to revise it to: Frequency Bias Setting A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's (BA's) Area Control Error (ACE) equation to approximate the expected natural response provided by the assets within the respective Balancing Authority's area.

Response: The SDT believes that these terms will be used in later version of the BAL Standards. The term FRO is presently being used in the development of a new standard (BAL-012-1 Planning Reserves). The SDT has modified the definitions to no longer reference any other documents.

The SDT agrees that the Balancing Authority does not directly supply energy. However, the NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.

The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.

There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.

Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.

The SDT also believes that the definition you have suggested is basically saying the same thing as the definition the SDT has

Organization	Yes or No	Question 1 Comment
chosen to use.		
Duke Energy	No	Duke Energy would suggest removing "usually" from the Frequency Bias Setting definition, as the value in the ACE equation must be in terms of MW/0.1Hz in order for ACE to be correctly calculated. We apologize for missing this point in the last round of comments. Though some would argue that the last phrase of the definition is more of an explanation of a function rather than a definition, we support keeping the phrase inserted, as it should be recognized that the intent is to account for the frequency response contribution AND keep the FBS slightly larger (in magnitude) than the average estimated response, to better discourage withdrawal, which was also recognized by Nathan Cohn. Should the definition for Frequency Response Measure (FRM) be specific to the BA, similar to the definition for Frequency Response Obligation (FRO)?
Response: It is the understanding of the SDT that EMS systems could use different methods implementing the ACE calculation. The SDT therefore believes that the term "usually" is more appropriate. **The SDT has modified the definition for FRM to state that is the responsibility of the BA. The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."**		
Independent Electricity System Operator	No	In our previous comments, we suggested to drop the definitions for the terms FRM and FRO in favor of providing the needed wording in the standard itself to take care of the specific details. The SDT did not adopt our suggestion with the reason that these definitions will be used by other standards in the future. That's fair enough. However, the FRM definition: "The median of all the Frequency Response observations reported annually on FRS Form 1" is problematic. It references an FRS Form 1 which is not included in the definition itself but is in fact an attachment to a standard. In the current NERC Glossary of Terms, there is no such precedence that a

Organization	Yes or No	Question 1 Comment
		definition must rely on the requirements or details in a standard for completeness. Also, it is very cumbersome that when changes are made to FRS Form 1, the definition must be posted for industry comment and balloting, and vice versa. When other standards begin using the term, there will be cross references between standards. This further complicates the update/maintenance problem without any appreciable value. Once again, we strongly urge the SDT to consider dropping these definitions, and have the details fully specified in the standard body. This will eliminate the cross reference issues. After all, the definition for FRM is a simple sentence and does not provide any clarity or specific details that cannot be addressed by providing the appropriate wording in a requirement. With this cross-reference issue, combined with the issues associated with Attachments A and B (see our comments under Q6, below), we are unable to support this standard at this time.
Response: The SDT believes that these terms will be used in later version of the BAL Standards. The term FRO is presently being used in the development of a new standard (BAL-012-1 Planning Reserves). The SDT has modified the definitions to no longer reference any other documents.		
Keen Resources Asia Ltd.	No	In the Standard, the definition of Frequency Response Measure (FRM) is statistically wrong. The median is an improper statistical measure of Frequency Response because--it truncates large excursions which are the specific subject of Frequency Response control, not normal operating frequency errors which are self-correcting and are the subject of CPM control;--it is non-linear; and therefore--it is non-summable over the interconnection; in other words, the individual BA medians don't add up to the interconnection median, in complete incompatibility with CPM control which requires summability of BA performances into the interconnection's performance. Moreover, it is mathematically impossible to sum the medians of the BAs in a Reserve Sharing Group (RSG) into the RSG's median:

Organization	Yes or No	Question 1 Comment
		in other words, the RSG's median cannot represent the sum of the medians of its members.The last paragraph on page 5 of the Background Document is patently wrong, invented, and supported in no probability & statistics literature whatsoever. As a practicing statistician, I hereby give testimony to the utter falsehood of the statement that "In general, statisticians use the median as the best measure of central tendency when a population has outliers." (See http://www.robertblohm.com/BestStatistic.doc for an explanation of "best statistic" which is a highly technical and central topic in modern probability theory and statistics.) Also, "outliers" are falsely and rhetorically claimed to be "noise" when in fact they are the "events" that are the specific subject of Frequency Response. It is well known that they do not "fit" a normal distribution. They are distinct from the normal operating errors that are the subject of CPM control. The paragraph does correctly conclude that the linear regression more accurately incorporates outliers than the median does, although the paragraph uses rhetoric by calling this improvement "skew" as if it is distortionary when, in fact, the median distorts the reality.

Response: The word "average" is a generic term to represent central tendency. The term is often used synonymously with the arithmetic "mean".
The issue with measuring frequency response is that a BA's calculated performance (as opposed to actual performance) is highly variable event to event. This is particularly true for a single BA in a multi-BA Interconnection.

Calculated Frequency Response has a very large noise to signal ratio. A 5,000 MW BA in the East typically is only called to contribute about 10-15 MW for the loss of a large unit. Its minute to minute load changes can easily wash this contribution out. An arithmetic mean or regression analysis will be influenced by noise-induced outliers.

Statisticians note that the median is a more accurate measure of central tendency than the mean when analyzing a sample that is small and or where scores vary widely. This is the case when estimating a BA's Frequency Response.

A regression would be appropriate if you were trying to forecast "calculated" frequency response for a BA in a multi-BA

Organization	Yes or No	Question 1 Comment
interconnection. **While not perfect, the median approaches a BA's typical performance after 15-20 observations. More observations give a higher confidence in the estimate of the BA's performance.**		
Manitoba Hydro	No	It is not clear why the term "Single Event Frequency Response Data (SEFRD)" has been removed from the standard but is still used and defined in the Background Document and Attachment A.
Response: The SDT removed the term because it was not being used within the standard itself. It was only being used in the calculation of the FRM. There is no need to create a NERC Glossary defined term if it is not being used in the standard.		
Seattle City Light	No	LADWP and SCL recommend the following change (in red) to the definition of Frequency Bias Setting. LADWP believes that this change increases the clarity of the definition:OriginalA number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems.Proposed ChangeA number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and discourage prevent response withdrawal through secondary control systems
Response: The SDT disagrees with your definition The SDT considered using the term "prevent" but decided to use the term "discourage" instead. The SDT believes that the word "prevent" would imply that you could stop withdrawal. The SDT does not believe that you can totally stop the withdrawal but you can discourage withdrawal.		
Los Angeles Department of Water and Power	No	LADWP recommends the following change to the definition of Frequency Bias Setting (replace the word "discourage" with the word "prevent"). LADWP believes that this change increases the clarity of the definition:OriginalA number, either fixed or variable, usually expressed in

Organization	Yes or No	Question 1 Comment
		MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems.Proposed ChangeA number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and prevent response withdrawal through secondary control systems
Response: The SDT disagrees with your definition. The SDT considered using the term "prevent" but decided to use the term "discourage" instead. The SDT believes that the word "prevent" would imply that you could stop withdrawal. The SDT does not believe that you can totally stop the withdrawal but you can discourage withdrawal.		
Progress Energy	No	PGN supports the collective comments of SERC members.We feel that the last phrase of the definition of Frequency Bias Setting is more of an explanation of a function rather than a definition. While the SERC OC Standards Review Group understands the statement, we do not feel it belongs in the definition of the Frequency Bias Setting and a period should be inserted after the word "Interconnection". Should the definition for Frequency Response Measure (FRM) be specific to the BA, similar to the definition for Frequency Response Obligation (FRO)?
Response: The SDT thanks you for your suggestion but feels that the statement referenced provides further clarity and has decided to not further modify the definition based on your comments. **The SDT has modified the definition for FRM to state that it is the responsibility of the BA. The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."**		
ERCOT	No	RE: Frequency Response Obligation (FRO) definition: ERCOT suggests changing "Balancing Authority's" to "Balancing Authority Area's" as follows:

Organization	Yes or No	Question 1 Comment
		The Balancing Authority Area's share of the required Frequency Response needed for the reliable operation of an Interconnection. A BA that does not own generation resources cannot provide Frequency Response, it can only schedule and dispatch available resources capable of such; . The BA should be responsible for taking action to schedule resources that are capable of frequency response, and monitoring to assure frequency response performance. The GOP (possibly the LSE when demand side performance is involved) must be accountable for performing.However, there is nothing in this requirement to encourage the owner of a resource who chooses not to provide frequency response to come to the table. There is nothing in this standard that uniformly requires all frequency response providers to perform. This is likely to be detrimental to the performance of a BAA and unfairly sanctions those willing to perform to to assure reliability while others are not required to perform.

Response: The SDT believes that the BA is the responsible entity not the BA Area.

The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.

The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.

There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.

Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a

Organization	Yes or No	Question 1 Comment
need for a generator performance obligation, they are encouraged to submit a SAR to that effect.		
Ameren	No	The Frequency Response Measure (FRM) definition should include which Entity(ies) it applies to, similar to the definition of the FRO.
Response: The SDT has modified the definition for FRM to state that is the responsibility of the BA. The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."		
Constellation Energy Commodities Group	No	The Frequency Response Obligation has two components based on Attachment 1 - an Interconnection FRO and a BA FRO. The proposed definition captures only the BA FRO.
Response: The definition is referencing the responsible entity, the BA. The interconnection's FRO is only calculated as the beginning point for the determination of the BA's FRO.		
Hydro-Quebec TransEnergie	No	The FRM and FRO definitions should precise that it is expressed in MW/0.1Hz. As for the Frequency Bias Setting definition, as written, would apply only to a multiple BA Interconnection. In a single BA Interconnection, the Frequency Bias translates the frequency error into a MW value that must be dispatched to bring back Frequency to desired value. Since Tie Lines are not controlled through AGC, there is no response withdrawal issue
Response: The FRM and FRO definitions have been modified to state MW/0.1Hz. **The SDT disagrees. There can be withdrawal on any interconnection that uses a Frequency Bias estimate if that estimate is lower than Frequency Response and other factors are used to determine dispatch, i.e., future load estimate.**		
Northeast Power Coordinating Council/ISO New England Inc.	No	The FRM definition should not refer to FORM 1. Also, suggest the following wording for frequency bias setting: "A number,

Organization	Yes or No	Question 1 Comment
		either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to approximate the frequency response provided by the assets within the respective Balancing Authority's area."
Response: The SDT has modified the definitions to no longer reference any other documents. **The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."** **The SDT agrees that the Balancing Authority does not directly supply energy. However, the NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.** **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **The SDT also believes that the definition you have suggested is basically saying the same thing as the definition the SDT has chosen to use.**		
MRO NSRF	No	The FRM definition: "The median of all the Frequency Response observations reported annually on FRS Form 1" is problematic. It references an FRS Form 1 which is not included in the definition itself but is in fact an

Organization	Yes or No	Question 1 Comment
		attachment to a standard. In the current NERC Glossary of Terms, there is no such precedence that a definition must rely on the requirements or details in a standard for completeness. Additionally, the definition of Frequency Bias Setting should focus on what it is. Balancing Authorities do not supply energy. Suggest revising it to:Frequency Bias Setting A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to approximate the expected natural response provided by the assets within the respective Balancing Authority's area.

Response: The SDT has modified the definitions to no longer reference any other documents.

The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."

The SDT agrees that the Balancing Authority does not directly supply energy. However, the NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.

The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.

There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.

Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.

The SDT also believes that the definition you have suggested is basically saying the same thing as the definition the SDT has

Organization	Yes or No	Question 1 Comment
chosen to use.		
Alberta Electric System Operator	No	The FRO definition is specific to BAs. The Appendix 1, which is incorporated in the standard, uses this definition in relation to requirements of the Interconnection. The SDT should consider a revision of this definition that accounts for the requirements of the Interconnection versus the BA obligation to the Interconnection.
Response: The definition is referencing the responsible entity, the BA. The Interconnection's FRO is only calculated as the beginning point for the determination of the BA's FRO.		
South Carolina Electric and Gas	No	The last phrase of the definition of Frequency Bias Setting is more of an explanation of a function rather than a definition. Therefore, we do not feel it belongs in the definition of the Frequency Bias Setting and a period should be inserted after the word "Interconnection". Should the definition for Frequency Response Measure (FRM) be specific to the BA, similar to the definition for Frequency Response Obligation (FRO)?
Response: The SDT thanks you for your suggestion but feels that the statement referenced provides further clarity and has decided to not further modify the definition based on your comments. **The SDT has modified the definition for FRM to state that is the responsibility of the BA. The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."**		
SERC OC Standards Review Group	No	We feel that the last phrase of the definition of Frequency Bias Setting is more of an explanation of a function rather than a definition. While the SERC OC Standards Review Group understands the statement, we do not feel it belongs in the definition of the Frequency Bias Setting and a period should be inserted after the word "Interconnection". Should the definition for Frequency Response Measure (FRM) be specific to the BA, similar to the

Organization	Yes or No	Question 1 Comment
		definition for Frequency Response Obligation (FRO)?
Response: The SDT thanks you for your suggestion but feels that the statement referenced provides further clarity and has decided to not further modify the definition based on your comments. **The SDT has modified the definition for FRM to state that is the responsibility of the BA. The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."**		
Southern Company	No	We suggest adding BA to the definition of Frequency Response Measure (FRM), similar to the definition for Frequency Response Obligation (FRO).
Response: The SDT has modified the definition for FRM to state that is the responsibility of the BA. The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."		
Associated Electric Cooperative Inc	Yes	The FRO definition incorrectly applies the historically narrow Balancing Authority scope of responsibility, while the FRM definition does not address applicability at all. But the BAL-003-1 Standard itself identifies RSGs (where applicable) and BAs as the Responsible Entities within scope of this standard. For consistency, AECI recommends using "Responsible Entities (e.g. Reserve Sharing Groups - where applicable, and Balancing Authorities)" in both the FRO and FRM definitions. Rationale: This change should help future-proof the definition, should more specific "frequency response" or "spinning reserve" sharing groups later surface within our industry. AECI agrees with the Frequency Bias Setting definition's inclusion of a bit more functionality than typical. We however recommend replacing "to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems", with "to support their Frequency Response contribution to the Interconnection". Rationale: Readability, and clarity on

Organization	Yes or No	Question 1 Comment
		the "discouraging withdrawal..." phrase, which should reside in the Background document.
Response: The SDT believes that using the term "Responsible Entities" would cause confusion since different standards could define a Responsible Entity differently. However, the SDT has defined a new term "Frequency Response Sharing Group" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." The SDT has decided not to add the term FRSG to the definition for Frequency Response Obligation (FRO). The SDT believes that the FRO is assigned to a BA not the FRSG. The FRSG FRO is a summation of the BA FRO's. **The SDT thanks you for your suggestion but feels that the statement referenced provides further clarity and has decided to not further modify the definition based on your comments.**		
SCE&G	Affirmative	The last phrase of the definition of Frequency Bias Setting is more of an explanation of a function rather than a definition. Therefore, we do not feel it belongs in the definition of the Frequency Bias Setting and a period should be inserted after the word "Interconnection". Should the definition for Frequency Response Measure (FRM) be specific to the BA, similar to the definition for Frequency Response Obligation (FRO)? o The utilization of the term, "Reserve Sharing Group", is not consistent with the definition in the NERC Glossary of Terms, and should be deleted, applicability should be clarified or replaced with a new term, such as "Frequency Response Sharing
Response: The SDT thanks you for your suggestion but feels that the statement referenced provides further clarity and has decided to not further modify the definition based on your comments. **The SDT has modified the definition for FRM to state that is the responsibility of the BA. The definition now read "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."**		

Organization	Yes or No	Question 1 Comment
The SDT agrees that using the phrase Reserve Sharing Group could cause confusion. The SDT has defined a new term "Frequency Response Sharing Group". The definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." The SDT has decided not to add the term FRSG to the definition for Frequency Response Obligation (FRO). The SDT believes that the FRO is assigned to a BA not the FRSG. The FRSG FRO is a summation of the BA FRO's.		
Bonneville Power Administration	Yes	
Imperial Irrigation District	Yes	
SPP Standards Review Group	Yes	
Western Electricity Coordinating Council	Yes	
ACES Power Marketing Standards Collaborators	Yes	
Southwest Power Pool Regional Entity	Yes	
Salt River Project	Yes	
Energy Mark, Inc.	Yes	
Florida Power & Light Company	Yes	
FPL	Yes	
FMPP	Yes	

Organization	Yes or No	Question 1 Comment
Xcel Energy	Yes	
Tucson Electric Power	Yes	
NV Energy	Yes	
Cleco Corporation	Yes	
Great River Energy	Yes	

2. The SDT has made minor modifications to the Requirements R1 through R4 to provide additional clarity. Do you agree that these modifications provide sufficient clarity to comply with the standard? If not, please explain in the comment area.

Summary Consideration: The majority of the commenters felt that the use of an RSG as a method for supplying Frequency Response was not fully explained. The SDT modified the Background Document to further explain how an RSG (now FRSG) could be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

Many of the commenters were concerned with the language in Requirement R3 stating that an entity had to be operating in Tie Line Bias mode unless there were adverse affects on the BES. The SDT removed this requirement from the proposed standard since it is duplicative of Requirement R6 and R7 in BAL-005-0.1b.

Many of the commenters did not agree with assigning the BA to provide Frequency Response. The NERC Functional Model and FERC cited the BA as the responsible party for providing Frequency Response. There are several different methods available to the BA to provide Frequency Response included in the Background Document.

A few of the commenters did not agree with lowering the minimum Frequency Bias Setting. Early research by Nathan Cohn on interconnected power system operations found that control is optimum if a BA's Bias Setting is equal to its natural Frequency Response. If there were to be a difference between the two values, it is preferable to be slightly over-biased. The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.

A couple of commenters were concerned that the BA could be responsible to supply an infinite amount of Frequency Response. They felt that a BA could not prepare for this in its planning process. The proposed standard was not clear on this subject and the SDT has added language in the "Event Selection Criteria" section of Attachment A to limit the amount of Frequency Response a BA would be required to provide to be compliant with the standard.

Organization	Yes or No	Question 2 Comment
Seattle City Light	Negative	The language in Requirement 4 needs to be clarified and recommends the following change: R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation to be equivalent to either (i) the sum of the Frequency Bias Settings of the participating Balancing Authorities as validated by the ERO, or (ii) (ii) the Frequency Bias Setting as calculated based on the entire area being combined and thereby represent the Frequency Response for the combined area being controlled. [Risk Factor: Medium][Time Horizon: Operations Planning]
Response: The SDT has modified Requirement R4 to use bullets in support of your suggestion.		
Public Utility District No. 1 of Douglas County	Negative	1. Recommend clarifying the language in R1 to include background information as to how RSGs fit into the FRM performance. 2. Recommend R3 language be modified to permit operation in other than tie-line bias mode with the requirement to notify the RC. 3. We have concern about the affect R3 will have on the WECC time error correction standard (BAL-004-WECC-1). 4. Clarification is needed between Attachment A and the Background Document for projected peak and historical peak. 5. We have a concern about the affect of lowering the minimum frequency bias obligation from 1% to .8% and its probable affect on reliability. 6. We have a concern about he upper limit to the amount of frequency response expected from BAs.
Response: Comment 1 – The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes		

Organization	Yes or No	Question 2 Comment
that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **Comment 2 & 3– The SDT has removed the Requirement R3 from the next version of the proposed standard. This removal was based on industry comments and the belief that it was duplicative with Requirements R6 and R7 in BAL-005-0.1b.** **Comment 4 – The SDT has corrected the error between Attachment A and the Background Document.** **Comment 5 – Early research by Nathan Cohn[2] on interconnected power system operations found that control is optimum if a BA's Bias Setting is equal to its natural Frequency Response. If there were to be a difference between the two values, it is preferable to be slightly over-biased.** **The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.** **Comment 6 – The SDT understands your concern and agrees that this could cause problems with compliance. The SDT has modified Attachment A to include language which puts an upper limit on the amount of Frequency Response required from an entity.**		
Potomac Electric Power Co.	Negative	1)The proposed Requirements do not meet all the FERC directives. 2)The proposed Requirements fail to recognize the fact that not all BAs can provide primary frequency response. 3)The proposed Requirements are not all in the standard. Some are in the Attachments.

[2] *Control of Generation and Power Flow on Interconnected Systems*, John Wiley & Sons, 1967

Organization	Yes or No	Question 2 Comment
Response: Comment 1 – The SDT disagrees with you about their meeting all of the FERC directives. Unfortunately your comment does not provide specific information as to what you believe is not being addressed. The SDT has included a section within the Background Document which details how this standard is meeting the FERC directives. **Comment 2 – The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.** **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **Comment 3 – Unfortunately your comment does not provide enough information as to what parts of the attachments you believe should be in the requirements. However, the SDT has made significant modifications to both Attachment A and Attachment B now a Procedure for the ERO to follow in support of the proposed standard. The SDT believes that the requirements should be succinct and the methodologies to be used should be part of an attachment.**		
Seattle City Light	No	o LADWP and SCL have a concern with Requirement 3. The requirement should provide allowance for legitimate circumstances when an entity cannot run on Tie Line Bias mode and not have an Adverse Reliability Impact on the Balancing Authority's Area. An entity should not be penalized when these legitimate circumstances occur. LADWP believes that the Frequency Response Standard Background Document, on Page 8, lists examples of legitimate circumstances:- Telemetry problems that lead the operator to believe ACE is significantly in error.-

Organization	Yes or No	Question 2 Comment
		The frequency input to AGC is not reflective of the BA's true frequency (such as if the control center were operating a local generator and disconnected from the Interconnection).- During restoration (where one BA might be controlling frequency while another to which it is connected is managing interchange between them).- For training purposes.- Many AGC systems will automatically switch to an alternate mode if the EMS determines Tie Line Bias control could lead to problems. o LADWP and SCL believe that the language in Requirement 4 needs to be clarified and recommends the following change (in red):R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation to be equivalent to either (i) the sum of the Frequency Bias Settings of the participating Balancing Authorities as validated by the ERO, or (ii) calculate the Frequency Bias Setting as calculated based on the entire area being combined and thereby represent the Frequency Response for the combined area being controlled. [Risk Factor: Medium][Time Horizon: Operations Planning] o LADWP and SCL believes the language in Requirement 5 needs to be modified to be consistent with that of the second paragraph of Attachment B. SCL recommends the addition of "natural frequency response" as a third bullet item to Requirement 5 (in red). The revised requirement would read: R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is at least equal to one of the following: [Risk Factor: Medium][Time Horizon: Operations Planning] o The minimum percentage of the Balancing Authority Area's estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B. o The minimum percentage of the Balancing Authority Area's estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as specified by the ERO in accordance with Attachment

Organization	Yes or No	Question 2 Comment
		B. o The natural frequency response
Response: The SDT has removed the Requirement R3 from this version of the proposed standard. This removal was based on industry comments and the belief that it was duplicative with Requirements R6 and R7 in BAL-005-0.1b. **The SDT has modified Requirement R4 which now uses bullets in support of your suggestion.** **The SDT disagrees with your suggested modification. The SDT believes that your suggested modification could allow an entity to circumvent the minimum percentage process. However, the SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3.**		
FMPP	No	o R1. Each Balancing Authority (BA) or Reserve Sharing Group (RSG) shall achieve an annual Frequency Response Measure (FRM) (as detailed in Attachment A and calculated on FRS Form 1) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each BA or RSG to maintain an adequate level of Frequency Response in the Interconnection. [Risk Factor: Medium][Time Horizon: Operations Assessment] The BA does not have control over the frequency responsive generation. There needs to be a requirement that the GOP shall set frequency response for the generators as directed by the BA. o R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is {greater than or (<= add these words)} {at least (<= delete these words)} equal to one of the following: [Risk Factor: Medium][Time Horizon: Operations Planning] o The minimum percentage of the Balancing Authority Area's estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B. o The minimum percentage of the Balancing Authority Area's estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as specified by the ERO in accordance with Attachment B.

Organization	Yes or No	Question 2 Comment
Response: The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **With regards to your comment concerning Requirement R5, you have not provided enough information for the SDT to respond. However, the SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3.**		
Western Electricity Coordinating Council	No	Agree with the changes made to this latest version of BAL-003-1. However, additional clarity could be added by addressing the following: R1- It is not clear what is intended by "Reserve Sharing Group". As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifiying this concept and possibly include an example in the background document to help explain how this would work. R3 - There may be occasions in which an entity has a legitimate reason or a need to operate in a mode other than Tie Line Bias but that does not qualify as an Adverse Reliability Impact. Recommend including language that would permit limited operation in a mode other than Tie Line Bias mode provided the Reliability Coordinator was notified. R3 - Has the drafting team considered whether or not the

Organization	Yes or No	Question 2 Comment
		language of Requirement R3 will have any conflict or coordination issue with the FERC-approved regional reliability standards BAL-004-WECC-1 - Automatic Time Error Correction? R5 - Suggest changing the language “at least equal to” to “greater than or equal to” for clarity.
Response: The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. The SDT has defined a new term “Frequency Response Sharing Group (FRSG)” because it believes that using the presently defined term “Reserve Sharing Group” could cause confusion. The new definition reads “A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members.” **The SDT has removed the Requirement R3 from this version of the proposed standard. This removal was based on industry comments and the belief that it was duplicative with Requirements R6 and R7 in BAL-005-0.1b.** **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.**		
Seattle City Light	Negative	Answer: No Comments: o LADWP and SCL have a concern with Requirement 3. The requirement should provide allowance for legitimate circumstances when an entity cannot run on Tie Line Bias mode and not have an Adverse Reliability Impact on the Balancing Authority’s Area. An entity should not be penalized when these legitimate circumstances occur. LADWP believes that the Frequency Response Standard Background Document, on Page 8, lists examples of legitimate circumstances: - Telemetry problems that lead the operator to believe ACE is significantly in error. - The frequency input to AGC is not reflective of the BA’s true frequency (such as if the control center were operating a local generator and disconnected from the Interconnection). - During restoration (where one BA might be controlling frequency while another to which it is connected is managing interchange between them). - For training purposes. - Many AGC systems will automatically switch to an alternate mode if the EMS determines Tie Line Bias control could lead to problems.

Organization	Yes or No	Question 2 Comment
		o LADWP and SCL believe that the language in Requirement 4 needs to be clarified and recommends the following change: R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation to be equivalent to either (i) the sum of the Frequency Bias Settings of the participating Balancing Authorities as validated by the ERO, or (ii) the Frequency Bias Setting as calculated based on the entire area being combined and thereby represent the Frequency Response for the combined area being controlled. [Risk Factor: Medium][Time Horizon: Operations Planning] o LADWP and SCL believes the language in Requirement 5 needs to be modified to be consistent with that of the second paragraph of Attachment B. SCL recommends the addition of "natural frequency response" as a third bullet item to Requirement 5. The revised requirement would read: R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is at least equal to one of the following: [Risk Factor: Medium][Time Horizon: Operations Planning] o The minimum percentage of the Balancing Authority Area's estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B. o The minimum percentage of the Balancing Authority Area's estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as specified by the ERO in accordance with Attachment B. o The natural frequency response
Response: The SDT has removed the Requirement R3 from this version of the proposed standard. This removal was based on industry comments and the belief that it was duplicative with Requirements R6 and R7 in BAL-005-0.1b. **The SDT has modified Requirement R4 which now uses bullets in support of your suggestion.** **The SDT disagrees with your suggested modification. The SDT believes that your suggested modification could allow an entity to circumvent the minimum percentage process. However, the SDT has removed Requirement R5 and combined it into Requirement**		

Organization	Yes or No	Question 2 Comment
R2 and a new Requirement R3.		
Avista Corp.	Negative	As drafted, Requirement R1 requires Balancing Authorities or Reserve Sharing Groups (RSGs) to achieve an annual Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO). As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifiying this concept and possibly including an example in the background document to help explain how this would work. Reducing frequency bias obligation is detrimental to reliability. It seems that Lowering the Minimum Frequency Bias Setting from 1% to .8% will result in a lower response, which in turn will lower the natural frequency response. Over time it seems this pattern would lead to poorer response.
Response: The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **Early research by Nathan Cohn[3] on interconnected power system operations found that control is optimum if a BA's Bias Setting is equal to its natural Frequency Response. If there were to be a difference between the two values, it is preferable to be slightly over-biased.** **The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting**		

[3] *Control of Generation and Power Flow on Interconnected Systems*, John Wiley & Sons, 1967

Organization	Yes or No	Question 2 Comment
0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.		
City of Redding, Oregon Public Utility Commission, BrightSource Energy, Inc., Clark Public Utilities, Avista, Tri-State G & T Association, Inc.; Deseret Power	Negative	As drafted, Requirement R1 requires Balancing Authorities or Reserve Sharing Groups (RSGs) to achieve an annual Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO). As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifying this concept and possibly including an example in the background document to help explain how this would work.
Response: The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."		
Sacramento Municipal Utility District (SMUD)	No	As drafted, requirement R1 requires Balancing Authorities or Reserve Sharing Groups (RSGs) to achieve an annual Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO). As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifying this concept and possibly including an example in the background document to help explain how this would work. As drafted, in requirement R3, each Balancing Authority not receiving Overlap Regulation Service to operate its AGC in Tie Line Bias mode... unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area. There may be occasions in which an entity needs to perform testing or other instances where it is necessary or desirable to operate in a mode other than Tie Line Bias that does not qualify as an Adverse Reliability Impact, but never the less is necessary or

Organization	Yes or No	Question 2 Comment
		desired. Recommend including language that would permit operation other than Tie Line Bias mode provided the Reliability Coordinator was notified.We seek clarification from the drafting team as to whether or not there will be any conflicts between proposed Requirement R3 and the requirements of FERC-approved regional reliability standard BAL-004-WECC-1 - Automatic Time Error Correction.
Response: The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **The SDT has removed the Requirement R3 from the next version of the proposed standard. This removal was based on industry comments and the belief that it was duplicative with Requirements R6 and R7 in BAL-005-0.1b.**		
Energy Mark, Inc.	No	Comment 1: The timing requirements for implementing the Frequency Bias Setting are not specified for BAs participating in Overlap Regulation Service. The requirements indicate the value that should be used for the Frequency Bias Setting, but they do not indicate when those settings should be implemented. Comment 2: The term "Tie Line Bias mode" in Requirement R3 is not sufficiently defined to make this requirement enforceable. Any operating mode labeled as "Tie Line Bias mode" on an EMS that uses interchange scheduled and frequency error as inputs will meet the standard requirement as stated. This loop-hole exists because the NERC definition of "Tie Line Bias" fails to define the term in enough detail to actually limit AGC operation to the specified mode of operation. One way to improve this requirement would be to redefine Tie Line Bias in the NERC Glossary as a mode that uses the NERC ACE Equation as defined in BAL-001 as the basis for AGC action when the EMS is in Tie Line Bias mode. Comment 3: The standard is silent on how a BA receiving Overlap Regulation Service should set its Frequency Bias Setting. Unless this is explicitly stated, it will be up to

Organization	Yes or No	Question 2 Comment
		the auditors to determine the value of the Frequency Bias Setting for BAs receiving Overlap Regulation Service. Comment 4: In general, the requirements indicate what the responsible BAs should do and when. The requirements do not indicate what the BAs that are not responsible should do and when, ie. how they are relieved from responsibility. This may create problems when the auditors are required to interpret the standards for BAs that have appropriately shifted responsibilites to others.
Response: Comment 1 – The SDT believes that Requirement R2 states the timing for implementation of the Frequency Bias Setting. The Requirement R4 is simply to provide the BA with the method for combining the Frequency Bias Settings for providers of Overlap Regulation Service. The Background Document and Attachment A have also been modified to provide further clarity. **Comment 2 – The SDT has removed the Requirement R3 from this version of the proposed standard. This removal was based on industry comments and the belief that it was duplicative with Requirements R6 and R7 in BAL-005-0.1b.** **Comment 3 & 4 – The SDT does not believe that there is an issue for entities receiving Overlap Regulation Service. However, the SDT has modified the Background document to further clarify this issue.**		
Duke Energy	No	Duke Energy supports the concept of a group of BAs forming a group to share in Frequency Response however it should be clear that it is an option. We feel that the utilization of the term, "Reserve Sharing Group", is not consistent with the definition in the NERC Glossary of Terms which is specific to sharing of contingency reserves, and should be replaced with a new term, such as "Frequency Response Sharing Group". R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in "Tie Line Bias" mode. Though comments are provided below on the Attachments, Duke Energy believes that all NERC Reliability Standards' requirements must reside within the standard itself (which is vetted by the Industry and subject to FERC approval), and not within Attachments that may be revised without Industry review and approval. As noted below and in prior comments, given the secondary control implications of changing

Organization	Yes or No	Question 2 Comment
		the minimum Frequency Bias Setting (FBS), Duke Energy believes that subsequent revisions to the minimum FBS should be vetted through the Standards process. Duke Energy would suggest moving the details of the minimum FBS for each Interconnection into the Standard, and having the implementation plan include annual submittal of a revised minimum FBS based upon the methodology presented in Attachment B for ballot approval by the Industry.
Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it also believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **The SDT has removed the Requirement R3 from this version of the proposed standard. This removal was based on industry comments and the belief that it was duplicative with Requirements R6 and R7 in BAL-005-0.1b.** **Attachments that are referenced within a Requirement are mandatory and enforceable.** **Early research by Nathan Cohn[4] on interconnected power system operations found that control is optimum if a BA's Bias Setting is equal to its natural Frequency Response. If there were to be a difference between the two values, it is preferable to be slightly over-biased.** **The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.**		
ISO/RTO Council Standards Review Committee	No	General CommentsThe SRC offers the following general comment with regard to the SDT's proposed revisions: Gerry Cauley's Results based initiative calls for

[4] *Control of Generation and Power Flow on Interconnected Systems*, John Wiley & Sons, 1967

Organization	Yes or No	Question 2 Comment
		requirements that focus on performance (i.e. WHAT must be accomplished NOT on WHY it is required or HOW it should be accomplished). The SRC has found that such explanatory statements as the SDT is proposing lead to ambiguities and confusion in the compliance application. Compliance Enforcement agents must consider not just the results but must decide if the action was taken for the given reason. To avoid such confusion, the Results based approach uses reference documents to address such background material while leaving the requirement as a direct mandate.The SRC notes: o All NERC Reliability Standards' requirements must reside within the standard itself (which is vetted by the Industry and subject to FERC approval). o Data requirements are better handled through NERC's Rules of Procedure Section 1600 than by mandating that ad hoc Forms be submitted. o Definitions should be generic, and should be self-contained (i.e. should not reference an external document). o The decisions regarding alternative methodologies should be decided by the Industry not by the SDT. The SDT should make its case and ask the Industry for its approval. Regarding Order 693 directives, the SRC notes that there are three directives as follows: (1) To include Levels of Non-Compliance; (2) To determine the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other requirements of the Reliability Standard are being met, and to modify Measure M1 based on that determination and (3) To define the necessary amount of Frequency Response needed for Reliable Operation for each balancing authority with methods of obtaining and measuring that the frequency response is achieved.

Organization	Yes or No	Question 2 Comment
		The SRC suggests that Directive 2 be handled directly as a mandate that the ERO conduct a fixed number of Frequency Response Surveys for randomly selected events. Discussion of the number and the methodology can be explained in a reference document and leave the specifics to the requirement. Directive 3 is critical to the Industry as it relates to who is the Applicable Entity. The SDT addresses Directive 3 by mandating Balancing Authorities meet an objective. The directive is to define that Objective, but there is no requirement associated with that Objective. There is an attachment and there are discussions of what "may" be done, but there is no requirement in the Standard itself. The reference to the BA as the provider of Frequency Response (i.e. Primary Control response) runs counter to other FERC directives that mandate obligated entities be able to self-serve or to interchange provision of services. In this case the BA per se has no assets and cannot self-serve, moreover the primary response service providers have no obligations to provide the service, thus the BA potentially could face a situation where there is no physical service to be purchased but there is a federally mandated standard to comply with. The idea of creating a Primary Response Market as some have proposed does not work without an obligation on some entity to physically provide that service. One final note, the SRC points out that the ACE is an error signal used to drive secondary response; it is not a signal to drive primary response. Thus the use of the Frequency Bias setting is not for control, it is for "adjusting" the error measure that is analyzed after the fact.This standard needs: o a requirement on the ERO to compute the Obligation on each Interconnection o a requirement on the ERO to conduct Frequency Response surveys (note the SRC does not support this requirement but believes that it is needed to meet the FERC directive) o a requirement on energy supply assets (both generation and load) to provide primary response (as a function of the Interconnection obligation in the first bullet)

Organization	Yes or No	Question 2 Comment
		The above will allow NERC to comply with the FERC directives in a fashion consistent with the processes and procedures approved by FERC. Specific recommendations: The SRC proposes that R1 be deleted based on the facts that: o It imposes an obligation on an entity that has no capability to comply o There is an internal conflict with imposing penalties on a deterministic basis (compliance with a fixed set of events) for a statistical service (primary response is a function of the assets operating state and not a fixed service of the asset).In any case, all of the words after FRO should be deleted. The words are not needed for the requirement and if left in can become a source of contention between auditors and registered entities. R3 - delete the added phrase "mode to effectively coordinate control".The phrase "would have an Adverse Impact on the BA's area" needs further discussion. Who makes the decision that operating on AGC will have adverse impact must be defined. R5 - delete the phrase "In order to ensure control response". Such phrases can be needless causes of debate. If a BA uses one of the bulleted methods but does not get "adequate response" then is the BA non-compliant? What is "adequate response"? Who decides if the response is adequate?
Response: Unfortunately your comment does not provide enough information as to what parts of the attachments you believe should be in the requirements. However, the SDT has made significant modifications to both Attachment A and Attachment B, now a Procedure for the ERO to follow in supporting the standard. The SDT believes that the requirements should be succinct and the methodologies to be used should be part of an attachment. **The SDT is using defined forms to ensure that everyone calculates their Frequency Bias Setting and Frequency Response Measure in a consistent manner. The SDT also believes that this provides entities a relatively non-time consuming method to provide the necessary information to evaluate compliance.**		

Organization	Yes or No	Question 2 Comment
		The SDT has modified the definitions to no longer reference any other documents. **The SDT is recommending a certain approach to calculating the FRM. The reference to other methods being evaluated is simply a statement that the SDT believes that further analysis would be beneficial. Any modification to the calculation methodology would require industry approval.** **The SDT believes that it is meeting Directive #2 by requiring at least 20 events to be analyzed each year.** **The SDT believes that it is meeting the directive to define the "objective" by creating the BA Frequency Response Obligation (FRO). With regards to the BA being the responsible entity to provide Frequency Response the NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.** **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **The SDT has been instructed to include a "reliability outcome" within the requirements. The SDT will forward your concerns about the wording to the Standards Committee Quality Review group for consideration.** **The ERO is not defined as an applicable entity in the industry approved SAR and therefore it would be inappropriate to include them as an applicable entity.**
Los Angeles Department of Water and Power	No	LADWP has a concern with Requirement 3. The requirement should provide allowance for legitimate circumstances when an entity cannot run on Tie Line Bias

Organization	Yes or No	Question 2 Comment
		mode and not have an Adverse Reliability Impact on the Balancing Authority's Area. An entity should not be penalized when these legitimate circumstances occur. LADWP believes that the Frequency Response Standard Background Document, on Page 8, lists examples of legitimate circumstances:- Telemetry problems that lead the operator to believe ACE is significantly in error.- The frequency input to AGC is not reflective of the BA's true frequency (such as if the control center were operating a local generator and disconnected from the Interconnection).- During restoration (where one BA might be controlling frequency while another to which it is connected is managing interchange between them).- For training purposes.- Many AGC systems will automatically switch to an alternate mode if the EMS determines Tie Line Bias control could lead to problems. LADWP believes that the language in Requirement 4 needs to be clarified and recommends the following change:- R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation to be equivalent to either (i) the sum of the Frequency Bias Settings of the participating Balancing Authorities as validated by the ERO, or (ii) the Frequency Bias Setting as calculated based on the entire area being combined and thereby represent the Frequency Response for the combined area being controlled. [Risk Factor: Medium][Time Horizon: Operations Planning] LADWP believes the language in Requirement 5 needs to be modified to be consistent with that of the second paragraph of Attachment B. LADWP recommends the addition of "natural frequency response" as a third bullet item to Requirement 5. The revised requirement would read:- R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is at least equal to one of the following: [Risk Factor: Medium][Time Horizon: Operations Planning] o The minimum percentage of the Balancing Authority Area's estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B. o The minimum percentage of the Balancing Authority Area's estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as

Organization	Yes or No	Question 2 Comment
		specified by the ERO in accordance with Attachment B. o The natural frequency response
Response: The SDT has removed the Requirement R3 from the next version of the proposed standard. This removal was based on industry comments and the belief that it was duplicative with Requirements R6 and R7 in BAL-005-0.1b. **The SDT has modified Requirement R4 which now uses bullets in support of your suggestion.** **The SDT disagrees with your suggested modification. The SDT believes that your suggested modification could allow for an entity to circumvent the minimum percentage process. However, the SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3.**		
MidAmerican Energy Co.	Negative	MidAmerican supports the comments provided by the NSRF. It is not clear if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. It is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz (e.g. what if freq dips to 59.5). Without a statement that the BA is expected to keep its allocated portion of generation reserves only up to the largest event identified in Table 2, a BA could be expected to provide limitless amounts of frequency response. Balancing Authorities cannot know what is expected of them and therefore cannot plan appropriately.
Response: The SDT understands your concern and has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide.		
East Kentucky Power Coop.; ACES Power Marketing; Hoosier Energy Rural Electric Cooperative, Inc.; Southwest Transmission Cooperative, Inc.	Negative	Overall, [we] believes the drafting team has done an excellent job to address the FERC directives from Order 693. However, we believe there is still room for improving the standard and that there is a significant technical error. The technical error was introduced by applying Requirement 1 to the RSG and is discussed below. Requirement 1 should not apply to a Reserve Sharing Group. Reserve Sharing Groups (RSG) are designed to share Contingency Reserves and/or Operating Reserves not

Organization	Yes or No	Question 2 Comment
		Frequency Response. While these reserves may be frequency responsive, they are not being shared for the purpose of expanding frequency response. Furthermore, while reserve sharing groups may calculate a joint ACE by summing its individual BA ACE values, RSGs do not have a Frequency Bias Setting which is necessary to assess a Frequency Response Obligation. Under item 3 of the Event Selection Criteria section, the delta F and Point C should be described either in this attachment or the "Frequency Response Standard Background Document". While many in industry may understand what these terms mean, history has a way of getting lost with personnel turnover. Furthermore, this would help ensure that the auditors and industry have a duplicate understanding. In the Frequency Response Obligation section on page 2, several items require more description. Further description of why an N-2 event was chosen for the Contingency Protection Criteria should be provided and which N-2 event was selected so that industry can help validate if the correct MW value was selected. Furthermore, the document should clarify if the Contingency Protection Criteria contains the "safety margin". There is a statement in the paragraph before the table that states it does, but then the table lists out a separate 25% "Safety Margin". Thus, it is not clear if the "Safety Margin" is included in the Contingency Protection Criteria value listed in the table or not. "Safety margin" should be changed to "reliability margin". Safety has a specific meaning in the electric industry and its use here is not appropriate. The Base Obligation should be explained. The explanation should include its purpose and origin. The Data Retention section requires the BA to retain data or evidence for up to four years. No data that exceeds the audit cycle should be required to be retained. The audit cycle is three years for BAs.
Response: The SDT agrees that using the term "Reserve Sharing Group" could cause confusion and has defined a new term "Frequency Response Sharing Group (FRSG)". The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency		

Organization	Yes or No	Question 2 Comment
Response Obligations of its members." **The SDT agrees with your comment concerning further clarification on certain terms and has made significant modifications to the Background Document and Attachments A and B.** **The Data Retention is stated as "the current year plus three calendar years" since it is highly unlikely that an entity will be audited exactly three years after its previous audit. The SDT recognizes that most audits will occur within the year following the third year.**		
PPL Electric Utilities Corp.; PPL Generation LLC	Negative	The PPL Companies do not support proposed Reliability Standard BAL-003-1 (Frequency Response and Frequency Bias Setting) primarily because PPL believes it inappropriately subjects Reserve Sharing Groups (RSGs) to the proposed requirements. The proposed Applicability provision states that the mandatory reliability requirements would be applicable to (1) Balancing Authorities and (2) Reserve Sharing Groups (where applicable). However, it is unclear how the proposed requirements would be applicable to an RSG. RSGs typically do not provide a mechanism for sharing automatic Frequency Response. The BA Frequency Response Obligation (FRO) is a formula based on BAs and the Interconnection and has nothing to do with RSGs. Rather, RSGs collectively respond to requests for activation of contingency reserves generally after the request is made by a member Balancing Authority. The Standard Drafting Team should therefore remove RSGs from the Applicability section and should remove all other references to RSGs in the proposed standard.
Response: The SDT disagrees that an RSG is not an appropriate mechanism for providing Frequency Response. However the SDT does believe that using the term "Reserve Sharing Group" could cause confusion and has defined a new term "Frequency Response Sharing Group (FRSG)". The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a**		

Organization	Yes or No	Question 2 Comment
means to meet one of the FERC's Order No. 693 directives. **FRSG performance may be calculated on one of two ways:** • **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or** • **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.**		
Progress Energy	No	PGN supports the collective comments of SERC members.We feel that the utilization of the term, "Reserve Sharing Group", is not consistent with the definition in the NERC Glossary of Terms, and should be deleted, applicability should be clarified or replaced with a new term, such as "Frequency Response Sharing". R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in "Tie Line Bias" mode
Response: The SDT agrees that using the term "Reserve Sharing Group" could cause confusion and has defined a new term "Frequency Response Sharing Group (FRSG)". The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **The SDT has removed the requirement to operate AGC in Tie Line Bias mode as this requirement was duplicative of the Requirements R6 and R7 in BAL-005-0.1b.**		
MRO NSRF	No	R1- It is not clear what is intended by "Reserve Sharing Group" in this context. As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifiying this concept and possibly include an example in the background document to help explain how this would work. R2 - Please add the word "range" in-between the words "date" and "specified". The background document specifies that there is a 72-hour period to implement the FBS setting (See Background document Page 7). R2, as written, does not reflect the

Organization	Yes or No	Question 2 Comment
		period for which an entity may implement the ERO validated Bias into ACE. Also see our comment on #7 as to the length of the comment period. Question 7 comment is provided to assist the SDT; Note from question 7: (Page 7 (3rd paragraph) of the Background document states "Given the fact that BA's can encounter staffing or EMS change issues coincident with the date the ERO sets for new Frequency Bias Setting implementation, the standard provides a 24 hour window on each side of the target date. 1. The Standard itself does not state this provision (24 hour window on each side of target date) as indicated. 2. The SDT accurately addresses the fact that BA's could have EMS or staffing issues during implementation of the ERO validated FBS. The current stated 72-hour window is not long enough for implementation of the FBS as there may be a host of issues that could impact implementation. We suggest that a seven day window be used for implementation of the FBS.) R3 - Recommend the term "Adverse Reliability Impact" be removed from Requirement 3. Based on the NERC definition of the term, a smaller entity could never operate its AGC outside of TLB mode due to their impact on the BES not likely to result in "instability or Cascading". To ensure a more consistent and equitable approach when applying this Requirement, recommend the drafting team incorporate the reliability reasons listed within the Background Document into the actual Requirement. Additionally, the phrase "effectively coordinated control" should be removed as this is not essential to the Requirement and introduces ambiguity in its application. To this end, the following revisions are proposed: R3. Each Balancing Authority not receiving Overlap Regulation Service shall operate its Automatic Generation Control (AGC) in Tie Line Bias mode to ensure effectively coordinated control, unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area meets one or more of the following conditions.

Organization	Yes or No	Question 2 Comment
		o Telemetry problems that lead the operator to believe ACE is significantly in error. o The frequency input to AGC is not reflective of the BA's true frequency (such as if the control center were operating a local generator and disconnected from the Interconnection). o During restoration (where one BA might be controlling frequency while another to which it is connected is managing interchange between them). o For training purposes. o Many AGC systems will automatically switch to an alternative mode if the EMS determines Tie Line Bias control could lead to problems. o For single BA Interconnections, Flat Frequency and Tie Line Bias are equivalent. o The Reliability Coordinator has been informed and the duration is [insert time constraint language here]. R5 - Recommend to delete the phrase "In order to ensure control response". Such phrases can be needless causes of debate. If a BA uses one of the bulleted methods but does not get "adequate response" then is the BA non-compliant? What is "adequate response"? Who decides if the response is adequate? Please clarify.

Response: The SDT agrees that using the term "Reserve Sharing Group" could cause confusion and has defined a new term "Frequency Response Sharing Group (FRSG). The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.

FRSG performance may be calculated on one of two ways:

- **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or**

Organization	Yes or No	Question 2 Comment
• **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.** **The SDT has modified Requirement R2 to provide better clarity. The requirement now reads "**Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO and shall use this Frequency Bias Setting until directed to change by the ERO to ensure effectively coordinated Tie Line Bias control.**".** **The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.** **The SDT has been instructed to include a "reliability outcome" within the requirements. The SDT will forward your concerns about the wording to the Standards Committee Quality Review group for consideration.**		
Xcel Energy	No	R1- It is not clear what is intended by "Reserve Sharing Group" in this context. As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifiying this concept and possibly include an example in the background document to help explain how this would work. R3 - recommend modifying the language to permit AGC out of TLB mode if the RC is notified; also remove the "to ensure coordinated control" as this is not essential for the requirement. Our reasoning behind the suggested change to notification of the RC is that there are occassions where an entity would need to perform testing, etc and it could be argued that testing would not be sufficient justification for meeting the Adverse Reliability Impact definition. Here is proposed revised language:Each Balancing Authority not receiving Overlap Regulation Service shall operate its Automatic Generation Control (AGC) in Tie Line Bias mode, unless the Balancing Authority's Reliability Coordinator has been informed and the duration is [insert time constraint language here].
Response: The SDT agrees that using the term "Reserve Sharing Group" could cause confusion and has defined a new term "Frequency Response Sharing Group (FRSG)". The new definition reads "A group whose members consist of two or more		

Organization	Yes or No	Question 2 Comment
Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.**		
Constellation Energy Commodities Group	No	R1 should accommodate agreements between multiple BAs and RSGs in achieving the annual Frequency Response Measure. See proposed modification below: R1. Each Balancing Authority shall achieve an annual Frequency Response Measure (FRM) (as detailed in Attachment A and calculated on FRS Form 1) that is equal to or more negative than its Frequency Response Obligations (FRO) to ensure that sufficient Frequency Response is provided by each BA. Either the Balancing Authority individual FRM, multiple Balancing Authority's FRM per written agreement, or the FRM of the Reserve Sharing Group must be equal to or more negative than the applicable Frequency Response Obligations (FRO) for a single Balancing Authority or the aggregate of multiple Balancing Authorities or RSGs.- In R2, "Each Balancing Authority not participating in Overlap Regulation Service" should state "Each Balancing Authority, not receiving Overlap Regulation, shall implement the appropriate Frequency Bias Setting (fixed or variable,) validated by the ERO, into its Area Control Error (ACE) calculation beginning on the date specified by the ERO to ensure effectively coordinated Tie Line Bias control". – In R3, the explanatory language about why to operate in Tie Line Bias mode should be deleted. See proposed modification below: R3. Each Balancing Authority not receiving Overlap Regulation Service shall operate its Automatic Generation Control (AGC) in Tie Line Bias mode, unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area.- R5 should be modified to state only that the FBS is specified by the ERO in accordance with Attachment B. As drafted the Requirement is in conflict with Attachment B because the Requirement mandates a minimum and does not allow for a reduction to the minimum but it references Attachment B which is titled

Organization	Yes or No	Question 2 Comment
		"Process for Adjusting Minimum Frequency Bias Setting". See proposed modification below: R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is as specified by the ERO in accordance with Attachment B.- There should be a Requirement specifically stating there is an obligation to complete and submit FRS Form 1 by January 10th each year for clarity.- The requirements should be re-ordered to reflect the chronology of the process for frequency calculation, implementation and performance measurement. The recommended order is as follows: R5 which defines the minimum Frequency Bias Setting (FBS) for a Balancing Authority R4 which describes how the minimum FBS may be altered through Overlap Regulation Service R2 which identifies the coordination required around implementationR3 which requires operation in Tie Line Bias mode R1 which establishes the performance obligation
Response: The SDT does not see anything within the Requirement that would restrict any agreements between multiple BAs and RSGs. However, the SDT has modified the language in Requirement R1 to provide additional clarity. The requirement now reads "Each Balancing Authority or Frequency Response Sharing Group (FRSG) shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each Balancing Authority or FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation." The SDT has also defined a new term "Frequency Response Sharing Group (FRSG)" because it also believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to		

Organization	Yes or No	Question 2 Comment
jointly meet the Frequency Response Obligations of its members." **The SDT has modified Requirement R2 to provide better clarity. The requirement now reads "**Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO and shall use this Frequency Bias Setting until directed to change by the ERO to ensure effectively coordinated Tie Line Bias control.**".** **The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.** **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT also believes that Attachment B, now a Procedure for the ERO to follow in supporting the standard, only details the process the ERO is to use when evaluating and making modifications to the minimum Frequency Bias Setting.** **The SDT disagrees with your comment concerning an additional requirement for timing of reporting. The SDT believes that this is an administrative issue and is better handled within an attachment. The SDT would also like to note that an attachment when referenced in a requirement becomes mandatory and enforceable.** **The SDT thanks you for your suggested ordering for the requirements but believes that the revised proposed standard reflects the proper order in that it sets the goal at beginning of year, calculates performance, reports performance and calculates bias at the end of the year.**		
Constellation Energy	Negative	-R1 should accommodate agreements between multiple BAs and RSGs in achieving the annual Frequency Response Measure. See proposed modification below: R1. Each Balancing Authority shall achieve an annual Frequency Response Measure (FRM) (as detailed in Attachment A and calculated on FRS Form 1) that is equal to or more negative than its Frequency Response Obligations (FRO) to ensure that sufficient Frequency Response is provided by each BA. Either the Balancing Authority individual FRM, multiple Balancing Authority's FRM per written agreement, or the FRM of the Reserve Sharing Group must be equal to or more negative than the applicable Frequency Response Obligations (FRO) for a single Balancing Authority or the aggregate of multiple Balancing Authorities or RSGs. -In R2, "Each Balancing Authority not participating in Overlap Regulation Service"

Organization	Yes or No	Question 2 Comment
		should state “Each Balancing Authority, not receiving Overlap Regulation, shall implement the appropriate Frequency Bias Setting (fixed or variable,) validated by the ERO, into its Area Control Error (ACE) calculation beginning on the date specified by the ERO to ensure effectively coordinated Tie Line Bias control”. -In R3, the explanatory language about why to operate in Tie Line Bias mode should be deleted. See proposed modification below: R3. Each Balancing Authority not receiving Overlap Regulation Service shall operate its Automatic Generation Control (AGC) in Tie Line Bias mode, unless such operation would have an Adverse Reliability Impact on the Balancing Authority’s Area. -R5 should be modified to state only that the FBS is specified by the ERO in accordance with Attachment B. As drafted the Requirement is in conflict with Attachment B because the Requirement mandates a minimum and does not allow for a reduction to the minimum but it references Attachment B which is titled “Process for Adjusting Minimum Frequency Bias Setting”. See proposed modification below: R5. In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is as specified by the ERO in accordance with Attachment B. -There should be a Requirement specifically stating there is an obligation to complete and submit FRS Form 1 by January 10th each year for clarity. -The requirements should be re-ordered to reflect the chronology of the process for frequency calculation, implementation and performance measurement. The recommended order is as follows: R5 which defines the minimum Frequency Bias Setting (FBS) for a Balancing Authority R4 which describes how the minimum FBS may be altered through Overlap Regulation Service R2 which identifies the coordination required around implementation R3 which requires operation in Tie Line Bias mode R1 which establishes the performance obligation
Response: The SDT does not see anything within the Requirement that would restrict any agreements between multiple BAs and RSGs. However, the SDT has modified the language in Requirement R1 to provide additional clarity. The requirement now reads		

Organization	Yes or No	Question 2 Comment
		"Each Balancing Authority or Frequency Response Sharing Group (FRSG) shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each Balancing Authority or FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation." The SDT has also defined a new term "Frequency Response Sharing Group (FRSG)" because they also believed that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **The SDT has modified Requirement R2 to provide better clarity. The requirement now reads "**Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO and shall use this Frequency Bias Setting until directed to change by the ERO to ensure effectively coordinated Tie Line Bias control.**".** **The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.** **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT also believes that Attachment A only details the process the ERO is to use when evaluating and making modifications to the minimum Frequency Bias Setting.** **The SDT disagrees with your comment concerning an additional requirement for timing of reporting. The SDT believes that this is an administrative issue and is better handled within an attachment. The SDT would also like to note that an attachment when referenced in a requirement becomes mandatory and enforceable.** **The SDT thanks you for your suggested ordering for the requirements but believes that the revised proposed standard reflects the proper order in that it sets the goal at beginning of year, calculates performance, reports performance and calculates bias at the end of the year.**
Ameren	No	R1.While we agree with the concept of the entire requirement and the determination of the Interconnection Frequency Response Obligation, we believe that the accurate measurement of individual BA's FRM has not yet been demonstrated. This requirement should not be part of the standard (even with the additional 12 months in the effective date) until the field trial demonstrates that

Organization	Yes or No	Question 2 Comment
		each BA's FRM can be consistently calculated to a level that will not create false non-compliance to this requirement. While the calculation methodology in FRS Form 1 looks promising, with the A-value and B-value average periods, we believe successful completion of the field trial is prudent. R5. We were not sure if it was intended for this comment question to include Requirement R5, but have decided to include our comments here. While we agree with the requirement of R5, it should not be at the expense of changing the value of L10 in BAL-001, R2, which has been accepted by FERC in Order 693. An accommodation should be made so that any changes to the Frequency Bias Setting according to BAL-003, R5, should not affect the value of L10 used in BAL-001, R2.
Response: The SDT agrees that validation of the methodology needs to occur. However, the SDT is working under a FERC approved deadline for completion of this project. The SDT is recommending that continued analysis should occur during the filing period and implementation period of the standard. The STD has also added considerable language to the Background Document on why it has chosen the methodology it is recommending for this standard. **The SDT understands your concern with the reduction of the minimum Frequency Bias Setting affecting other performance standards. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.**		
American Electric Power	No	R1: Clarification is needed regarding the responsibility of a BA that is a member of a Reserve Sharing Group. R2 and R3: What does "coordinated control" mean? There no leverage for the BA to require the generator to carry their burden of addressing governor settings or droop settings, yet the BA is obligated to meet some performance measures.

Organization	Yes or No	Question 2 Comment
		This revision adds new performance measure responsibilities on the BA who likely has no direct control over every resource affecting their performance within their footprint. We are not necessarily challenging the performance measures themselves, nor their underlying objectives, however AEP views this as a gap in responsibilities which potentially effects reliability.

Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" to eliminate any confusion with the present d3efined term "Reserve Sharing Group". The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.

FRSG performance may be calculated on one of two ways:

- **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or**
- **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.**

The SDT has been instructed to include a "reliability outcome" within the requirements and therefore included the language "…coordinated control…". The SDT understands that this does not provide any additional clarity for complying with the requirement and could be removed. The SDT will forward your concerns about the wording to the Standards Committee Quality Review group for consideration.

The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.

The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.

Organization	Yes or No	Question 2 Comment
The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR. **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.**		
Great River Energy	No	R1: Including the Reserve Sharing Group (RSG) in the Frequency Response Obligation is outside of the boundaries of a RSG. Where or how would a Frequency Bias be determined for an RSG to determine their Frequency Response Obligation? Although it is apparent that frequency responds during the implementation of reserves, the intention of a RSG is not to share frequency response, but rather to share Reserves. Additionally, if the Frequency Response Obligation is not met by the RSG how are penalties assessed? Should they be assessed to the group as a whole or strictly to the generators that did not meet their individual obligation? R3: Needs to include verbiage for those circumstances when it would be necessary to run AGC out of TLB such as during necessary testing. The BA should have the option to operate out of TLB for a predetermined amount of time if needed when notification and coordination with the RC has been established.
Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine**		

Organization	Yes or No	Question 2 Comment
how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives. **FRSG performance may be calculated on one of two ways:** • **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or** • **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.** **The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response.** **The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.**		
Tucson Electric Power	No	R1: TEP feels that the FRO should be able to be calculated by the BA and that Form 1 changes should be treated via the Standard drafting process. R2: TEP feels that use Form 1 should be required by the Standard. Further, BAs should calculate its own frequency bias setting without ERO intervention. R3: Operating outside Tie Line Bias mode should be allowed during a year to allow for the testing of other modes. R4: Agree with the concept, but without ERO intervention. R5: Should read "greater than or equal to".
Response: The FRO can be estimated by the BA but the actual BA FRO for compliance is based on the BA's footprint and is a function of the Interconnection FRO. Modifications to the FRS Form 1 would go through the Standard Drafting Process. **R3 - The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.** **R2 and R4 - The Frequency Bias Setting is calculated on FRS Form 1. The ERO is only validating the data used in the calculation. This is a practice that exists today. History has shown that there typically are errors in the data.** **R5 - The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has**		

Organization	Yes or No	Question 2 Comment
modified the requirement and believes we have implemented the intent of your suggestion.		
SCE&G	Affirmative	R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in "Tie Line Bias" mode. o We suggest the SDT consider a term other than "Initial' in the title for Table 1. We suggest "Proposed Frequency Bias Setting" for Table 1 o
Response: The requirement to operate AGC in Tie Line Bias mode has been removed from the standard since it was duplicative of Requirements R6 and R7 in BAL-005-0.1b. **The SDT has modified Attachment B, now a Procedure for the ERO to follow in supporting the standard, to address your concern. The new title is, "Frequency Bias Setting Minimums".**		
Bonneville Power Administration	No	Regarding R1, BPA believes that adding additional requirements in R1 by referencing Attachment A does not add clarity. FRO should be a calculation that the BA's can do themselves and included within the standard. Can Form 1 be changed outside of the standard drafting process? BPA doesn't believe that Form 1 should be allowed to be changed outside of the standard drafting process. As drafted, Requirement R1 requires Balancing Authorities or Reserve Sharing Groups (RSGs) to achieve an annual Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO). As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. BPA recommends clarifying this concept and possibly including an example in the background document to help explain how this would work. Regarding R2, BPA believes each BA should be able to calculate its own frequency bias setting without ERO validation. The standard can require the BA to use Form 1, if the BA doesn't use Form 1 correctly, then the BA would be in violation of the

Organization	Yes or No	Question 2 Comment
		standard. BPA believes that R3 should include a minimal amount of time (suggesting a couple of hours per year) to allow for testing other modes. Requirement R3 requires each Balancing Authority not receiving Overlap Regulation Service to operate its AGC in Tie Line Bias mode... unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area. There may be occasions in which an entity needs to perform testing or other instances where it is necessary or desirable to operate in a mode other than Tie Line Bias that does not qualify as an Adverse Reliability Impact, but never the less is necessary or desired. BPA recommends including language that would permit operation other than Tie Line Bias mode provided the Reliability Coordinator was notified.BPA seeks clarification from the drafting team as to whether or not there will be any conflicts between proposed Requirement R3 and the requirements of FERC-approved regional reliability standard BAL-004-WECC-1 - Automatic Time Error Correction. BPA agrees with the concept of R4, however, BPA again disagrees with the ERO validation of the frequency bias setting. BPA believes that reducing frequency bias obligation is detrimental to reliability. It seems that lowering the Minimum Frequency Bias Setting from 1% to .8% will result in a lower response, which in turn will lower the natural frequency response. BPA believes that over time, it would seem that this pattern would lead to poorer response. BPA believes that R5 should read "greater than or equal to one of the following" not " at least equal to". The requirement should be a part of Form 1 or included in R2. For variable bias, the minimum percentage should be based on the forecasted month peak.
Response: R1 – The FRO can be estimated by the BA but the actual BA FRO for compliance is based on the BA's footprint and is a function of the Interconnection FRO.		

Organization	Yes or No	Question 2 Comment
		Modifications the FRS Form 1 would go through the Standard Drafting Process. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives. FRSG performance may be calculated on one of two ways: • Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or • Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance. The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. R2 – The SDT is interested in the use of good data for the calculations but does not believe that a BA should be penalized for minor data errors. This is why the SDT proposes that the ERO validate the data. In addition, this process is used today. R3 - The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b. R4 – Again, this is a process that is in use today. The SDT is not proposing that the ERO modify anything, just proposing that the ERO validate the data being supplied. R5 - The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. However, the SDT understands your concern with the reduction of the minimum Frequency Bias Setting affecting other performance requirements. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change

Organization	Yes or No	Question 2 Comment
in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.		
Manitoba Hydro	No	Regarding R1: 1. Neither R1 nor the referenced Attachment A clarifies the FRM requirements for an RSG to comply versus a BA. In particular (i) At p.3, Attachment A states that the ERO is responsible for "annually assigning an FRO and Frequency Bias Setting to each BA." No mention is made of RSGs. (ii) Attachment A only references RSGs in the context of reporting obligations for Form 1 (at p.4) and (iii) Compared to BAL-002-0 R1.1, which clearly states that the BA may elect to fulfill its obligation through an RSG and that in such cases the RSG has the same responsibilities as each BA (that is a participant in the RSG). 2. It should be clarified that this requirement applies to a BA, where the BA doesn't belong to an RSG, OR to an RSG. As it is currently drafted, the standard applies to each BA and each RSG. It is redundant in that each BA would need to comply, whether or not they are a member of an RSG that would also be required to comply. Further, the NERC Glossary definition of an RSG is a group of BAs that collectively maintain, allocate and supply operating reserves. No mention is made of the agreement including the sharing or delegation of responsibility related to FRM. Accordingly, the standard should only reference a BA being able to delegate responsibility to an RSG if the RSG Agreement allows for such delegation. 3. R1 does not specify where or how the FRO is determined. Presumably this would be determined by the ERO pursuant to Attachment A. 4. The phrase "to ensure that sufficient Frequency Response ..." should be separated from the requirement as it is

Organization	Yes or No	Question 2 Comment
		(i) not descriptive of the required actions; (ii) redundant with the stated purpose at the beginning of the standard. In general, such a drafting technique should be avoided as it may allow Responsible Entities to argue that a violation has not occurred where the specific action that is described has not been taken, but the purpose referenced in the requirement has been met. Regarding R2: 1. It is not clear from R2 who determines the Frequency Bias Setting for "validation" by the ERO and how the FBS is determined. (Presumably done by the BA in accordance with Attachment B). Based on Background document, should refer to those "published" by ERO. The BA's FBS may not be validated, and may be modified before posting. 2. Attachment B does not refer to the ERO "validating" FBS. 3. Attachment B refers to an RSG calculating FBS, but the standard does not.

Response: R1 – Comment 1 & 2 – The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.

FRSG performance may be calculated on one of two ways:

- **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or**
- **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual**

Organization	Yes or No	Question 2 Comment
performance. The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. Comment 3 – The process for determining the FRO is detailed in Attachment A. Comment 4 – The SDT has been instructed to include a "reliability outcome" within the requirements. The SDT will forward your concerns about the wording to the Standards Committee Quality Review group for consideration. R2 – Comment 1 – The Frequency Bias Setting is calculated on FRS Form 1. The ERO is only validating the data not calculating the setting. The ERO will be working with the BA to correct any data errors discovered during the validation process. This is a process that is in use today Comment 2 & 3 – The SDT has made significant modifications to the Background Document and Attachment A to provide additional clarity. The SDT has added language to Attachment A regarding validation of the BA data. The SDT has removed all references to a FRSG for Frequency Bias Setting. Attachment B has been removed and the information from Attachment B has been incorporated in a Procedure developed by the SDT for the ERO to follow to support this standard.		
NV Energy	No	Requirement 1 seems to be the only one that has any applicability to an RSG; however, it is unclear under what circumstances this requirement applies to an RSG. Suggest changing the R1 to be addressed solely to BA's or alternatively, explain under Applicability section 1.2 what "where applicable" means.
Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.		

Organization	Yes or No	Question 2 Comment
FRSG performance may be calculated on one of two ways: • **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or** • **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.** **The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response.**		
ACES Power Marketing Standards Collaborators	No	Requirement 1 should not apply to a Reserve Sharing Group. Reserve Sharing Groups (RSG) are designed to share Contingency Reserves and/or Operating Reserves not Frequency Response. While these reserves may be frequency responsive, they are not being shared for the purpose of expanding frequency response. Furthermore, while reserve sharing groups may calculate a joint ACE by summing its individual BA ACE values, RSGs do not have a Frequency Bias Setting which is necessary to assess a Frequency Response Obligation.
Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.** **FRSG performance may be calculated on one of two ways:** • **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or** • **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.**		

Organization	Yes or No	Question 2 Comment
The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response.		
City of Redding, Oregon Public Utility Commission, BrightSource Energy, Inc., Clark Public Utilities, Avista, Tri-State G & T Association, Inc.; Deseret Power	Negative	Requirement R3 requires each Balancing Authority not receiving Overlap Regulation Service to operate its AGC in Tie Line Bias mode... unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area. There may be occasions in which an entity needs to perform testing or other instances where it is necessary or desirable to operate in a mode other than Tie Line Bias that does not qualify as an Adverse Reliability Impact, but never the less is necessary or desired. Recommend including language that would permit operation other than Tie Line Bias mode provided the Reliability Coordinator was notified.
Response: The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.		
Alberta Electric System Operator	No	The language used in the requirements is superfluous. This could result in confusion and incorrect assumptions being made. In R1, the comment within brackets "(as detailed in Attachment A and calculated on FRS Form 1)", is not necessary as it is already part of the FRM definition. We suggest removing this bracketed text from the requirement. Also in R1, the phrase "to ensure that sufficient Frequency Response is provided by each BA or RSG to maintain an adequate level of Frequency response in the Interconnection" is a high level objective that does not add clarity to this requirement. We suggest removing this from the requirement. R2, R3 and R5 use similar language e.g. "to ensure effectively coordinated Tie Line Bias control", "to ensure adequate control response" etc. Although it provides background information, this does not add clarity to the requirement. We suggest removing these from the requirements.
Response: Based on industry comments the SDT has modified the definition for FRM such that it no longer references any other documents. Therefore, the SDT believes that leaving the reference to Attachment in the standard is prudent, based on advice		

Organization	Yes or No	Question 2 Comment
from the standards staff – without a reference to the specific Attachment, the responsible entity can't be held to compliance with the performance identified in that attachment. **The SDT has been instructed to include a "reliability outcome" within the requirements and therefore included the language you are referencing. The SDT understands that this does not provide any additional clarity for complying with the requirement and could be removed. The SDT will forward your concerns about the wording to the Standards Committee Quality Review group for consideration.**		
Hydro-Quebec TransEnergie	No	The objective of R2 is that all BA's implement their new Bias Setting at the same time, based on the previous year's data, so that control stays the most effective throughout the Interconnection (Tie-Line Bias). In addition, the new Bias will be in effect all year long. The process is quite simple and straightforward for a fixed Bias Setting. As for Variable Bias Setting, this process is not applicable before the fact since the Bias equation can depend on real-time values that are not known in advance. In addition, the simultaneous Bias implementation is not an issue for a single BA Interconnection. Therefore, we suggest that Requirement 2 applies only to Fixed Bias Setting.
Response: The SDT agrees with your comment and has modified Requirement R2 to reflect your concern. The SDT has also added an addition Requirement R3 to address entities using a variable Frequency Bias Setting.		
Northeast Power Coordinating Council	No	The requirements should not be directed at Balancing Authorities, as generators are the main supplier of "discretionary" frequency response. Requirement R1 refers to an attached form, which is not part of the standard and therefore not enforceable.
Response: The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.**		

Organization	Yes or No	Question 2 Comment
There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost. **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **If an attachment is referenced in a requirement that attachment becomes part of the requirement. The requirement has been modified to no longer reference an attached form.**		
Beaches Energy Services; City of Bartow, Florida; Tampa Electric Co.	Negative	The standard is silent on the "methods to obtain Frequency Response". For instance, the BA does not have authority over governor and other generator settings. There should be a requirement for GOPs to incorporate setting changes directed by the BA, otherwise the standard establishes requirements that BAs may not have the authority to achieve. R1 includes the Reserve Sharing Group in its applicability, but none of the other requirements do. There is no consideration of "footprint" changes of the BA resulting in different allocation from the ERO during a year. The standard and Attachments seem to specify an annual process with due dates in December and January with no allowance for mid-year changes and associated allocation changes. If a standard has a requirement for the ERO, who will audit the ERO for compliance? If the ERO does not meet its obligations, can an entity still be found non-compliant, especially on a schedule basis? Wasn't there an issue of assigning standards to RROs, e.g., the fill-in-the-blank standards? Are there similar issues with assigning requirements to the ERO? Is the ERO a "user, owner or operator" of the BPS under Section 215, e.g., at (b)(1)"... All users, owners and operators of the bulk-power system shall comply with the reliability standards that take effect under this section." I question how this would work from a compliance perspective. On R5, the wording should be changed from "absolute value is at least equal to" to

Organization	Yes or No	Question 2 Comment
		"absolute value is greater than or equal to"
Response: The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **The SDT has also included other methods that a BA can use to provide Frequency Response in the Background Document.** **The SDT has added language to Attachment A to address changes in a BAs footprint.** **The proposed standard is not putting a requirement on the ERO. There is language in the Attachments to provide additional time for a BA to become compliant if the ERO is late in providing the necessary information. If the ERO does not provide the necessary information then the BA would not be required to modify anything and therefore the last information provided would be that which would be used for compliance purposes.** **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.**		
South Carolina Electric and Gas	No	The utilization of the term, "Reserve Sharing Group", is not consistent with the definition in the NERC Glossary of Terms, and should be deleted, applicability should be clarified or replaced with a new term, such as "Frequency Response Sharing".

Organization	Yes or No	Question 2 Comment
		R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in "Tie Line Bias" mode.
Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." **Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.** **FRSG performance may be calculated on one of two ways:** • **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or** • **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.** **The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response.** **The SDT has removed the requirement to operate AGC in Tie Line Bias mode as this requirement was duplicative of the Requirements R6 and R7 in BAL-005-0.1b.**		
Tri-State G & T Association, Inc.; Tucson Electric Power Co.; U.S. Army Corps of Engineers; South California Edison ; Platte River Power Authority; Pacific Gas and Electric Company; Colorado Springs Utilities; Idaho Power	Negative	We believe that there are several modifications that, if implemented to the existing requirements, would result in an improved, clarified standard. As drafted, Requirement R1 requires Balancing Authorities or Reserve Sharing Groups (RSGs) to achieve an annual Frequency Response Measure (FRM) that is equal to or more negative than its Frequency Response Obligation (FRO). As RSGs exist today, FRM performance by an RSG is not contemplated in the definition of FRM and appears to apply more towards 'secondary response'. Recommend clarifiying this concept and possibly including an example in the background

Organization	Yes or No	Question 2 Comment
Company; California Energy Commission; California ISO; Deseret Power		document to help explain how this would work. Requirement R3 requires each Balancing Authority not receiving Overlap Regulation Service to operate its AGC in Tie Line Bias mode... unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area. There may be occasions in which an entity needs to perform testing or other instances where it is necessary or desirable to operate in a mode other than Tie Line Bias that does not qualify as an Adverse Reliability Impact, but never the less is necessary or desired. Recommend including language that would permit operation other than Tie Line Bias mode provided the Reliability Coordinator was notified. We seek clarification from the drafting team as to whether or not there will be any conflicts between proposed Requirement R3 and the requirements of FERC-approved regional reliability standard BAL-004-WECC-1 - Automatic Time Error Correction.

Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.

FRSG performance may be calculated on one of two ways:

- **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or**
- **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.**

The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response.

Organization	Yes or No	Question 2 Comment
The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.		
ISO New England Inc	No	We do not agree with placing a requirement on Balancing Authorities, as generators are the main supplier of "discretionary" frequency response. Also, the requirement refers to an attached form, which is not part of the standard and therefore not enforceable.
Response: The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **If an attachment is referenced in a requirement that attachment becomes part of the requirement. However the requirement has been modified to no longer reference an attached form.**		
SERC OC Standards Review Group	No	We feel that the utilization of the term, "Reserve Sharing Group", is not consistent with the definition in the NERC Glossary of Terms, and should be deleted, applicability should be clarified or replaced with a new term, such as "Frequency Response Sharing". R2 exempts BAs participating in Overlap Regulation Service from implementing the Frequency Bias Setting on the date specified by the ERO, and R4 states how the BA

Organization	Yes or No	Question 2 Comment
		performing Overlap Regulation Service will modify its Frequency Bias Setting but does not state when the setting will be implemented. The exemption for BAs participating in Overlap Regulation Service should either be deleted from R2 or language stating the implementation date of the frequency bias setting needs to be included in R4. R4 should clarify that a BA performing Overlap Regulation Service should still be required to operate its AGC in "Tie Line Bias" mode.

Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.

FRSG performance may be calculated on one of two ways:

- **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or**
- **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.**

The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response.

The SDT has modified the language in Requirement R2. The term "not participating in" has be replace with "not receiving". This now encompasses entities that are providing Overlap Regulation Service.

The SDT has removed the requirement to operate AGC in Tie Line Bias mode as this requirement was duplicative of the Requirements R6 and R7 in BAL-005-0.1b.

Organization	Yes or No	Question 2 Comment
Florida Municipal Power Agency/JEA Electric Compliance	No	We thank the SDT for their hard work and diligence in moving this Project forward. However, we have some concerns that cause us to not support the standard in its current form. In general, we believe that there has not been sufficient prudency review for the standard, especially R1, to justify a performance based standard around a Frequency Response Measure. We also believe that the proposed standard does not meet all of the conditions of the Final SAR and Supplemental SAR.The “Final SAR” was to develop methods by which a performance based standard would eventually be developed. The Final SAR states:”The proposed standard’s intent is to collect data needed to accurately model existing Frequency Response. There is evidence of continuing decline in Frequency Response in the three Interconnections over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be modeled, and the reasons for the decline in Frequency Response can be identified. Once thereasons for the decline in Frequency Response are confirmed, requirements can be written to control Frequency Response to within defined reliability parameters.”BAL-003-1 does not seem to complete the scope of this “Final SAR”. For instance, “the reasons for the decline in Frequency Response” were not confirmed to our knowledge; and the field trial is not completed to our knowledge.The Supplemental SAR adds to the scope of the Final SAR:”To provide a minimum Frequency Response Obligation for the Balancing Authority to achieve, methods to obtain Frequency Response and provide a consistent method for calculating the Frequency Bias Setting for a Balancing Authority. In addition, the standard will specify the optimal periodicity of Frequency Response surveys.”The Supplemental SAR does not eliminate the pre-requisite contained in the Final SAR to determine the reasons for the decline in frequency response and confirm them before establishing “defined reliability parameters”. In addition, the standard does not complete the requirement of the Supplemental

Organization	Yes or No	Question 2 Comment
		SAR to identify “methods to obtain Frequency Response”. For instance, neither the BA nor the RSG have authority over governor and other generator settings. There should be a requirement for GOPs to incorporate setting changes directed by the BA, otherwise the standard establishes requirements that BAs and RSGs may not have the authority to achieve. There is no consideration of "footprint" changes of the BA resulting in different allocation from the ERO during a year. The standard and Attachments seem to specify an annual process with due dates in December and January with no allowance for mid-year changes and associated allocation changes. If a standard has a requirement for the ERO, who will audit the ERO for compliance? If the ERO does not meet its obligations, can an entity still be found non-compliant, especially on a schedule basis? Wasn’t there an issue of assigning standards to RROs, e.g., the fill-in-the-blank standards? Are there similar issues with assigning requirements to the ERO? Is the ERO a “user, owner or operator” of the BPS under Section 215, e.g., at (b)(1)”... All users, owners and operators of the bulk-power system shall comply with the reliability standards that take effect under this section.” We question how this would work from a compliance perspective.
Response: The SDT is responding to FERC Directives from Order 693 as well as the FERC Order dated March 18, 2010 which mandated development of a standard addressing the Order 693 directives within six months. FERC later granted an extension to provide a standard addressing these issues by the end of May 2012. **The SDT agrees that the original SAR was strictly for data collection. However, a supplemental SAR was developed to address the FERC March 18, 2010 Order and was subsequently approved by the industry. The Standards Committee has determined that a proposed standard must be within the scope of the approved SAR but the proposed standard is not required to address the full scope of the SAR if stakeholders support a reduced scope.** **The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.**		

Organization	Yes or No	Question 2 Comment
The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR. **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **The SDT has also included other methods that a BA can use to provide Frequency Response in the Background Document.** **The SDT has added language to Attachment A to address changes in a BA's footprint.** **The proposed standard is not putting a requirement on the ERO. There is language in the Attachments to provide additional time for a BA to become compliant if the ERO is late in providing the necessary information. If the ERO does not provide the necessary information then the BA would not be required to modify anything and therefore the last information provided would be that which would be used for compliance purposes.**		
Imperial Irrigation District	Yes	
SPP Standards Review Group	Yes	
Southwest Power Pool Regional Entity	Yes	
Salt River Project	Yes	
Florida Power & Light Company	Yes	
Independent Electricity	Yes	

Organization	Yes or No	Question 2 Comment
System Operator		
Associated Electric Cooperative Inc	Yes	
Cleco Corporation	Yes	
Keen Resources Asia Ltd.	Yes	

3. The SDT has developed VRFs for the proposed Requirements within this standard. Do you agree that these VRFs are appropriately set? If not, please explain in the comment area.

Summary Consideration: The majority of the commenters agreed with the VRFs that the SDT has proposed for the requirements within the standard.

One commenter felt the VRFs were too high and that they should have a "lower" VRF. The SDT developed the VRFs using the NERC Violation Risk Factor guidelines approved by FERC. A lower VRF is an administrative type of requirement that, if violated would not be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system; or, a requirement that is administrative in nature and a requirement in a planning time frame that, if violated, would not, under the emergency, abnormal, or restorative conditions anticipated by the preparations, be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. Violation of any of the requirements in the proposed standard could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system.

Another commenter stated that they could not fine the "Risk Severity Levels" in the standard. The SDT is not sure as to the meaning of this comment. The SDT believes that the commenter may have been mixing two different terms, Violation Risk Factors (VRFs) and Violation Severity Levels (VSLs). The question asked by the SDT was concerning the VRFs. These are located within the body of the Requirement. The VSLs are located towards the end of the proposed standard.

Organization	Yes or No	Question 3 Comment
Seattle City Light	Negative	Answer: Yes. Comments: LADWP and SCL agree with the following VRFs: - R1 - Medium - R2 - Medium - R3 - Medium - R4 - Medium - R5 - Medium
Response: The SDT thanks you for your clarifying comment.		
Energy Mark, Inc.	No	Comment 5: See comments in the non-binding poll.
Response: Please see our response to your comments from the non-binding poll.		
Florida Power & Light Company	No	Could not find the Risk Severity Levels in the documents.

Organization	Yes or No	Question 3 Comment
Response: The SDT is not sure as to the meaning of your comment. The SDT believes that you may be mixing two different terms, Violation Risk Factors (VRFs) and Violation Severity Levels (VSLs). The question asked by the SDT was concerning the VRFs. These are located within the body of the Requirement. The VSLs are located towards the end of the proposed standard.		
Cleco Corporation	No	Please note Cleco does not use the VRFs therefore we feel too much energy and time is spent on the VRFs. The SDT needs to concentrate on the requirements and measurements.
Response: The SDT thanks you for your clarifying comment.		
Ameren	No	This is problematic since for a single BA interconnection these could be argued to be appropriate VRFs, but is different for a multiple BA interconnection, where the risk that a single BA would pose to the interconnection would be Lower.
Response: The SDT developed the VRFs using the NERC Violation Risk Factor guidelines approved by FERC. This document can be found at http://www.nerc.com/files/Violation_Risk_Factors.pdf. IA lower VRF is an administrative type of requirement that, if violated not be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system; or, a requirement that is administrative in nature and a requirement in a planning time frame that, if violated, would not, under the emergency, abnormal, or restorative conditions anticipated by the preparations, be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. Violation of any of the requirements in the proposed standard could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system.		
Seattle City Light/Los Angeles Department of Water and Power	Yes	LADWP and SCL agree with the following VRFs:- R1 - Medium- R2 - Medium- R3 - Medium- R4 - Medium- R5 - Medium
Response: The SDT thanks you for your affirmative response and clarifying comment.		
NV Energy	Yes	Medium appears to be reasonable and appropriate.
Response: The SDT thanks you for your affirmative response and clarifying comment.		

Organization	Yes or No	Question 3 Comment
Bonneville Power Administration	Yes	
Imperial Irrigation District	Yes	
Northeast Power Coordinating Council	Yes	
MRO NSRF	Yes	
SERC OC Standards Review Group	Yes	
SPP Standards Review Group	Yes	
ISO/RTO Council Standards Review Committee	Yes	
ACES Power Marketing Standards Collaborators	Yes	
Southwest Power Pool Regional Entity	Yes	
Salt River Project	Yes	
Progress Energy	Yes	
Southern Company	Yes	
FMPP	Yes	

Organization	Yes or No	Question 3 Comment
ISO New England Inc	Yes	
Tucson Electric Power	Yes	
Independent Electricity System Operator	Yes	
Associated Electric Cooperative Inc	Yes	
American Electric Power	Yes	
South Carolina Electric and Gas	Yes	
Manitoba Hydro	Yes	
Constellation Energy Commodities Group	Yes	
Great River Energy	Yes	
Hydro-Quebec TransEnergie	Yes	
Duke Energy	Yes	
Keen Resources Asia Ltd.	Yes	

4. The SDT has developed Measures for the proposed Requirements within this standard. Do you agree with the proposed Measures in this standard? If not, please explain in the comment area.

Summary Consideration: Many of the commenters were concerned with the language in Requirement R3 stating that an entity had to be operating in Tie Line Bias mode unless there were adverse affects on the BES and that if the requirement was modified that the measure should be modified. The SDT explained that it had removed this requirement from the proposed standard since they felt it was duplicative of Requirement R6 and R7 in BAL-005-0.1b.

Some commenters objected to the definition for FRM and the Measure referencing another document (FRS Form 1). The SDT explained that it modified the definition for FRM to no longer reference another document. The revised definition reads "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."

A couple of the commenters had concerns with Requirement R5 in that it should reference "natural Frequency Response" as a third bullet. The SDT has explained that it removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT did not include the term "natural Frequency Response" within the standard itself but included it in the Background Document and Attachment A. The SDT felt that this provided additional clarity within the requirement and allowed for further explanation of the term in the Background Document and Attachment A.

Some commenters indicated that the use of an RSG as a method for supplying Frequency Response was not fully explained. The SDT modified the Background Document to further explain how an RSG (now FRSG) could be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

A couple commenters wanted the sampling interval to be tuned on a per Interconnection basis to support HQTE's characteristics. The SDT agreed and explained that it adjusted the event selection criteria to address concerns related to response driving frequency back to pre-event level during the B value measurement period and this adjustment should address their concern.

Organization	Yes or No	Question 4 Comment

Organization	Yes or No	Question 4 Comment
Seattle City Light	Negative	Answer: No. Comments: LADWP and SCL recommend that the Measures for Requirement 3 and Requirement 5 reflect their comments to Question 2.
Response: The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3.**		
Constellation Energy Commodities Group	No	Based on language modifications proposed to the Requirements, the measures should be revisited.
Response: The SDT has revised the Measures to align with modifications made to the Requirements.		
Xcel Energy	No	Based on our suggested changes to R3 in response to Question 2, the drafting team should modify M3 to be consistent with the proposed language.
Response: The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b.		
MRO NSRF	No	Based on suggested changes to R3 in response to Question 2, the drafting team should modify M3 to be consistent with the proposed language. Additionally, M1 should be revised to not reference a specific Form. The Form may be the format of choice but it should not be an implied requirement. Measures 3 and 4 identify the use of "operating logs" as evidence. Measure 2 identifies hard copy and electronic evidence, "or other evidence". We suggest calling out specifically "operator logs" for M2 also, in case there are system problems in capturing hard copy or electronic evidence during the short time window for implementation.
Response: The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b. **The SDT has modified Measure M1 which no longer references a form but does reference Attachment A to align with the requirement.**		

Organization	Yes or No	Question 4 Comment
The SDT is only providing examples ("…such as…") of what could be used to reflect compliance. Other evidence can be used as long as it reflects compliance with the standard.		
Bonneville Power Administration	No	BPA believes that historian data should be able to be used for evidence.
Response: The SDT is only providing examples ("…such as…") of what could be used to reflect compliance. Other evidence can be used as long as it reflects compliance with the standard. The SDT believes that the data from the software program "Historian" could be used to demonstrate compliance..		
Manitoba Hydro	No	It should be clarified that R1 requirement applies to a BA, where the BA doesn't belong to an RSG, or to an RSG. As it is currently drafted, the standard applies to each BA and each RSG. It is redundant in that each BA would need to comply, whether or not they are a member of an RSG that would also be required to comply. Further, the NERC Glossary definition of an RSG is a group of BAs that collectively maintain, allocate and supply operating reserves. No mention is made of the agreement including the sharing or delegation of responsibility related to FRM. Accordingly, the standard should only reference a BA being able to delegate responsibility to an RSG if the RSG Agreement allows for such delegation.
Response: The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. The SDT has modified the Applicability Section to clarify when a BA or FRSG is accountable for compliance. **The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."**		
Tucson Electric Power	No	It should be clear that historical data may be used to show compliance.
Response: The SDT is only providing examples ("…such as…") of what could be used to reflect compliance. Other evidence can be used as long as it reflects compliance with the standard. The SDT believes that the data used to reflect compliance would have to		

Organization	Yes or No	Question 4 Comment
be historical data.		
Seattle City Light/ Los Angeles Department of Water and Power	No	LADWP and SCL recommend that the Measures for Requirement 3 and Requirement 5 reflect their comments to Question 2.
Response: The SDT has removed Requirement R3 as it is duplicative of Requirements R6 & R7 in BAL-005-0.1b. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3.**		
ISO/RTO Council Standards Review Committee	No	M1: The measure should not be tied to a specific Form. If a BA has the evidence but does not provide it on a given Form, how is the reliability of the Power System impacted? The Form may be the format of choice but it should not be an implied requirement. M4: This measure does not read quite right. Something seems to be missing in the part that says: "...showing when Overlap Regulation Service is provided including Frequency Bias Setting calculation to demonstrate compliance with Requirement R4." This part might have read something like: "...showing that when it performed Overlap Regulation Service, it modified its Frequency Bias Setting in its ACE calculation or it calculated the Frequency Bias Setting meeting the conditions specified in Requirement R4."
Response: The SDT has modified Measure M1 which no longer references a form, however it does reference Attachment A to align with the associated requirement. **The SDT is only providing examples ("…such as…") of what could be used to reflect compliance. Other evidence can be used as long as it reflects compliance with the standard.** **The SDT has modified the Measure M4 to incorporate your suggested wording.**		
Independent Electricity	No	M4: This measure does not read quite right. Something seems to be missing in the

Organization	Yes or No	Question 4 Comment
System Operator		part that says: "...showing when Overlap Regulation Service is provided including Frequency Bias Setting calculation to demonstrate compliance with Requirement R4." This part might have read something like: "...showing that when it performed Overlap Regulation Service, it modified its Frequency Bias Setting in its ACE calculation or it calculated the Frequency Bias Setting meeting the conditions specified in Requirement R4."
Response: The SDT has modified the Measure M4 to incorporate your suggested wording.		
ERCOT	No	Measure should be modified to align with revised Requirements per ERCOT's comments on #1.
Response: The SDT has modified the Measures to align with the modifications to the Requirements.		
SERC OC Standards Review Group/ Progress Energy/ South Carolina Electric and Gas/ Duke Energy	No	See comments in Question 2 regarding utilization of the term "Reserve Sharing Group".
Response: Please see our response to your comments on Question 2 regarding "Reserve Sharing Group".		
Northeast Power Coordinating Council/ISO New England Inc.	No	The sampling interval needs to be tuned on a per Interconnection basis to support HQTE's characteristics.
Response: The SDT adjusted the event selection criteria to address concerns related to response driving frequency back to pre-event level during the B value measurement period. We believe that this adjustment addresses your concern.		
Florida Power & Light Company	No	What is meant by documented formulae for M5? Is a one time snapshoot of the AGC formual sufficien? The concept is ok but this needs clarification of proof.
Response: The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3.		

Organization	Yes or No	Question 4 Comment
Southwest Power Pool Regional Entity	Yes	Measures are more specific and measurable than seen in the past. This is a positive improvement.
Response: The SDT thanks you for your affirmative response and clarifying comment.		
Ameren	Yes	With the understanding that any suggested changes to the proposed requirements would come with corresponding changes to their measure.
Response: The SDT thanks you for your affirmative response and clarifying comment. The SDT agrees that any modification to a Requirement would necessitate a re-evaluation of the corresponding Measure.		
Imperial Irrigation District	Yes	
SPP Standards Review Group	Yes	
ACES Power Marketing Standards Collaborators	Yes	
Salt River Project	Yes	
Energy Mark, Inc.	Yes	
FMPP	Yes	
Associated Electric Cooperative Inc	Yes	
NV Energy	Yes	
Cleco Corporation	Yes	

Organization	Yes or No	Question 4 Comment
Great River Energy	Yes	
Hydro-Quebec TransEnergie	Yes	
Keen Resources Asia Ltd.	Yes	

5. The SDT has developed VSLs for the proposed Requirements within this standard. Do you agree with these VSLs? If not, please explain in the comment area.

Summary Consideration: Most of the commenters indicated that VSLs for Requirement R1 should not include language tied to whether or not a BA is in a single BA Interconnection or a multi-BA Interconnection. Frequency Response is an Interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections. Consider a small BA whose performance is 70% of its' FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.

Several commenters did not agree with the VSLs for Requirement R3. The SDT removed Requirement R3 from the revised standard since the requirement was duplicative of Requirement R6 & R7 in BAL-005-0.1b.

With concerns about the use of the RSG as a means to provide Frequency Response, the SDT modified the Background Document to further explain how an RSG (now FRSG) could be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

Organization	Yes or No	Question 5 Comment
Seattle City Light	Negative	Answer: No. Comments: LADWP and SCL recommend that either the VSL for Requirement 3 reflects its comments to Question 2, or that these comments be addressed as an exception in the Measure for Requirement 3.
Response: Based on Industry comments and further review, the drafting team has deleted R3 as the requirement is duplicative		

Organization	Yes or No	Question 5 Comment
with R6 and R7 in BAL-005-0.1b.		
Public Utility District No. 1 of Douglas County	Negative	1. The BA and interconnection meet the FRO differently. Suggest removing the interconnection performance from the VSL and develop additional levels of BA failure to meet its FRO.
Response: The drafting team does not agree, but believes an explanation would be helpful. VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections. Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.		
BrightSource Energy, Inc.	Negative	The negative vote from BrightSource is related to the proposed VSL only. The proposed VSLs for Requirement R1 treats a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO. Conforming changes to the VSLs would need to be made for any changes to the Requirements as suggested in the comments to the standard.
Response: The drafting team does not agree, but believes an explanation would be helpful. VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's		

Organization	Yes or No	Question 5 Comment
impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections. **Consider a small BA that whose performance is 70% of its FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.**		
U.S. Army Corps of Engineers; Platte River Power Authority; Pacific Gas and Electric Company; Idaho Power Company; Colorado Springs Utilities; California Energy Commission; California ISO; Clark Public Utilities; Tucson Electric Power Co.; Tri-State G & T Association, Inc.	Negative	The proposed VSLs for Requirement R1 treats a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO. Conforming changes to the VSLs would need to be made for any changes to the Requirements as suggested in the comments to the standard.
Response: The drafting team does not agree, but believes an explanation would be helpful. **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.** **Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response**		

Organization	Yes or No	Question 5 Comment
Obligation.		
Kansas City Power & Light Co.	Negative	The VSL for Requirement 3 does not sufficiently reflect a thoughtful range of violation severity of duration or number of instances by which AGC is not in Tie-Line Bias mode.
Response: Based on Industry comments and further review, the drafting team has deleted R3 as the requirement is duplicative with R6 and R7 in BAL-005-0.1b.		
ACES Power Marketing; East Kentucky Power Coop.; Hoosier Energy Rural Electric Cooperative, Inc.	Negative	The VSLs on for Requirement R1 set a previously un-established precedent of relying on the performance of other registered entities to establish the severity level of the violation. This is not appropriate. The VSLs should be rewritten to provide further gradations of the violation severity based on the BA's own performance.
Response: The drafting team does not agree, but believes an explanation would be helpful. **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.** **Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.**		
Southwest Transmission Cooperative, Inc.	Negative	The VSLs on for Requirement R1 set a previously un-established precedent of relying on the performance of other registered entities to establish the severity level of the violation. This is not appropriate. The VSLs should be rewritten to provide further gradations of the violation severity based on the BA's own

Organization	Yes or No	Question 5 Comment
		performance. The proposed VSLs for Requirement R1 treats a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO. Conforming changes to the VSLs would need to be made for any changes to the Requirements as suggested in the comments to the standard.
Response: The drafting team does not agree, but believes an explanation would be helpful. **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.** **Consider a small BA that whose performance is 70% of its FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.**		
Western Area Power Administration	Negative	Under compliance for R1, there is a difference between VSL levels whether the interconnection met is FRO or not. If the interconnection meets it's FRO but a single BA doesn't't meet its share of FRO the violation is considered low VSL, but, if the interconnection dosen't't meet it's FRO the same BA will have a High VSL. Obligation of the individual BA to meet its allocated FRO should always be applicable regardless of what other BAs are doing in the interconnection. This provision creates a disparity amongst BAs and creates a disparate treatment between the BAs who perform compared to those who don't.
Response: The drafting team does not agree, but believes an explanation would be helpful.		

Organization	Yes or No	Question 5 Comment
VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections. **Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.**		
Ameren Services; Ameren Energy Marketing Co./Ameren	Negative/No	It is not clear how the VSL for R1 uses the "Summation of the BA's FRM", when the requirement is BA or RSG specific.
Response: Based on comments, the drafting team has created a new definition for an entity called a Frequency Response Sharing Group (FRSG). FRSG performance may be calculated on one of two ways: • **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or** • **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.**		
Manitoba Hydro	Negative/No	The Violation Severity Levels for R1 penalize entities more severely depending on how the interconnection as a whole has performed. MH believes that BAs should only be held accountable for issues within their control and that the VSLs for R1 should be revised accordingly.
Response: The drafting team does not agree, but believes an explanation would be helpful. **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.**		

Organization	Yes or No	Question 5 Comment
Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.		
Constellation Energy Commodities Group	No	The language in the VSLs for R1 should be revisited based on the proposed language modifications above and should also clearly look to the FRM of a BA, group of BAs or RSG against the BA FRO not an Interconnection FRO.
Response: The drafting team has made conforming changes to VSLs based on wording changes to the Requirements. **Regarding the evaluation of the Interconnection, the drafting team does not agree, but believes an explanation would be helpful.** **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.** **Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections.** **The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.** **Based on comments, the drafting team has created a new definition for an entity called a Frequency Response Sharing Group (FRSG). FRSG performance may be calculated on one of two ways:**		

Organization	Yes or No	Question 5 Comment
• Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or • Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.		
Bonneville Power Administration	No	BPA believes that R1 needs to be more clear and concise as to what is being conveyed in the requirement. It is difficult to understand. The proposed VSLs for Requirement R1 treats a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO.BPA believes that conforming changes to the VSLs would need to be made for any changes to the Requirements as suggested in the comments to the standard.
Response: The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. We would welcome suggested wording changes that relay this concept more clearly. **With regard to removing a view of Interconnection performance, the drafting team does not agree, but believes an explanation would be helpful.** **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.** **Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency**		

Organization	Yes or No	Question 5 Comment
Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.		
Florida Power & Light Company	No	For R1 the low and high level descriptions appear to be identical and the high level is less than the medium risk level. For R3 there should be low, medium, and high levels. One BA not operating to TLB does not jepordize the Interconnection. Additionally, computer failures, database loads etc may require some period where TLB is not in service. Suggestion would be Lower VSL operation off of TLB for more than 5 but < 8 continuous hours or accumlative during the year of more than 8 < 16 hours. Medium VSL would be operation off of TLB for more than 8 but <16 continuous hours or accumlative during the year of more than 16 <24 hours. High VSL would be operation off of TLB for more than 16 <24 continuous hours or accumlative during the year of more than 36 <48 hours. Severe VLS would be >24 continuous hours off of TLB or accumlative of > 48.
Response: The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation. **Based on Industry comments and further review, the drafting team has deleted R3 as the requirement is duplicative with R6 and R7 in BAL-005-0.1b.**		
NV Energy	No	For R1, suggest that the VSL's not be dependent upon the aggregate performance of the BA's within an interconnection.
Response: The drafting team does not agree, but believes an explanation would be helpful. **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.**		

Organization	Yes or No	Question 5 Comment
Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.		
American Electric Power	No	It is not clear for R1 what the exact delineations are among Lower, Medium, High, and Severe VSL's.
Response: The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.		
Seattle City Light	No	LADWP and SCL recommend that either the VSL for Requirement 3 reflects its comments to Question 2, or that these comments be addressed as an exception in the Measure for Requirement 3.
Response: Based on Industry comments and further review, the drafting team has deleted R3 as the requirement is duplicative with R6 andR7 in BAL-005-0.1b.		
Los Angeles Department of Water and Power	No	LADWP recommends that either the VSL for Requirement 3 reflects its comments to Question 2, or that these comments be addressed as an exception in the Measure for Requirement 3.
Response: Based on Industry comments and further review, the drafting team has deleted R3 as the requirement is duplicative with R6 and R7 in BAL-005-0.1b.		
ReliabilityFirst	No	ReliabilityFirst thanks the SDT for their effort on this project. ReliabilityFirst has a number of concerns/questions related to the draft BAL-003-1 VSLs which include

Organization	Yes or No	Question 5 Comment
		the following: 1. General VSL Comment - For consistency with other standards, each VSL should begin with the phrase “The Responsible Entity...” or “The Balancing Authority”. This is consistent with the language of the requirement and correctly pinpoints the appropriate responsible entity. 2. VSL R1 Comment - Based on the FERC Guideline #3 “Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement”. ReliabilityFirst suggests the following modification:a. Lower VSL - The Responsible Entity achieved an annual FRM within an Interconnection that was equal to or more negative than the Interconnection’s FRO and the Responsible Entity’s FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FROb. Medium VSL - The Responsible Entity achieved an annual FRM within an Interconnection that was equal to or more negative than the Interconnection’s FRO and the Responsible Entity’s FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever one is the greater deviation from its FROc. High VSL - The responsible entity failed to achieve an annual FRM that is equal to or more negative than its FRO and the Responsible Entity’s, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FROd. Severe VSL - The responsible entity failed to achieve an annual FRM that is equal to or more negative than its FRO and the Responsible Entity’s FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO3. VSL R4 Comment - Based on the FERC Guideline #3 “Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement”. ReliabilityFirst suggests the following modification: a. Example for Lower VSL which should be carried throughout all four VSLs - The Balancing Authority incorrectly modified the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined

Organization	Yes or No	Question 5 Comment
		footprint setting-error less than 5% of the validated or calculated value4. VSL R5 Comment - Based on the FERC Guideline #3 "Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement". ReliabilityFirst suggests the following modification: a. Example for Lower VSL which should be carried throughout all four VSLs - The Balancing Authority used a monthly average Frequency Bias Setting whose absolute value was less than or equal to 5% below the minimum specified by the ERO.
Response: While there may be a better way to lay out the VSL, the VSL for R1 is consistent with R1 in that performance can be reported either as a single BA or as an RSG. The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation. **The drafting team has modified the VSLs for R4 based on your comments. The SDT removed Requirement R5 and combined it into revised Requirement R2 and new Requirement R3.**		
Progress Energy / South Carolina Electric and Gas/Duke Energy	No	See comments in Question 2 regarding utilization of the term "Reserve Sharing Group".
Response: Based on comments, the drafting team has created a new definition for an entity called a Frequency Response Sharing Group (FRSG). **Similar to traditional Reserve Sharing Groups for Contingency Reserves, FRSGs as proposed in this standard , are voluntary organizations whose members determine the terms and conditions of participation. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRFSGs, but allows them as a means to meet one of the FERC's Order No. 693 directives.** **FRSG performance may be calculated on one of two ways:** • **Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or**		

Organization	Yes or No	Question 5 Comment
• **Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual annual performance.**		
SERC OC Standards Review Group	No	See comments in Question 2 regarding utilization of the term "Reserve Sharing Group". VSL for R1:The draft VSLs for R1 uses the summation of FRM for all BAs within an Interconnection as a factor in determining the applicable VSL. This does not seem consistent with R1. R1 is about a single BA and the individual BA's frequency response performance as measured by the FRM for that specific BA. Including the FRM summation of the Interconnection expands R1. It appears that a BA that is non-compliant with R1 could end up with either a Low/Medium or High/Severe VSL based upon the FRO performance of the Interconnection. The FRM performance of the Interconnection is beyond the knowledge and control of a single BA and should not be a determinate of the applicable VSL.Is there a technical basis for selection of the 1%, 30% and 15MW/.1 Hz VSL breakpoints? Does the Lower VSL give a 1% dead band to a BA's FRO? If so, will this be acceptable to NERC/FERC? VSL for R2:The VSL should reflect the language used in the requirement. R2 says a BA "not participating in Overlap Regulation service shall ....", while the VSL says a BA "not receiving Overlap Regulation Service....." The VSL language is not consistent with the requirement. VSLs for R5:Since Frequency Bias Setting is expressed as a negative value, the terms "absolute value" and "less than" must be used carefully. Wouldn't the "absolute value" of a BA's Frequency Bias Setting always be positive and thus it could never be less than the minimum specified by the ERO (a negative value)?
Response: With regard to R1, VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.		

Organization	Yes or No	Question 5 Comment
The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation. **Regarding the 1%, 30% and 15MW breakpoints, the 1% value accommodates rounding error. The 30% or 15MW/0.1Hz is intended to comparably address both large and small BAs. The drafting team used its judgment in selecting these values and cannot predict what the FERC might accept.** **The SDT has modified the VSLs for Requirement R2 to correctly match the requirement.** **The SDT has removed Requirement R5 from the proposed standard and combined it into Requirements R2 and R3. Requirement R2 no longer references "absolute value" and Requirement R3 references "absolute value" only as a comparison to another "absolute value".**		
Western Electricity Coordinating Council	No	The proposed VSLs for Requirement R1 treat a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO.

Organization	Yes or No	Question 5 Comment
		Response: The drafting team does not agree, but believes an explanation would be helpful. **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.** **Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response.** **To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections.** **The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.**
JEA Electric Compliance/ MRO NSRF	No	The proposed VSLs for Requirement R1 treats a BA that did not meet the FRO requirement differently depending on whether or not the Interconnection met the FRO requirement. The obligation of the BA to meet its allocated FRO should be consistent regardless of what the other entities within the interconnection are doing. Suggest removing the interconnection performance from the VSLs and developing four increasing levels of BA failure to meet its FRO.
		Response: The drafting team does not agree, but believes an explanation would be helpful. **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.**

Organization	Yes or No	Question 5 Comment
Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. **To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections.** **The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.**		
Northeast Power Coordinating Council	No	The violation severity levels for R1 are reasonable. The technical writing needs to be enhanced for clarity.
Response: Thank you for the comment. The drafting team will look at ways to clarify the wording or provide an explanation in the Background Document.		
ISO New England Inc	No	The violation severity levels for R1 seem to be reasonable. However, the technical writing needs to be enhanced for clarity
Response: Thank you for the comment. The drafting team will look at ways to clarify the wording or provide an explanation in the Background Document.		
SPP Standards Review Group/Cleco Corporation	No	The VSLs for R2 are based on 5, 15 and 25 days. What was the justification for these values? Could we just as well use 10, 20 and 30 or some other set of values? In R3, we understand that brief periods of operation outside of TLB control are allowable providing 1) continued operation in TLB control would create ARI on the Interconnection or 2) that justification is provided for the periods when TLB is not used. For example, if something happens within our EMS that disables TLB control

Organization	Yes or No	Question 5 Comment
		are we compliant if we document the period as an EMS malfunction?
Response: Regarding R2, the time windows were based on judgment of the drafting team. Similar to the commenters' question, the team could have chosen 1, 7, 14 and 28 days or 1, 2, 3 or 4 days to frame the four levels of VSLs. The SDT has modified Attachment A to allow an implementation window of 3 days for implementation of the Frequency Bias Setting. **With regard to R3, the drafting team has deleted R3 as the requirement is duplicative with R6 and R7 in BAL-005-0.1b.**		
ACES Power Marketing Standards Collaborators/Great River Energy	No	The VSLs on for Requirement R1 set a previously un-established precedent of relying on the performance of other registered entities to establish the severity level of the violation. This is not appropriate. The VSLs should be rewritten to provide further gradations of the violation severity based on the BA's own performance.
Response: The drafting team does not agree, but believes an explanation would be helpful. **VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections.** **Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections.** **The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively. However, the SDT has added language to the requirement to reference the Interconnection Frequency Response Obligation.**		
Southern Company	No	VSL for R2:We suggest the language in the VSL be consistent with the language

Organization	Yes or No	Question 5 Comment
		used in the Requirement. The VSL for R2 says a BA 'not receiving Overlap Regulation Service.....' R2 says a BA 'not participating in Overlap Regulation service shall .....' VSLs for R5:Since Frequency Bias Setting is expressed as a negative value, the terms "absolute value" and "less than" must be used carefully. This VSL uses "absolute value" when referring to the BA's Frequency Bias Setting, but does not use "absolute value" when referring to the Frequency Response Obligation, or minimum value specified by the ERO. Consider revising this VSL so that a true comparison can be made.
Response: We agree with your suggested change for the VSL for R2 and corrected the mismatch between the requirement and the VSLs. **The SDT has removed Requirement R5 from the proposed standard and combined it into Requirements R2 and R3. Requirement R2 no longer references "absolute value" and Requirement R3 references "absolute value" only as a comparison to another "absolute value".**		
Tucson Electric Power	No	VSL's could be clearer and simpler. Allowance for the testing of other AGC modes should be considered.
Response: The drafting team has made changes to VSLs based on specific suggestions. Regarding AGC operation, the drafting team has deleted R3 as the requirement is duplicative with R6 and R7 in BAL-005-0.1b.		
Southwest Power Pool Regional Entity	Yes	Hard to follow the language for the VSL for R1. Suggest using formulas for ease of interpretation or provide an example in the Supporting Documentation.
Response: The drafting team will provide an explanation in the Background Document.		
Associated Electric Cooperative Inc	Yes	The VSLs appear reasonable for the risk and particularly where they assess higher severity when the BA or RSG Interconnection's performance was sub-standard as well.

Organization	Yes or No	Question 5 Comment
Response: Thank you for your comment.		
ISO/RTO Council Standards Review Committee	Yes	We do not have any issues with the VSLs, but wonder if the wording for R1 should have been "...Reserve Sharing Group's...". Alternatively, the wording after "interconnection's FRO" could be revised to: "...and the Balancing Authority's or the Reserve Sharing Group's FRM was..."
Response: The drafting team agrees and has made this change.		
Independent Electricity System Operator	Yes	We do not have any issues with the VSLs, but wonder if the wording for R1 should have been "...Reserve Sharing Group's...". Alternatively, the wording after "interconnection's FRO" could be revised to: "...and the Balancing Authority's or the Reserve Sharing Group's FRM was..."
Response: The drafting team agrees and has made this change.		
Texas Reliability Entity	Yes	We suggest that the Severe VSL for R3 is confusing and should be clarified as follows: "A Balancing Authority not receiving Overlap Regulation service failed to operate AGC in Tie Line Bias mode, when operation in Tie Line Bias mode would not have had an Adverse Reliability Impact on the Balancing Authority's Area."
Response: Regarding AGC operation, the drafting team has deleted R3 as the requirement is duplicative with R6 and R7 in BAL-005-0.1b.		
Imperial Irrigation District	Yes	
Salt River Project	Yes	
Energy Mark, Inc.	Yes	
FMPP	Yes	

Organization	Yes or No	Question 5 Comment
Xcel Energy	Yes	
Hydro-Quebec TransEnergie	Yes	
Keen Resources Asia Ltd.	Yes	

6. The SDT divided the previously posted "Attachment A – Background Document" into two documents to provide additional clarity. The first document "Attachment A- Supporting Document" which details the methods used to develop the events to be analyzed, the FRO, FRM and Frequency Bias Setting. Do you agree that the revised Attachment A – Supporting Document provides sufficient clarity on the methodologies to be used? If not, please explain in the comment area.

Summary Consideration: The majority of the commenters pointed out that there was a discrepancy between Attachment A and the Background Document concerning the methodology used to calculate FRO. The SDT addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that Interconnection.

Several of the commenters indicated that the proposed standard did not provide a limit on the amount of Frequency Response that a BA was supposed to provide. The SDT added Paragraph #8 in Attachment A under the Event Selection Criteria to clarify that events greater than the limit in the criteria would be capped at a certain limit. This translates to a maximum expectation of Frequency Response equal to a Balancing Authority's FRO times the number of .1 Hz shown in Table 2 in Attachment A.

Some commenters were confused about the intent of Attachment A. They indicated that Attachment A was describing both a methodology to select events and providing a background for the process (not a process/methodology). The intent of Attachment A is to describe the process that will be used. There is no intent to require a filing on a certain date and to have the BA prove to the auditor that a filing was made on that date. Rather the requirement is to have an FRM that provides at least the response required of a BA based on it's FRO and provide a high-level overview of the mechanical parts of the process. The drafting team has modified the Requirements and Attachments to address the concerns raised by the comments that requirements were in the Attachments. In order to explain the process, the drafting team believes the information needs to be attached to the standard such that it cannot be changed without input from the industry.

As to the use of the term "may" in the attachment, at this time the drafting team is unable to further restrict the language due to the issues surrounding an individual event. As an example, frequency is scheduled at 60 Hz most of the time. However, when viewed on a graph or an EMS screen, it rarely sits at 60.000 for a long period of time, it fluctuates between 59.995 and 60.005. The drafting team is unable to say at this time that an event that starts with frequency at 60.005 is materially different than an event that starts at 59.995. Therefore, the drafting team has attempted to put guidance into the document as to what is pertinent without attempting to be overly restrictive in the selection criteria since there is no support for a restriction at this time. As more experience is gained, the process should be refined. If the refinement is significant enough to require a change to the Attachment A language, the process required to do so would be open to participation of industry and not done without public exposure.

A couple of commenters said that using older data for compliance could cause an entity to be in "double jeopardy". The SDT discussed the concern of double jeopardy several times. At this time, the drafting team believes the issue of noise in individual events and the convergence of measurement of multiple events outweighs the double jeopardy concerns. The drafting team has, however, reduced the minimum number of events in a 12 month period to 20 from 25 but is still recommending that events from a previous year be used for the calculation if this number of events cannot be found in that period.

A few o commenters indicated that the allocation of the FRO to the BAs was a "top down" approach. The SDT agrees with some of the comments made, but not in the conclusion drawn from the individual points. There is not currently an obligation to provide any amount of frequency response to a sudden change in interconnection frequency. The proposed standard addresses this shortcoming in the proposed standard.

The drafting team has also reduced the initial reduction in the minimum Frequency Bias Setting to ensure that the reduction can be studied closely to ensure no detrimental impact on the reliable operation of the Bulk Electric System.

Finally, there is ongoing disagreement in the industry as to whether it is desired to have a minimum Frequency Bias Setting that is significantly greater than the Frequency Response Characteristic.

A couple of commenters questioned whether point B was 18 seconds after the start of the disturbance. The SDT revised the language in the document to provide clarity on the 18 seconds. To the extent that the language is related to a specific definition of steady frequency, this has been worded intentionally to allow the process being developed by the ERO (specifically the Resources Subcommittee and the Frequency Working Group) to be adjusted based on experience that will only be gained through evaluation of actual events over the course of the next few years. Until that experience is gained, there will need to be some leeway in the process. The drafting team believes that the level of guidance provided in Attachment A is appropriate based on the information currently available.

Organization	Yes or No	Question 6 Comment
Western Area Power Administration, Western Area Power Administration - UGP Marketing	Negative	4. The allocation of FRO among BAs is a top-down approach instead of bottom up approach currently used. Currently, BAs calculate their FRC and set their Bias based on the greater of 1% peak load (1% generation for gen only BAs), or the average of frequency response characteristic of their BA over a year (FRC). These calculated individual biases get summed up and it becomes the Interconnection Bias value. The proposed standard has identified a set MW (for Western Interconnection 685 MW for

Organization	Yes or No	Question 6 Comment
		0.1 of HZ) and is allocating it among all BAs. The individual BA's allocated FRO is much lower than what BAs obligations' presently are since the proposed standard lowers the bar for the BAs. The current approach is definitely superior to what is proposed since it more closely matches with the characteristic of the system and it protect the interconnection by requiring larger contribution than proposed standard. 5. The allocation of FRO among the BAs in the interconnection favors the BAs with more load than more installed capacity
Response: 4. The drafting team agrees with some of the comments made here but not in the conclusion you draw from the individual points. There is not currently an obligation to provide any amount of frequency response to a sudden change in the interconnection frequency. The proposed standard addresses this shortcoming in the current standard. The drafting team has also reduced the initial reduction in the minimum Frequency Bias Setting to ensure that the reduction can be studied closely to ensure no detrimental impact on the reliable operation of the Bulk Electric System. Finally, there is ongoing disagreement in the industry as to whether it is desired to have a minimum Frequency Bias Setting that is significantly greater than the Frequency Response Characteristic. Please refer to Order 693 P371 for further information on this issue. **5) After further discussion, the drafting team believes that the proposed allocation methodology does not favor any specific type of entity. To the extent that the commenter believes that the allocation favors any specific type of entity, the commenter should provide detailed reasoning of its position, not just an unsupported statement. The drafting team was unable to find any basis for this position during our discussions of the proposed allocation methodology. The drafting team will also point out that installed capacity is not a part of the calculation. The proposed allocation methodology, which has been clarified in the revised documents, utilizes monthly average peak generation and average peak load.**		
Seattle City Light	Negative	Answer: No. Comments: o LADWP and SCL consider the increase in number of events to analyze (now 25) to be excessive. Previous years analyses typically involved 4-6 events; a permanent five-fold increase is not justified. SCL suggests reducing the baseline number of events from 25 to 12 per year. Analysis of a larger number of events could be requested on a year-by-year basis if conditions warrant, but should not be mandatory for all regions in all years.

Organization	Yes or No	Question 6 Comment
Response: The studies from the field trial show a convergence of the measurement after approximately 20 to 25 events. Based on the studies, the drafting team believes that a sample size as suggested would be very likely to cause entities to fail inappropriately due to the large amount of noise in the data related to each event. Additionally, there is a desire to ensure that the events picked are not weighted in such a way to cause the measurements to be increased over actual response. The drafting team has attempted to minimize the effort required of the reporting entities by developing the forms needed to calculate the FRM. Finally, the calculation process is being used for more than the previous process, not to mention that the previous process is not clearly defined and therefore not be used consistently across the industry.		
Alliant Energy Corp. Services, Inc.	Negative	Confusion exists around the "peak load" in that Attachment A states the allocastion is based on Projected Peak Loads and Generation but the Background Document states it will use historical Peak and Generation to make the allocation. - There appears to be a difference in how FRO is calculated in Attachment A and what is described in the Background Document. These differences should be reconciled such that both documents address the same approach. If installed capacity is used in the equation in Attachment A, how are variable/intermittent resources (e.g. wind, solar) accounted for? At full capacity of something less - please clarify. – It is not clear if there is an upper limit to the amount of frequcncy response expected of the BA's under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of FR expected on a total basis. BA's need to know for how many tenths of a hertz they are to respond so they can determine how to plan to meet the requirements.
Response: The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. The drafting team has added a paragraph in the FRM section of Attachment A limiting the amount of Frequency Response for which a BA will be measured for compliance purposes. This translates to a maximum expectation of Frequency Response equal to a Balancing Authority's FRO times the number of .1 Hz shown in Table 2 in Attachment A.		
BrightSource Energy, Inc.; Clark Public Utilities; Tri-State	Negative	Confusion exists between Attachment A and the Background Document. Attachment A states peak load allocation is based on "Projected" Peak Loads and Generation, but

Organization	Yes or No	Question 6 Comment
G & T Association, Inc.; Tucson Electric Power Co.; U.S. Army Corps of Engineers; South California Edison ; Platte River Power Authority; Pacific Gas and Electric Company; Colorado Springs Utilities; Idaho Power Company; California Energy Commission; California ISO; Deseret Power		the Background Document states it will use “historical” Peak Load and Generation. Reducing frequency bias obligation is detrimental to reliability. It seems that Lowering the Minimum Frequency Bias Setting from 1% to .8% will result in a lower response, which in turn will lower the natural frequency response. Over time it seems this pattern would lead to poorer response. The standard is unclear as to if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of Frequency Response expected on a total basis. Balancing Authorities need to know for how many tenths of a hertz they are to respond so they can determine how to plan to meet this requirement. The documents do not appear to provide any boundary on the maximum amount of Frequency Response that a BA will provide, i.e. it is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz or in the Western Interconnection that causes the frequency to drop to less than 59.5 Hz, or if that event is excluded from the list used to calculate the Balancing Authorities’ response or is it included with an expectation that it counts the same as any other event. Without a clear statement of what is expected, including whether there is a limit on that expectation or not, it is unclear what is expected of the Balancing Authorities. Finally, why are there no requirements on governor installation, settings, and operation for a frequency response standard?
Response: The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. **A reduction in the Frequency Bias Setting (FBS) may reduce the amount of AGC responses to a change in frequency. However, the drafting team has ensured that the FBS does not dip below the actual frequency response to ensure that the Frequency Response**		

Organization	Yes or No	Question 6 Comment
is not withdrawn due to AGC action. With that said, there is currently not an obligation to provide any amount of frequency response to a sudden change in the interconnection's frequency. The proposed standard addresses this shortcoming in the current standard. The drafting team has modified the initial reduction in the minimum Frequency Bias Setting to ensure that the reduction can be studied closely to ensure no detrimental impact on the reliable operation of the Bulk Electric System. Finally, there is ongoing disagreement in the industry as to whether it is desired to have a minimum Frequency Bias Setting that is significantly greater than the Frequency Response Characteristic. Please refer to Order 693 P371 for further information on this issue. **The drafting team has added a paragraph in the FRM section of Attachment A limiting the amount of Frequency Response for which a BA will be measured for compliance purposes. This translates to a maximum expectation of Frequency Response equal to a Balancing Authority's FRO times the number of .1 Hz shown in Table 2 in Attachment A.** **The drafting team is operating under the Standard Authorization Requests (SARs) as approved. This drafting team believes that proposing a generator requirement is beyond the scope of the SARs. To the extent that the commenter believes there is a need to have a reliability standard related to generators, the drafting team would suggest that the commenter submit a SAR to begin the development process.**		
Beaches Energy Services; City of Bartow, Florida; Tampa Electric Co.	Negative	On Event Selection Criteria, bullet 2, if 25 events cannot be identified then the ERO can go back in time to the previous year. This creates a double jeopardy to R1 of the standard. It also may include irrelevant data if there have been changes from one year to the next in FRO or Bias settings assigned by the ERO. On Frequency Response Obligation, first paragraph states that "Each Interconnection will establish target contingency protection criteria"; however, the Interconnection is not a decision-making body. Does this really mean the ERO will establish FRO for each Interconnection? The single asterisk note for the table on page 2 states: "It is extremely unlikely that an event elsewhere in the Eastern Interconnection would cause the Florida UFLS special protection scheme to "false trip".", "Special protection scheme" should be stricken from this sentence, Florida has just a regional difference in its UFLS program.
Response: The drafting team has discussed the concern of double jeopardy several times. At this time, the drafting team believes the issue of noise in individual events and the convergence of measurement of multiple events outweighs the double jeopardy		

Organization	Yes or No	Question 6 Comment
concerns. After further discussions, the drafting team has reduced the minimum number of events in a 12 month period to 20 from 25 but is still recommending that events from a previous year be used for the calculation if this number of events cannot be found in that period. **The drafting team modified the language to clarify that the ERO will set the IFRO.** **This modification was made.**		
Salmon River Electric Cooperative	Negative	We feel that the drafting team has done an excellent job of providing clarify and reasonable reporting requirements to the right functional entity. We support the modifications but would like to have two additional minor modification in order to provide additional clarification to the Attachment I Event Table. We suggest the following clarifications: For the Event: BES Emergency resulting in automatic firm load shedding Modify the Entity with Reporting Responsibility to: Each DP or TOP that experiences the automatic load shedding within their respective distribution serving or Transmission Operating area. For the Event: Loss of Firm load for = 15 Minutes Modify the Entity with Reporting Responsibility to: Each BA, TOP, DP that experiences the loss of firm load within their respective balancing, Transmission operating, or distribution serving area. With these modifications or similar modifications we fully support the proposed Standard.
Response: The drafting team understands that this comment was submitted under the wrong project.		
FMPP	No	o Item 2 should be changed as follows: The ERO will identify at least 25 frequency excursion events in each Interconnection for calculating the Frequency Bias Setting and the FRM. If the ERO cannot identify in a given evaluation period 25 frequency excursion events satisfying the limits specified in criteria 3 below, then similar acceptable events from the previous evaluation period also satisfying listed criteria will be included with the data set by the ERO for determining FRS compliance. (as written this item could cause double jeopardy for event from the previous period) o Under FRO for the Interconnection the first sentence should be changed as follows: "The ERO {Each Interconnection (delete these words)} will establish target

Organization	Yes or No	Question 6 Comment
		contingency protection criteria for each Interconnection." (each Interconnection is not a governing entity) o The footnote under Table 2 of Attachment A should be changed as follows: The Eastern Interconnection set point listed is a compromise value for the highest UFLS step setting of 59.5Hz used in the east and the {special protection scheme's (delete these words)} highest UFLS step setting of 59.7Hz used in Florida. It is extremely unlikely that an event elsewhere in the Eastern Interconnection would cause the Florida UFLS {special protection scheme (delete these words)} to "false trip". (this is not a special protection system; it is just an UFLS)
Response: The drafting team has discussed the concern of double jeopardy several times. At this time, the drafting team believes the issue of noise in individual events and the convergence of measurement of multiple events outweighs the double jeopardy concerns. After further discussions, the drafting team has reduced the minimum number of events in a 12 month period to 20 from 25 but is still recommending that events from a previous year be used for the calculation if this number of events cannot be found in that period. **The drafting team modified the language to clarify that the ERO will set the IFRO.** **This modification was made.**		
Seattle City Light	No	o LADWP and SCL consider the increase in number of events to analyze (now 25) to be excessive. Previous years analyses typically involved 4-6 events; a permanent five-fold increase is not justified. SCL suggests reducing the baseline number of events from 25 to 12 per year. Analysis of a larger number of events could be requested on a year-by-year basis if conditions warrant, but should not be mandatory for all regions in all years.
Response: The studies from the field trial show a convergence of the measurement after approximately 20 to 25 events. Based on the studies, the drafting team believes that a sample size as suggested would be very likely to cause entities to fail inappropriately due to the large amount of noise in the data related to each event. Additionally, there is a desire to ensure that the events picked are not weighted in such a way to cause the measurements to be increased over actual response. The drafting team has attempted to minimize the effort required of the reporting entities by developing the forms needed to calculate the FRM. Finally,		

Organization	Yes or No	Question 6 Comment
the calculation process is being used for more than the previous process, not to mention that the previous process is not clearly defined and therefore not used consistently across the industry.		
Manitoba Hydro	No	1. p.2 refers to each "Interconnection" establishing target contingency protection criteria. However, an "Interconnection" as defined in the NERC Glossary is an electrical system, not a Responsible Entity. This should be revised to clarify which Responsible Entities must establish the protection criteria. 2. Table 2, although entitled "Interconnection Frequency Response Obligations" does not use the term FRO in the Table itself. This terminology should be consistent. 3. There is no clear statement in Attachment A identifying the significance of Table 2. The previous paragraph identifies Table 2 as listing "default targets", but how does this relate to the FRO referenced in R1? 4. The "Note" on p.2 regarding the ERO being able to use additional events that don't satisfy the criteria is unreasonable as drafted. Since these events are used to calculate the Frequency Bias Setting and FRM (as per p.1, s.2), the selection of events should not be at the unfettered discretion of the ERO. As drafted, no grounds or criteria must be satisfied.
Response:1. The drafting team modified the language to clarify that the ERO will set the IFRO. **2. The drafting team modified the table to ensure consistent terminology is used.** **3. The drafting team modified Attachment A to clarify the importance and explain the calculations made to get to the Interconnection FRO.** **4. The drafting team revised the note to clarify that the ERO may use any event, regardless of size or other condition, in its evaluation of Interconnection Frequency Response. However, these additional events will not be used for evaluation of BA response compliance.**		
FPL	No	3. - How many seconds of observation for "Delta F"? Does "Point C" in a. refer to "Figure 1 - Classic Frequency Excursion and Recovery" from NERC's Survey

Organization	Yes or No	Question 6 Comment
		Instructions document dated September 1, 2010? If so it should be included in this document along with the added 8 and 18 second time lines being shown. What is a "narrow range" in item b.? 4. - Better define "relatively steady" (i.e. within a specific range and state it?) Also, "near 60.000 Hz" is not precise enough (i.e. if the event begins below 60.000 Hz, what range or time error correction is to be considered acceptable?) Is the "A" value also part of the figure cited in 3? 5. - Is the "B" value also part of the figure cited in 3? 6. - Change "should be excluded" to "will be excluded". 7. - Better explain "the cleanest 2 or 3 frequency excursion events" or remove the word "cleanest". Page 2 paragraph 5: Provide specific dates for the "quarterly postings" and where these will be posted (i.e. Internet address or other). Clarify the December 15 ERO annual post date with the dates stated for same posting on Page 3 paragraph 5 and the BA's January 10 deadline. The BA posts 30 days from which date? This is confusing. Page 2 Table 2: What of starting event frequencies that are < 60 Hz? Why is the "Highest UFLS" 59.6 when the Florida setting for its load is 59.7? Page 3 FRO equation: Page 4 of the "Frequency Response Standard Background Document, October 2011" also shows this equation but uses different terms. Make the same on both documents. In the Background Document each component of the numerator is explained and reference is made to FERC Form 714 to obtain these values. There is no reference to this form for the denominator values. All of this needs to be made clear with reference to FERC Form 714 on Attachment A.
Response: 3. The SDT has modified the titles of the columns in Table 1 of the Procedure document to clarify what was intended by the table. The Point C value is defined in section 3a.		

Organization	Yes or No	Question 6 Comment
4 - Due to the complicated nature of event evaluation and selection, the drafting team has retained the words "relatively steady" and "near 60" in the document without providing further clarification or definition. The drafting team believes that the process being developed by NERC (specifically the NERC Resources Subcommittee and the Frequency Working Group) requires some leeway. As more experience in gained, the NERC Resources Subcommittee will attempt to document the process further. **5 – No, the B value is a calculated value not shown in the chart referenced in number 3 above. Additional language has been added in Attachment A to clarify both the A value and the B value. The A and B values are shown on Figure 2 of the Background document as green and red lines, respectively.** **6 – The drafting team modified this language.** **7 – Due to the complicated nature of event evaluation and selection, the drafting team has retained the word "cleanest" in the document without providing further clarification or definition. The drafting team believes that the process being developed by NERC (specifically the NERC Resources Subcommittee and the Frequency Working Group) requires some leeway. As more experience in gained, the NERC Resources Subcommittee will attempt to document the process further.** **NERC is developing this part of the process and an area to post this information. The drafting team has put clear language in the attachment requiring at least quarterly posting of events. It is currently the drafting team's expectation that a list of potential events would be posted shortly after they actually occur and a refined list will be made available quarterly.** **Modifications to Table 2 have been made to clarify what is being used.** **Attachment A and the Background Document have been modified so that the FRO Allocation equation is the same and the terms are fully explained.**		
Tucson Electric Power	No	Attachment A creates additional requirements to the BAL-003-1 Standard. The arrested value of frequency observed within 8 seconds may not be long enough in some instances. The delta F in the West should be greater than 0.05 Hz to ensure a measurable frequency response. West Under Frequency should be set at 59.95 Hz. There is no reliability concern for Over Frequency. Does 18 seconds after the start of the disturbance set point B?

Organization	Yes or No	Question 6 Comment
		Pre-disturbance frequency should be relatively steady and near 60.000 Hz is vague. TEP feels that the ERO should not need to validate a BAs frequency bias setting.
Response: The drafting team has modified the standard to put the requirements there and use Attachment A to clarify the process. **After further discussion and review of the events in the Western Interconnection Form 1 for 2011, the drafting team has modified the Delta C and Under Frequency values in Table 1.** **Based on language in Order 693 P355, the drafting team believes that frequency response is needed in both directions, not just one.** **The drafting team has revised the language in the document to provide clarity on the 18 seconds. To the extent that the language related to a specific definition of steady frequency, this has been worded intentionally to allow the process being developed by the ERO (specifically the Resources Subcommittee and the Frequency Working Group) to be adjusted based on experience that will only be gained through evaluation of actual events over the course of the next few years. Until that experience is gained, there will need to be some leeway in the process. The drafting team believes that the level of guidance provided in Attachment A is appropriate based on the information currently available.** **Due to level of detail being used to determine the FBS and FRM as well as the interactions between this standard and others, the drafting team disagrees with the commenter and continues to recommend the ERO validate the FBS of each BA.**		
Bonneville Power Administration	No	BPA believes that Attachment A adds additional requirements to the standard. Confusion exists between Attachment A and the Background Document. Attachment A states peak load allocation is based on “Projected” Peak Loads and Generation, but the Background Document states it will use “historical” Peak Load and Generation. 3a: it may take longer than 8 seconds in some disturbances. This should be 10 seconds. .05 Hz Delta F is not low enough for the Western Interconnection, it should be .075Hz to ensure there is measurable frequency response for the interconnection. Also, under frequency should be set at 59.95 Hz. BPA does not believe there is a reliability need to include over frequency events.

Organization	Yes or No	Question 6 Comment
		3b: It is unclear if the 18 seconds is setting the B point. If this is the B point, BPA believes it should be changed to 25 seconds for the Western Interconnection. 4. Please define relatively steady and near 60 Hz. 6: For the Western Interconnection, BPA believes this needs to be 10 minutes at the top of the hour. As mid hour scheduling becomes more prevalent, the ramping at the bottom of the hour will have to be taken into account. FRO for the interconnection: Starting frequency should be the FTL limit. With RBC in place, the frequency is seldom at 60 Hz. BPA understands the theory behind setting the base obligation to the values listed in table 2. BPA would like to know if there were any studies performed to validate setting the FRO for the interconnection to such a low level? BA FRO and frequency bias setting: BPA does not agree with ERO assigning a Frequency Bias setting to each BA. This calculation is indicated as the initial FRO allocation, what is the process for changing it? BPA believes this should go through the standard drafting process for any changes. The calculation should use Peak online capacity, not the installed capacity. This would lead to the denominator being 2 X Peak projected load for the interconnection. BPA has approximately 35,000 MW of installed generation, and has never seen the actual coincidental generation go over 21,000 MW. Again, BPA doesn't believe the ERO should be validating the frequency bias setting. It is unclear to BPA how variable bias is being addressed in the standard.

Response: The drafting team has modified the requirements to address comments. The drafting team believes as modified the requirements are stated in the standard and the process to be used is in the Attachment.

The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection.

The drafting team has revised the language in the document to provide clarity on the 18 seconds. The drafting team has also

Organization	Yes or No	Question 6 Comment
		attempted to clarify that the B Value is the average of the scan rate data for the period from 20 to 52 seconds following the start of the event. The event selection criteria will use the frequency approximately 18 seconds (prior to the start of the B Value period) to as frequency level to determine if the change in frequency qualifies as an event for the purposes of this standard. Based on event information for the 12 month period beginning December 2010, the drafting team has modified the frequency levels used for event qualification but did not modify the 18 second frequency point. To the extent that the language related to a specific definition of steady frequency, this has been worded intentionally to allow the process being developed by the ERO (specifically the Resources Subcommittee and the Frequency Working Group) to be adjusted based on experience that will only be gained through evaluation of actual events over the course of the next few years. Until that experience is gained, there will need to be some leeway in the process. The drafting team believes that the level of guidance provided in Attachment A is appropriate based on the information currently available. Both the NERC Resources Subcommittee (RS) and the NERC Transmission Issues Subcommittee (TIS) evaluated the level of response needed. The drafting team decided to use the limits determined by the RS over that determined by the TIS after evaluation of both. The documents developed by both of these subcommittees are available on the NERC website under this project (http://www.nerc.com/filez/standards/Frequency_Response-RF.html). The drafting team clarifies that the ERO is not assigning the Frequency Bias Setting. The ERO will review the data to determine that the Frequency Response Measure is correctly determined by the BA and that the Frequency Bias Setting is therefore correct. The expected process is that a subcommittee under NERC will review the Form 1 and Form 2 for each entity to ensure that the BA correctly filled out the form. Assuming the BA has correctly filled out these forms, there is no ERO interaction with the number provided by the BA. The FRO calculation is being included in the Attachment A to ensure that the process to modify the calculation would need to be open to industry input. It is not appropriate to put it in a requirement since it would not make sense to make a requirement that the FRO be allocated in a certain manner. The proposed methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity. The drafting team revised the requirements to separate the variable bias requirement from the fixed bias setting requirement and provide clarity related to what is expected in a variable bias setting.
Energy Mark, Inc.	No	Comment 6: "If the ERO cannot identify in a given evaluation period 25 frequency excursion events satisfying the limits specified in criteria 3 below, then similar acceptable events from the previous evaluation period also satisfying listed criteria

Organization	Yes or No	Question 6 Comment
		will be included with the data set by the ERO for determining FRS compliance." I believe that the better alternative in this case would be to use the lesser number of events. This is partly based on the consideration that if there are fewer events, the risk to the interconnection for that year was less that expected, and as a result, evaluation of fewer events will not compromise interconnection reliability. If fewer than 25 events are available in any year, the selection criteria should be adjusted to select more events. Comment 7: There are a number of problems with the use of "median" Frequency Response of the measured events. These problems make a choice other than median preferable. The following comments list some of those problems. Comment 8: The current standard uses average Frequency Response of selected events. This makes the current standard incompatible with the use of median. Comment 9: If a BA reconfigures during a measurement year, that reconfiguration will create a bi-modal distribution of the Frequency Response events. Median is incapable of representing a bi-modal distribution. The use of median will result in a standard that is incapable of measuring compliance effectively for an BA that is reconfigured during a measurement year (Dec 1 thru Nov 30). Comment 10: Any attempt to purchase additional Frequency Response from another BA for a portion of a measurement year will also cause a bi-modal distribution making the purchase of Frequency Response only effective for entire measurement years. Comment 11: Median is a non-linear measurement method. Because it is a non-linear measurement method, there is no valid way to manage partial year measurements. Comment 12: I will offer an alternative to median to the SDT before the end of the development of responses to these comments. Comment 13: The Minimum Frequency Bias Setting and the Frequency Response Obligation are both based on a method that assigns responsibility based on a Peak

Organization	Yes or No	Question 6 Comment
		Load / Peak Generation share of the interconnection. However, the method used to set the Minimum Frequency Bias Setting is different than the method used to determine the Frequency Response Obligation. Using these two different methods could result in the Minimum Frequency Bias Setting being less that the FRO for a BA. The best way to correct this problem is to use that same allocation methodology for determining the FRO and the Minimum Frequency Bias Setting. This can be easily accomplished by modifying R5 to use the FRO allocation method to determine the Minimum Frequency Bias Setting. This calculation would divide the numerator from the FRO allocation equation, divide it by two and multiply it by the percentage specified in Attachment B. In fact, the current FRS Form 1 uses this equation with projected rather than historic data. The best alternative would be to modify the R5 in the standard to match the FRO allocation method and modify FRS Form 1 to use historic data instead of projected data. This would result in only one set of Peak Load and Peak Generation data throughout the standard, rather than three different sets of data as currently written. When multiple sets of the same or similar data are used within a single standard, it only creates confusion and errors in the result.

Response: Comment 6: The studies from the field trial show a convergence of the measurement after approximately 20 to 25 events. Based on the studies, the drafting team believes that a sample size as suggested would be very likely to cause entities to fail inappropriately due to the large amount of noise in the data related to each event. Additionally, there is a desire to ensure that the events picked are not weighted in such a way to cause the measurements to be increased over actual response. The drafting team has attempted to minimize the effort required of the reporting entities by developing the forms needed to calculate the FRM. Finally, the calculation process is being used for more than the previous process, not to mention that the previous process is not clearly defined and therefore not used consistently across the industry.

Comment 7-12: The drafting team is recommending use of the median for the purposes of determining a BA FRM over multiple events. This decision is based on the determination that, while it may not be perfect, it is better than the other alternatives available at this time. The drafting team recognizes that in the future a better methodology might be found; based on the data available at this time the median allows us to move forward to implement a response requirement.

Comment 13: The drafting team understands your concern of using the historical numbers for the FRO allocation and the projected number as the basis for the minimum Frequency Bias Setting. However, after discussions, the drafting team believes

Organization	Yes or No	Question 6 Comment
that at this time, minimizing the changes to the current Frequency Bias Setting process provides better comparability for the purpose of evaluating the impacts of reducing the minimum setting requirement. In the alternative, the drafting team feels that allocating the FRM based on historical data provides less room to game the process since the numbers used for allocation can be verified independently.		
MRO NSRF	No	Confusion exists around the "peak load" in that Attachment A states the allocation is based on Projected Peak Loads and Generation but the Background Document states it will use a historical Peak and Generation to make the allocation. Also, for the BA installed capacity, where is that value derived from and does NERC obtain that from FERC form data or does the BA provide that information somewhere specific to this effort? Additionally, there appears to be a difference in how FRO is calculated in Attachment A and what is described in the Background Document. These differences should be reconciled such that both documents address the same approach.If installed capacity is used in the equation, how are variable/intermittent resources (e.g. wind, solar) accounted for? At full capacity? Please clarify.We suggest the SDT clarify if the materials in the revised Attachment A (and Attachment B) are "Guideline" or "Technical Background", or "requirements
Response: The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. Installed capacity is not used in the allocation methodology. The proposed methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity.		
Xcel Energy	No	Confusion exists around the "peak load" in that the Attachment A states the allocation is based on Projected Peak Loads and Generation but the Background Document states it will use a historical Peak and Generation to make the allocation. Also, for the BA installed capacity, where does that value come from and does NERC obtain that from FERC form data or does the BA provide that information somewhere specific to this effort? Additionally, there appears to be a difference in how FRO is calculated in Attachment A and what is described in the Background Document. These differences should be reconciled such that both documents address the same

Organization	Yes or No	Question 6 Comment
		approach.If installed capacity is used in the equation, how are variable/intermittent resources (e.g. wind, solar) accounted for? At full capacity?
Response: The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. Installed capacity is not used in the allocation methodology. The proposed methodology uses the average of the historical peak loads (monthly peak) and monthly peak generation (monthly peak) and does not use installed capacity.		
ISO/RTO Council Standards Review Committee	No	Despite the SDT's good faith effort to convert the previous Attachment A into two separate documents (Attachments A and B), the modified Attachment A is problematic. As many commenters indicated, the previous Attachment A, other than the section providing guidance on event selection, appears to be explanatory, contextual, and instructional in content. These aspects are important, but do not rise up to the level of requirements to drive reliability performance/outcome. Attachment A should include only the event selection process and calculations associated with the requirements, including an explanation of what is necessary if variable Frequency Bias Settings are implemented. If other "requirements" need to be specified, such as the reporting time frame stipulated on P. 3 of Attachment A, they should be moved to the standard itself but not imbedded in an attachment. We suggest that the SDT first determine if the materials in the revised Attachment A (and Attachment B) are "Guideline" or Technical Background", or are they "requirements". If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as-written Attachment A is a mix bag as it on the one hand describes the ERO's process for supporting the Frequency Response Standard (FRS), in other words, the method and criteria it uses to calculate the frequency bias settings and the FRM, and on the other hand the BA's obligations to support this process. We strongly disagree that the latter requirements be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which is not held responsible for complying with the proposed method. Further, there are no measures provided for the requirements stipulated/imbedded in Attachment A so how can the Responsible Entity (BA, in this case) be assessed for compliance?We

Organization	Yes or No	Question 6 Comment
		suggest the SDT move those requirements on the BA to the main standard, and turn Attachment A into an appendix describing the calculation process. An appendix is not regarded as a mandatory requirement. Similar comments apply to Attachment B. Moreover, if the Attachments are to be integral to the standards, the terminology "may" must be replaced with "shall". Finally, the two Attachments are listed in Section F - Associated Documents. This Section is generally used to list reference documents that are NOT standard requirements. We suggest the SDT review and revise this listing depending on its final determination of the status of the two Attachments (or their revisions, where appropriate).
Response: The intent of Attachment A is to describe the process that will be used. There is no intent to require a filing on a certain date and to have the BA prove to the auditor that a filing was made on that date. Rather the requirement is to have an FRM that provides at least the response required of a BA based on it's FRO and provide a high-level overview of the mechanical parts of the process. The drafting team has modified the Requirements and Attachments to address the concerns raised by the comments that requirements were in the Attachments. In order to explain the process, the drafting team believes the information needs to be attached to the standard such that it cannot be changed without input from the industry. As to the use of the term "may" in the attachment, at this time the drafting team is unable to further restrict the language due to the issues surrounding an individual event. As an example, frequency is scheduled at 60 Hz most of the time. However, when viewed on a graph or an EMS screen, it rarely sits at 60.000 for a long period of time, it fluctuates between 59.995 and 60.005. The drafting team is unable to say at this time that an event that starts with frequency at 60.005 is materially different that an event that starts at 59.995. Therefore, the drafting team has attempted to put guidance into the document as to what is pertinent without attempting to be overly restrictive in the selection criteria since there is no support for a restriction at this time. As more experience is gained, the process should be refined. It the refinement is significant enough to require a change to the Attachment A language, the process required to do so would be open to participation of industry and not done without public exposure. **The SDT agrees with your comment about removing the documents from Section F of the proposed standard has made this modification to the standard.**		
Independent Electricity	No	Despite the SDT's good faith effort to convert the previous Attachment A into two separate documents (Attachments A and B), the modified Attachment A is

Organization	Yes or No	Question 6 Comment
System Operator		problematic. As many commenters indicated, the previous Attachment A, other than the section providing guidance on event selection, appears to be explanatory, contextual, and instructional in content. These aspects are important, but do not rise up to the level of requirements to drive reliability performance/outcome. Attachment A should include only the event selection process and calculations associated with the requirements, including an explanation of what is necessary if variable Frequency Bias Settings are implemented. If other "requirements" need to be specified, such as the reporting time frame stipulated on page 3 of Attachment A, they should be moved to the standard itself but not imbedded in an attachment. We suggest the SDT to first determine if the materials in the revised Attachment A (and Attachment B) are “Guideline” or “Technical Background”, or are they “requirements”. If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as-written Attachment A is a mix bag as it on the one hand describes the ERO’s process for supporting the Frequency Response Standard (FRS) (in other words, the method and criteria it uses to calculate the frequency bias settings and the FRM), and on the other hand the BA’s obligations to support this process. We strongly disagree that the latter requirements be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which, by the way, is not held responsible for complying with the proposed method. Further, there are no measures developed for the requirements stipulated/imbedded in Attachment A so how can the Responsible Entity (BA, in this case) be assessed for compliance? We suggest the SDT to move those requirements on the BA to the main standard, and turn Attachment A into an appendix describing the calculation process. An appendix is not regarded as a mandatory requirement. Similar comments apply to Attachment B. Finally, the two Attachments are listed in Section F - Associated Documents. This Section is generally used to list reference documents that are NOT standard requirements. We suggest the SDT review and revise this listing depending on its final determination of the status of the two Attachments (or their revisions, where

Organization	Yes or No	Question 6 Comment
		appropriate).
Response: The intent of Attachment A is to describe the process that will be used. There is no intent to require a filing on a certain date and to have the BA prove to the auditor that a filing was made on that date. Rather the requirement is to have an FRM that provides at least the response required of a BA based on it's FRO and provide a high-level overview of the mechanical parts of the process. The drafting team has modified the Requirements and Attachments and modified them to address the concerns raised by the comments that requirements were in the Attachments. In order to explain the process, the drafting team believes the information needs to be attached to the standard such that it cannot be changed without input from the industry. As to the use of the term "may" in the attachment, at this time the drafting team is unable to further restrict the language due to the issues surrounding an individual event. As an example, frequency is scheduled at 60 Hz most of the time. However, when viewed on a graph or an EMS screen, it rarely sits at 60.000 for a long period of time, it fluctuates between 59.995 and 60.005. The drafting team is unable to say at this time that an event that starts with frequency at 60.005 is materially different that an event that starts at 59.995. Therefore, the drafting team has attempted to put guidance into the document as to what is pertinent without attempting to be overly restrictive in the selection criteria since there is no support for a restriction at this time. As more experience is gained, the process should be refined. It the refinement is significant enough to require a change to the Attachment A language, the process required to do so would be open to participation of industry and not done without public exposure. **The SDT agrees with your comment about removing the documents from Section F of the proposed standard has made this modification to the standard.**		
Florida Power & Light Company	No	In the table on page2 the asterick references a statement that the 59.7Hz used in Florida is a special protection scheme. This is incorrect. The special protection scheme setting was 59.82Hz and was done away with in 2005 or earlier. The 59.7Hz setting used within the FRCC is based on FRCC TWG studies that require this level of setting to protect the state in the event of a separation and to protect nuclear equipment. FPL supports the use of the C(N-2) critiera. Additionally, the reference to the FERC714 report that is currently in the background data should be made part of attachment A not separated. FPL fully agrees with Table 1The formula used to derive the FRO is inconsistant with the definition used for requirement R5. R5 states that the load is " within the BA's metered boundary". The load used in the formulae is taken from FERC714. The yearly peak demand used in R5 should be the peak

Organization	Yes or No	Question 6 Comment
		monthly load from June, July or August as reported on FERC714 to be compatible with the FRO formula.
Response: The drafting team has removed the reference to the special protection scheme. The drafting team has modified the FRO allocation formula to better explain what is desired. However, the drafting team did not adjust the formula to what is suggested by the commenter.		
NV Energy	No	It is not clear whether the calculation of FRO is to utilize projections of BA load as in Att A, or past data reported in FERC Form 1 as per the Background Document.
Response: The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. The proposed methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity.		
Los Angeles Department of Water and Power	No	LADWP considers the increase in number of events to analyze (now 25) to be excessive. Previous years analyses typically involved 4-6 events; a permanent five-fold increase is not justified. LADWP suggests reducing the baseline number of events from 25 to 12 per year. Analysis of a larger number of events could be requested on a year-by-year basis if conditions warrant, but should not be mandatory for all regions in all years.
Response: The studies from the field trial show a convergence of the measurement after approximately 20 to 25 events. Based on the studies, the drafting team believes that a sample size as suggested would be very likely to cause entities to fail inappropriately due to the large amount of noise in the data related to each event. Additionally, there is a desire to ensure that the events picked are not weighted in such a way to cause the measurements to be increased over actual response. The drafting team has attempted to minimize the effort required of the reporting entities by developing the forms needed to calculate the FRM. Finally, the calculation process is being used for more than the previous process, not to mention that the previous process is not clearly defined and therefore not used consistently across the industry.		
JEA Electric	No	On Event Selection Criteria, bullet 2, if 25 events cannot be identified then the ERO

Organization	Yes or No	Question 6 Comment
Compliance/Florida Municipal Power Agency		can go back in time to the previous year. This creates a double jeopardy to R1 of the standard. It also may include irrelevant data if there have been changes from one year to the next in FRO or Bias settings assigned by the ERO. On Frequency Response Obligation, first paragraph states that "Each Interconnection will establish target contingency protection criteria"; however, the Interconnection is not a decision-making body. Does this really mean the ERO will establish FRO for each Interconnection? The single asterisk note for the table on page 2 states: "It is extremely unlikely that an event elsewhere in the Eastern Interconnection would cause the Florida UFLS special protection scheme to “false trip”.", "Special protection scheme" should be stricken from this sentence, Florida has just a regional difference in its UFLS program.
Response: The drafting team has discussed the concern of double jeopardy several times. At this time, the drafting team believes the issue of noise in individual events and the convergence of measurement of multiple events outweighs the double jeopardy concerns. After further discussions, the drafting team has reduced the minimum number of events in a 12 month period to 20 from 25 but is still recommending that events from a previous year be used for the calculation if this number of events cannot be found in that period. **The drafting team modified the language to clarify that the ERO will set the IFRO.** **This modification was made.**		
Duke Energy	No	On page 3 of the document it states “For a multiple Balancing Authority Interconnection, the Interconnection Frequency Response Obligation is allocated based upon either the Balancing Authority Peak Demand or peak generation”, however, the initial FRO allocation equation shows that the BA allocation is based upon the sum of the Projected BA Peak Load plus installed capacity, times the Interconnection FRO, and divided by the sum of the Projected Interconnection Peak Load plus Interconnection installed capacity. Is the statement in quotes correct, or is the allocation equation correct? In addition, the equation in Attachment A referencing “installed capacity” conflicts with the equation in the BAL-003-1

Organization	Yes or No	Question 6 Comment
		Background Document entitled "Frequency Response Standard Background Document" where "Peak Gen" is used. In summary, is the FRO allocation based upon an equation which a) sums the Projected BA Peak Load plus peak generation, b) sums the Projected BA Peak Load plus installed capacity, or c) uses either Projected BA Peak Load OR peak generation? All three options are currently represented in the documentation. Calculation of the FRO for the Eastern Interconnection: Duke Energy agrees with the criteria suggested for the event to be protected (4500 MW), and at this time also agrees with the "compromise" low limit of 59.6 Hz. However, knowing that another Standard is under development which may require hourly assessment of available "frequency responsive reserves", we are trying to determine what impact the choice of this methodology will have on the amount of frequency responsive reserves the industry will have to maintain - enough to cover frequency swings that only occasionally reach down to perhaps 59.9 Hz as we see on the Interconnection today (essentially the allocated FRO for a 0.1Hz deviation), enough to cover a 4500 MW loss, or whatever we deem appropriate as long as we are compliant to the FRM? We recognize that the Standard Drafting Team cannot answer this question, as the Standard under development is not within the scope of this team, however our comment is meant to illustrate the point that similar to our response to question 8, it should be recognized that elements of this Standard are tightly coupled to other current and potential Standards, and the impacts must be considered by the Industry.
Response: The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. Installed capacity is not used in the allocation methodology. The proposed methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity. **The drafting team has added a paragraph in the FRM section of Attachment A limiting the amount of Frequency Response for which a BA will be measured for compliance purposes. This translates to a maximum expectation of Frequency Response equal to a Balancing Authority's FRO times the number of .1 Hz shown in Table 2 in Attachment A.**		

Organization	Yes or No	Question 6 Comment
SERC OC Standards Review Group	No	The definition of Single Event Frequency Response Data (SEFRD) was struck from the draft standard but still appears in Attachment A. Since R1 of the standard references Attachment A, would the definition of SEFRD still be applicable? If the definition is to be totally struck, we don't think the term should be used in Attachment A.
Response: The SEFRD definition was moved to Attachment A. The SEFRD is used on individual events. The median of a BA's SEFRDs will be used to determine its FRM. Therefore, the drafting team believes it is appropriate to use the definition in the Attachment. Since it is not likely to be used outside of the context of this standard, the drafting team is not proposing to place the definition in the NERC Glossary.		
Hydro-Quebec TransEnergie	No	The Event Selection Criteria should be modified for the Quebec Interconnection. In Table 1, the change in frequency (Delta f) used for Quebec's Event Selection Criteria should be 0,3Hz (from point "A" to point "C") and must last for at least 7 seconds so that we don't measure AGC action. In addition, a criterion should be added by saying that events that recovered within the 20-52 second average period for point "B" should be excluded from analysis.
Response: The drafting team has modified Attachment A to address these comments.		
Keen Resources Asia Ltd.	No	The sample pre-selection described in Attachment A, Event Selection, Criteria 2 & 7, violates the fundamental statistical procedure of unbiased sampling. A population is governed by a single "process" which, when stationary, is represented by a fixed probability distribution. In this case the population is several years of events (which are the subject of Frequency Response), not of normal operating control errors which are the subject of CPM control. A sample is governed by a single process that approximates the process governing the population as the sample gets larger, in this case if it includes several years of data. Samples are measured "as they come", no triage/filtering allowed, and they are called "stratified" when their distribution approximates the population distribution. Unlike normal operating errors, samples of events are not evenly distributed over a year. The attempt in criteria 2 & 7 to pre-select only certain events, and not others, in such a way that the selected events

Organization	Yes or No	Question 6 Comment
		occur evenly throughout the year, is papently wrong because it is trying to "fit" events into a process (even distribution over time) that does not govern events, but that instead governs normal operating errors that are the subject of CPM control, not of this Frequency Response standard. In other words, criteria 2 & 7 confuse Frequency Response with CPM, and events with normal operating errors. The result is a false, biased sample which destroys the integrity of this standard. Paragraph 4 on page 5 of the Background Document, on the other hand, provides a statistically correct description of event selection without sample pre-selection and should followed instead of the erroneous criteria 2 & 7 in Attachment A.
Response: The drafting team has discussed this issue several times and believes that issues related to measurement caused by noise in individual events and the need to ensure adequate representation of events throughout the year outweigh the concern to have a "pure" statistical sample. For these reasons the drafting team has not modified the event selection criteria.		
Northeast Power Coordinating Council	No	The SDT has to first determine if the materials in the revised Attachment A & B are "Guideline" or Technical Background", or are they "requirements". If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as written Attachment A is confusing as it describes the ERO's process for supporting the Frequency Response Standard (FRS) (the method and criteria it uses to calculate the frequency bias settings and the FRM), and at the same time the BA's obligations to support this process. The latter requirements should not be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which is not held responsible for complying with the proposed method. An appendix is not regarded as a mandatory requirement. Additionally, regarding BAL-003-1- Attachment A 1. Criterion 5 needs to be re-written for clarity. 2. Criterion 7 refers to "cleanest events". A statement of what constitutes a "clean event" is needed to avoid possible controversy in the future.

Organization	Yes or No	Question 6 Comment
		3. The use of 59.6 Hz as the highest UFLS setting is flawed. It should either be 59.7 Hz as a deliberate choice to protect Florida interests, or it should be 59.5 Hz without concern for Florida's unique settings. 4. In the last 2 sentences at the end of the section on Frequency Response Obligation, it refers to an Interconnection being able to offer "alternate FRO protection criteria". The Interconnection should have been an integral part of establishing its obligation. It is stated that the "ERO will confirm" the "alternate FRO protection criteria". Does this mean the ERO unconditionally approves it, or evaluates with a right of rejection? Please clarify. 5. In the formula for determining the Balancing Authority's FRO allocation, installed capacity is used. Does the industry have a clear and consistent definition for installed capacity? Also, with greater wind energy development, the delivered capacity over longer time horizons will be substantially less than nameplate machine ratings. The background document refers to the use of peak generation instead of installed capacity. Which shall be used? Please clarify. 6. Recent studies have shown that the 18-52 second sampling interval does not work well for the Quebec Interconnection, in part due to the excellent and high level of response found in that Interconnection. The standard needs to be modified such that the sampling interval is that which works the best for each individual interconnection. 7. Attachment A needs to define the point A sampling interval.
Response: The intent of Attachment A is to describe the process that will be used. There is no intent to require a filing on a certain date and to have the BA prove to the auditor that a filing was made on that date. Rather the requirement is to have an FRM that provides at least the response required of a BA based on it's FRO and provide a high-level overview of the mechanical parts of the process. The drafting team has modified the Requirements and Attachments to address the concerns raised by the comments that requirements were in the Attachments. In order to explain the process, the drafting team believes the information needs to be attached to the standard such that it cannot be changed without input from the industry. **1. The drafting team believes that Criterion 5 is clear as written. The comment does not provide any guidance as to what needs**		

Organization	Yes or No	Question 6 Comment
		clarification so no change was made. **2. Due to the complicated nature of event evaluation and selection, the drafting team has retained the word "cleanest" in the document without providing further clarification or definition. The drafting team believes that the process being developed by NERC (specifically the NERC Resources Subcommittee and the Frequency Working Group) requires some leeway. As more experience in gained, the NERC Resources Subcommittee will attempt to document the process further.** **3. The drafting team has revised the terminology used to explain the frequency levels proposed. There was not a change to the Eastern Interconnection numbers.** **4. An interconnection can recommend a change to the table. As the standards process currently works, that interconnection would need to support its alternative level with data. If the interconnection has a single Regional Reliability Organization, the ERO would typically agree to the alternative assuming it would be more restrictive (in this case a larger response requirement) than the ERO has recommended.** **5. The drafting team has addressed the concerns raised by clarifying that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. Installed capacity is not used in the allocation methodology. The proposed methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity.** **6. The drafting team has modified Attachment A to address concerns with selection of an event where frequency returns to the A Value level during the measurement period. These events will be excluded from the measurement process for all interconnections.** **7. The definition of the terms are provided in the background document as well as the formulas in the spreadsheets.**
Sacramento Municipal Utility District (SMUD)	No	The standard is unclear as to if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of Frequency Response expected on a total basis. Balancing Authorities need to know for how many tenths of a hertz they are to respond so they can determine how to plan to meet this requirement. The documents do not appear to provide any boundary on the maximum amount of Frequency Response that a BA will provide, i.e. it is not clear what will happen if an event occurs in the Eastern Interconnection that causes the

Organization	Yes or No	Question 6 Comment
		frequency to drop to less than 59.6 Hz or in the Western Interconnection that causes the frequency to drop to less than 59.5 Hz, or if that event is excluded from the list used to calculate the Balancing Authorities' response or is it included with an expectation that it counts the same as any other event. Without a clear statement of what is expected, including whether there is a limit on that expectation or not, it is unclear what is expected of the Balancing Authorities.
Response: The drafting team has added a paragraph in the FRM section of Attachment A limiting the amount of Frequency Response for which a BA will be measured for compliance purposes. This translates to a maximum expectation of Frequency Response equal to a Balancing Authority's FRO times the number of .1 Hz shown in Table 2 in Attachment A.		
Western Electricity Coordinating Council	No	There is disagreement between Attachment A and the Background Document. Attachment A states peak load allocation is based on "Projected" Peak Loads and Generation, but the Background Document states it will use "historical" Peak Load and Generation. The allocation methodology of FRO among the BAs in the equation on page 3 of Attachment A favors BAs with more load than more installed capacity. Peak load is served but not all installed capacity is always dispatched.
Response: The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. Installed capacity is not used in the allocation methodology. The proposed methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity.		
Alberta Electric System Operator	No	These documents not only provide additional clarity but also specify additional requirements, such as FRS Form 1 annual reporting by January 10. All the enforceable requirements should be included in the body of the standard. 1. Attachment A uses the terms "delta F (change in frequency)", "arresting frequency (Point C)", "B Value", "A Value". These terms are not properly defined or described in this document as drafted. The AESO suggests adding a description or definitions for

Organization	Yes or No	Question 6 Comment
		clarity in this document. 2. The standard gives 2 sets of values for Interconnection Frequency Response Obligation in Table 2, (1) Base Obligation and (2) the obligation including 25% Safety Margin (which seems to be implied by the "contingency protection criterion"). The Attachment A does not specifiy whether the Base Obligation or the 25% Safety Margin value will be used to allocate the Interconnection FRO to the BAs. Please clarify which value will be used to calculate the BA Frequency Response Obligation (FRO) in the Interconnection FRO allocation formula in Attachment A. 3. The "initial FRO allocation" formula in Attachment A uses Peak Load. The term Peak Load is not used in the standard nor is it a defined term in the NERC Glossary. The standard uses Peak Demand, which is defined in the Glossary Is "Peak Load" synonymous with "Peak Demand"? If so, Peak Demand should be used in the formula instead. Otherwise Peak Load should be clearly defined in this document. 4. Is "Projected" in the FRO allocation formula synonymous with "Forecasted"? If so, Forecasted should be used for consistency. Otherwise "Projected" or the context in which it appears must be defined.
Response: The intent of Attachment A is to describe the process that will be used. There is no intent to require a filing on a certain date and to have the BA prove to the auditor that a filing was made on that date. Rather the requirement is to have an FRM that provides at least the response required of a BA based on it's FRO and provide a high-level overview of the mechanical parts of the process. The drafting team has modified the Requirements and Attachments to address the concerns raised by the comments that requirements were in the Attachments. In order to explain the process, the drafting team believes the information needs to be attached to the standard such that it cannot be changed without input from the industry. **1. The definition of the terms are provided in the background document as well as the formulas in the spreadsheets.** **2. The drafting team has modified Table 2 to clarify that the bottom number in each column is the Interconnection FRO. The Interconnection FRO will be allocated to the BAs within that interconnection.** **3 and 4. The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. The proposed**		

Organization	Yes or No	Question 6 Comment
methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity.		
Great River Energy/ACES Power Marketing Standards Collaborators	No	Under item 3 of the Event Selection Criteria section, the delta F and Point C should be described either in this attachment or the "Frequency Response Standard Background Document". While many in industry may understand what these terms mean, history has a way of getting lost with personnel turnover. Furthermore, this would help ensure that the auditors and industry have a duplicate understanding. In the Frequency Response Obligation section on page 2, several items require more description. Further description of why an N-2 event was chosen for the Contingency Protection Criteria should be provided and which N-2 event was selected so that industry can help validate if the correct MW value was selected. Furthermore, the document should clarify if the Contingency Protection Criteria contains the "safety margin". There is a statement in the paragraph before the table that states it does but then the table lists out a separate 25% "Safety Margin". Thus, it is not clear if the "Safety Margin" is included in the Contingency Protection Criteria value listed in the table or not. "Safety margin" should be changed to "reliability margin". Safety has a specific meaning in the electric industry and its use here is not appropriate. The Base Obligation should be explained. The explanation should include its purpose and origin.
Response: 1. The definition of the terms are provided in the background document as well as the formulas in the spreadsheets. The drafting team has clarified Table 2 by modifying the titles for each line.		
Texas Reliability Entity	No	We have a number of concerns regarding Attachment A which are set forth below: 1. Regarding the formula for "Initial FRO Allocation" on page 3 of Attachment A, the terms for "BA installed capacity" and "Interconnection installed capacity" are undefined and could be subject to manipulation and dispute. We suggest that this formula be revised to mirror the calculation based on well-established FERC Form 714 data that is discussed in the Background document, which is based on actual

Organization	Yes or No	Question 6 Comment
		generation output. 2. In Attachment A, all references to "Texas" should be changed to "ERCOT" as a reference to the Interconnection or the Region (including tables). 3. Regarding the Event Selection Criteria in Attachment A: in item 2, consider whether certain events, such as DCS events, should be required to be included in the FRM analysis. 4. Regarding the Event Selection Criteria in Attachment A: item 7 provides that the selected frequency excursion events are to be selected so that they are evenly distributed seasonally. Consider adding the seasonal distribution concept to item 2, particularly if it becomes necessary to include events from the previous evaluation period. 5. In Attachment A, page 1 says the ERO is to post the final list of frequency excursion events by December 15, but on page 3 it suggests that the list will be posted by December 10. These references should be made consistent. 6. Attachment A states, on page 3, "the ERO will use FRS Form 1 data to post the following information for each Balancing Authority for the upcoming year: Frequency Bias Setting and Frequency Response Obligation (FRO)." What is meant by "the upcoming year"? Is the BA supposed to implement the new FBS immediately, or wait until the beginning of the next evaluation period on December 1? Note that if the new FRO and FBS are implemented immediately (e.g. in March), then the FRO will change in the middle of an evaluation period. This will complicate the comparison of FRM and FRO as required by R1.
Response: 1. The drafting team has addressed the discrepancy between the two documents to ensure that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. The proposed methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity. **2. This change was made.**		

Organization	Yes or No	Question 6 Comment
3. The drafting team recommends all events with a frequency deviation that meets the selection criteria should be evaluated. For the entity that lost generation (or load) to initiate the event, the calculation methodology proposed allows adjustments to be made for that event. **4. This modification was made to the Attachment B (now a Procedure). The suggested modifications are shown in Criteria 2 and 7.** **5. These two documents have been conformed.** **6. The ERO will notify the BAs as to the date the Frequency Bias Setting is to be implemented if they are utilizing a fixed Frequency Bias Setting.**		
Southern Company	No	We suggest increasing the delta f for the East to be the same value as the West or larger. The reason for this is that the 0.04Hz suggested is too close to the governor deadbands of .036Hz. This would potentially omit frequency response that some units may provide for a larger excursion but not for those close to the deadband.
Response: The delta f values have been selected to balance the need to have a sufficient number of events for evaluation and the need to have sufficient frequency movement to actually measure response. At this time the drafting team is not modifying the eastern interconnection values based on the event selection process for the period December 2010 through November 2011.		
ISO New England Inc	No	We suggest the SDT to first determine if the materials in the revised Attachment A & B are "Guideline" or Technical Background", or are they "requirements". If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as-written Attachment A is a mix bag as it on the one hand describes the ERO's process for supporting the Frequency Response Standard (FRS), in other words, the method and criteria it uses to calculate the frequency bias settings and the FRM, and on the other hand the BA's obligations to support this process. We strongly disagree that the latter requirements be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which, by the way, is not held responsible for complying with the proposed method. An appendix is not regarded as a mandatory requirement. Additionally, BAL-003-1- Attachment A

Organization	Yes or No	Question 6 Comment
		1. Criterion 5 needs to be re-written for clarity. 2. Criterion 7 refers to the "cleanest events". Perhaps a statement of what constitutes a "clean event" is needed to avoid possible controversy in the future. 3. The use of 59.6 Hz as the highest UFLS setting seems flawed. It should either be 59.7 Hz as a deliberate choice to protect Florida interests, or, it should be 59.5 Hz without concern for Florida's unique settings. 4. In the last 2 sentences at the end of the section on Frequency Response Obligation, it refers to an Interconnection being able to offer "alternate FRO protection criteria". It seems that the Interconnection should have been an integral part of establishing its obligation. Also, it states that the "ERO will confirm" the "alternate FRO protection criteria". Does this mean the ERO unconditionally approves it, or evaluates with a right of rejection? Please clarify. 5. In the formula for determining the Balancing Authority's FRO allocation, installed capacity is used. Does the industry have a clear and consistent definition for installed capacity? Also, with greater wind energy development, the delivered capacity over longer time horizons will be substantially less than nameplate machine ratings. Also, the background document refers to the use of peak generation instead of installed capacity. Which shall be used? Please clarify. 6. Very recent studies have shown that the 18-52 second sampling interval does not work well for the Quebec Interconnection, in part due to the excellent and high level of response found in that Interconnection. The standard needs to be modified such that the sampling interval is that which works the best for each individual interconnection. 7. Attachment A needs to define the point A sampling interval.
Response: The intent of Attachment A is to describe the process that will be used. There is no intent to require a filing on a certain date and to have the BA prove to the auditor that a filing was made on that date. Rather the requirement is to have an FRM that provides at least the response required of a BA based on it's FRO and provide a high-level overview of the mechanical parts of the		

Organization	Yes or No	Question 6 Comment
process. The drafting team has modified the Requirements and Attachments to address the concerns raised by the comments that requirements were in the Attachments. In order to explain the process, the drafting team believes the information needs to be attached to the standard such that it cannot be changed without input from the industry. 1. The drafting team believes that Criterion 5 is clear as written. The comment does not provide any guidance as to what needs clarification so no change was made. 2. Due to the complicated nature of event evaluation and selection, the drafting team has retained the word cleanest in the document without providing further clarification or definition. The drafting team believes that the process being developed by NERC (specifically the NERC Resources Subcommittee and the Frequency Working Group) requires some leeway. As more experience in gained, the NERC Resources Subcommittee will attempt to document the process further. 3. The drafting team has revised the terminology used to explain the frequency levels proposed. There was not a change to the Eastern Interconnection numbers. 4. An interconnection can recommend a change to the table. As the standards process currently works, that interconnection would need to support its alternative level with data. If the interconnection has a single Regional Reliability Organization, the ERO would typically agree to the alternative assuming it would be more restrictive (in this case a larger response requirement) than the ERO has recommended. 5. The drafting team has addressed the concerns raised by clarifying that historical data is used for the allocation of an Interconnection Frequency Response Obligation to the BAs within that interconnection. Installed capacity is not used in the allocation methodology. The proposed methodology uses the average of the historical peak loads (monthly peak) and peak generation (monthly peak) and does not use installed capacity. 6. The drafting team has modified Attachment A to address concerns with selection of an event where frequency returns to the A Value level during the measurement period. These events will be excluded from the measurement process for all interconnections. 7. The definition of the terms are provided in the background document as well as the formulas in the spreadsheets.		
Constellation Energy Commodities Group	Yes	Additional information relating to defining the FRO for the Interconnection would be helpful as would an example for calculating the BA FRO.
Response: The drafting team has revised Attachment A to provide better explanation and to clarify the allocation methodology to		

Organization	Yes or No	Question 6 Comment
the BA.		
American Electric Power	Yes	A frequency response observation should not be used spanning multiple years, or if there does, there should at least be a reset period.
Response: The drafting team has discussed the concern of double jeopardy several times. At this time, the drafting team believes the issue of noise in individual events and the convergence of measurement of multiple events outweighs the double jeopardy concerns. After further discussions, the drafting team has reduced the minimum number of events in a 12 month period to 20 from 25 but is still recommending that events from a previous year be used for the calculation if this number of events cannot be found in that period.		
Cleco Corporation/ SPP Standards Review Group	Yes	We appreciate the effort of the SDT in developing Attachment A. It was very helpful in weeding through BAL-003.
Response: Thank you for your comments.		
Imperial Irrigation District	Yes	
Southwest Power Pool Regional Entity	Yes	
Salt River Project	Yes	
Progress Energy	Yes	
Associated Electric Cooperative Inc	Yes	
South Carolina Electric and Gas	Yes	

Organization	Yes or No	Question 6 Comment
Ameren	Yes	

7. The second document "BAL-003-1 Background Document" provides information behind the development of the standard. Do you agree that this new document provides sufficient clarity as to the development of the standard? If not, please explain in the comment area.

Summary Consideration: The majority of the commenters referenced other questions in the comments. The SDT asked them to review the response to those earlier questions.

Several of the commenters pointed out that there was a discrepancy between the Background Document and Attachment A regarding the calculation of the BA FRO. The SDT has corrected the reference so both documents agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.

Some commenters indicated that Supplemental Regulation Service is not an appropriate method to provide Frequency Response. It is inappropriate to expect supplementary regulation to transfer frequency response successfully. However the SDT does not want to prevent any innovative solution that will transfer frequency response through the use of a pseudo-tie among Balancing Authorities. Also, the SDT believes that Balancing Authorities exchanging supplementary regulation via a pseudo-tie have to be consistent in the removal or inclusion of it in their actual net interchange measurement as well as in all events across the measurement period.

Organization	Yes or No	Question 7 Comment
Seattle City Light	Negative	Answer: Yes Comments: o LADWP and SCL note that the document "BAL-003-1 Background Document" seems to be reasonable.
Response: Thank you for your comment.		
Energy Mark, Inc.	No	Comment 14: Some of the information in this document concerning the Frequency Bias Setting for BAs participating in Overlap Regulation should be moved to the Supporting Document. This change would help in addressing Comments 3 & 4 under Question 2.
Response: The SDT has added language to Attachment A to address your concern.		

Organization	Yes or No	Question 7 Comment
Duke Energy	No	Please see our comments to Question 6. In addition, Duke Energy disagrees with the statement on page 9 that Attachment B will "ensure there is no negative impact on other Standards" - please see our response to Question 8 for additional information.
Response: Thank you for your comments. Please see the responses to Questions #6 and #8.		
SERC OC Standards Review Group	No	Portions of the Background Document do not appear to be complete or finished. The Background Document should be edited to be consistent with changes made to the standard or other related documents (eg. elimination of the definition of SEFRD and any revisions to the draft BAL-003-1).
Response: The SDT has made significant modifications to the Background Document to support the proposed standard. The SDT is proposing that this document be posted on the NERC web site in order for it to be easily obtained by stakeholders once the standard is approved.		
ERCOT	No	Refer to comments in #1.
Response: Refer to the response in Question #1.		
Northeast Power Coordinating Council	No	Refer to the first comment in Question 6.For the Frequency Response Standard Background Document – 1. Cite Attachment B in addition to Attachment A in the discussion of requirement R1. 2. The Balancing Authority allocation method specified in this document does not agree with that in Attachment A. 3. Drop the speculation on page 4 that most Balancing Authorities will be compliant. While it may be a commonly held belief by many that there is adequate frequency response right now, that assessment should be made after a targeted level of reliability has been defined and approved. The same comment applies on page 12. 4. On page 6, drop the inappropriate recommendation of getting frequency response

Organization	Yes or No	Question 7 Comment
		through supplemental regulation. It is inappropriate to try to substitute a "minute plus" product that is deployed centrally by the Balancing Authority for a "sub-minute" product that is deployed automatically without any Balancing Authority action. When a pseudo-tie is used, changes in the ACE values due to supplemental regulation are unrelated to and not coordinated with the need to deploy frequency response. Not only should this approach not be offered as an alternative, but the FRSDT should actively conduct research to determine if supplemental regulation via a pseudo-tie should be deliberately REMOVED from any actual net interchange calculation that may include it. This comment also applies to the mentioning of supplemental regulation on page 11 as well. 5. On page 7, the reference to a 24 hour window on each side of the frequency bias setting implementation date is inconsistent with the wording of the standard. The standard states that any time within the designated date is acceptable. 6. On page 8, the inclusion of "for training purposes" as a reason to not operate in tie line bias control should be dropped. This training can be done in a training simulator. If it is determined that it should be supported, then the requirement needs to be reworded to allow it explicitly. 7. On page 14, the sentence: "This approach would only provide feedback for performance during that specific event and would not provide insight into the depth of response or other limitations" is difficult to understand. The paragraph would read better by simply deleting the sentence.
Response: Please refer to our response to Question #6. **Comment 1 – The SDT has modified the Background Document to incorporate your suggested change.** **Comment 2 – The SDT has corrected the reference so both documents agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.** **Comment 3 – The SDT has removed the speculative language and replaced it with more appropriate language.** **Comment 4 - While the SDT agrees that it is inappropriate to expect supplementary regulation to transfer frequency response**		

Organization	Yes or No	Question 7 Comment
successfully, we do not want to prevent any innovative solution that will transfer frequency response through the use of a pseudo-tie among Balancing Authorities. Also, the SDT believes that Balancing Authorities exchanging supplementary regulation via a pseudo-tie have to be consistent in the removal or inclusion of it in their actual net interchange measurement as well as all events across the measurement period. **Comment 5 – The SDT has corrected the background document to accurately reflect the language proposed in the standard.** **Comment 6 – The SDT has modified the background document to remove the training language.** **Comment 7 – The SDT has revised the paragraph to provide additional clarity.**		
Xcel Energy	No	Same comment here as the one in question 6.
Response: Please refer to our response to Question #6.		
ISO New England Inc	No	See first comment in 6 above. Also, Frequency Response Standard Background Document – 1. Cite Attachment B in addition to Attachment A in the discussion of requirement 1. 2. The Balancing Authority allocation method specified in this document does not agree with that in Attachment A. 3. Drop the speculation on page 4 that most Balancing Authorities will be compliant. While it may be a commonly held belief by many that there is adequate frequency response right now, that assessment should be made after a targeted level of reliability has been defined and approved. The same comment applies on page 12. 4. On page 6, drop the inappropriate recommendation of getting frequency response through supplemental regulation. It is inappropriate to try to substitute a "minute plus" product that is deployed centrally by the Balancing Authority for a "sub-minute" product that is deployed automatically without any Balancing Authority action. When a pseudo-tie is used, changes in the ACE values due to supplemental regulation are unrelated to and not coordinated with the need to deploy frequency response. Not only should this approach not be offered as an alternative, but the FRSDT should

Organization	Yes or No	Question 7 Comment
		actively conduct research to determine if supplemental regulation via a pseudo-tie should be deliberately REMOVED from any actual net interchange calculation that may include it! This comment also applies to the mentioning of supplemental regulation on page 11 as well. 5. On page 7, the reference to a 24 hour window on each side of the frequency bias setting implementation date is inconsistent with the wording of the requirement. The requirement says that any time within the designated date is acceptable. 6. On page 8, the inclusion of "for training purposes" as a reason to not operate in tie line bias control should be dropped. This sort of training can be done in a training simulator. Alternatively, if it is determined that it should be supported, then the requirement needs to be reworded to allow it explicitly. 7. On page 14, the sentence: "This approach would only provide feedback for performance during that specific event and would not provide insight into the depth of response or other limitations" is difficult to understand. The paragraph would read better by simply dropping it.

Response: Please refer to our response to Question #6.

Comment 1 – The SDT has modified the Background Document to incorporate your suggested change.

Comment 2 – The SDT has corrected the reference so both documents agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.

Comment 3 – The SDT has removed the speculative language and replaced it with more appropriate language.

Comment 4 - While the SDT agrees that it is inappropriate to expect supplementary regulation to transfer frequency response successfully, we do not want to prevent any innovative solution that will transfer frequency response through the use of a pseudo-tie among Balancing Authorities. Also, the SDT believes that Balancing Authorities exchanging supplementary regulation via a pseudo-tie have to be consistent in the removal or inclusion of it in their actual net interchange measurement as well as all events across the measurement period.

Comment 5 – The SDT has corrected the background document to accurately reflect the language proposed in the standard.

Organization	Yes or No	Question 7 Comment
Comment 6 – The SDT has modified the background document to remove the training language. **Comment 7 – The SDT has revised the paragraph to provide additional clarity.**		
Western Electricity Coordinating Council	No	See response to question 6.
Response: Please refer to our response to Question #6.		
Alberta Electric System Operator	No	The Background Document uses BA Peak Generation in the BA FRO allocation formula. Attachment A uses BA Installed Capacity. The AESO suggests making the two formulae consistent.
Response: The drafting team has corrected the reference so both documents agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.		
Florida Municipal Power Agency	No	The document does not discuss how the new reliability parameter will affect BAs
Response: The new standard will require that Balancing Authorities meet a level of response to frequency events equal to or more negative than their Frequency Response Obligation. The SDT has made significant modifications to the Background Document which should address your concern.		
JEA Electric Compliance	No	The document does not discuss how the new reliability parameter will affect BAs
Response: The new standard will require that Balancing Authorities meet a level of response to frequency events equal to or more negative than their Frequency Response Obligation. The SDT has made significant modifications to the Background Document which should address your concern.		
MRO NSRF	No	The MRO NSRF has restated the same answer as in question 6 on purpose. Confusion exists around the "peak load" in that Attachment A states the allocation is based on Projected Peak Loads and Generation but the Background Document states it will use

Organization	Yes or No	Question 7 Comment
		a historical Peak and Generation to make the allocation. Also, for the BA installed capacity, where is that value derived from and does NERC obtain that from FERC form data or does the BA provide that information somewhere specific to this effort? Additionally, there appears to be a difference in how FRO is calculated in Attachment A and what is described in the Background Document. These differences should be reconciled such that both documents address the same approach. If installed capacity is used in the equation, how are variable/intermittent resources (e.g. wind, solar) accounted for? At full capacity? Please clarify. Page 7 (3rd paragraph) of the Background document states "Given the fact that BA's can encounter staffing or EMS change issues coincident with the date the ERO sets for new Frequency Bias Setting implementation, the standard provides a 24 hour window on each side of the target date. 1) The Standard itself does not state this provision (24 hour window on each side of target date) as indicated. 2) The SDT accurately addresses the fact that BA's could have EMS or staffing issues during implementation of the ERO validated FBS. The current stated 72-hour window is not long enough for implementation of the FBS as there may be a host of issues that could impact implementation. We suggest that a seven day window be used for implementation of the FBS.
Response: The drafting team has corrected the proposed standard to accurately reflect the language in the Background Document.		
Texas Reliability Entity	No	There is an inconsistency between the Background Document and Attachment A. Attachment A only proposes event criteria based on "the largest category C (N-2) event identified," but the Background Document says: "Attachment A proposes the following Interconnection event criteria as a basis to determine an Interconnection's Frequency Response Obligation: - Largest category C loss-of-resource (N-2) event; - Largest total generating plant with common voltage switchyard; - Largest loss of generation in the interconnection in the last 10 years."

Organization	Yes or No	Question 7 Comment
Response: The drafting team has corrected the reference so both documents agree.		
Great River Energy/ACES Power Marketing Standards Collaborators	No	We can find no document titled "BAL-003-1 Background Document". We assume this question is referring to the "Frequency Response Standard Background Document" dated October 2011. We do not believe the document provides sufficient clarity. No explanation is provided for why RSG was added to Requirement R1.There are typos contained in the document. On page 6 in NIA, the A should be in subscript. On page 7 in bullet 4 in the first sentence, "The" should be in lowercase
Response: Your assumption was correct. The drafting team has corrected these typos.		
Southern Company	No	We suggest the Background Document should be edited to be consistent with changes made to the standard or other related documents (eg. Any revisions to draft BAL-003-1 and removal of the definition of SEFRD).
Response: Thank you for your comments. The drafting team revised the background document based upon modifications to the standard as well as modifications to other documents related to the standard.		
Seattle City Light	Yes	o LADWP and SCL note that the document "BAL-003-1 Background Document" seems to be reasonable.
Response: Thank you for your comments.		
Constellation Energy Commodities Group	Yes	Should be revisited based on the propposed modifications to the requirements.
Response: Thank you for your comments. The drafting team revised the background document based upon modifications to the standard as well as modifications to other documents related to the standard.		
Los Angeles Department of Water and Power	Yes	LADWP notes that the document "BAL-003-1 Background Document" seems to be reasonable.

Organization	Yes or No	Question 7 Comment
Response: Thank you for your comments.		
Keen Resources Asia Ltd.	Yes	Paragraph 4 on page 5 of the Background Document provides a statistically correct description of event selection without sample pre-selection and should followed instead of the erroneous criteria 2 & 7 in Attachment A. The risk-based approach to determining FRM, that the Background Document mentions in paragraph 4 of page 4 is being evaluated by the drafting team for application in this standard, should be considered for deployment as soon as possible to replace the administered method currently proposed in this standard, because the administered method lacks any technical justification. No such justification was ever attempted in the development of this standard. The administrative method of determining FRM is therefore but a highly dubious "quick fix" until the risk-based method is evaluated and implemented. The administrative method is in fact perverse because it discourages BAs from reducing their contribution to frequency error by refusing to reduce the BA's FRO accordingly, and because it encourages BAs to contribute to frequency error without increasing their FRO.
Response: The standard has to be written with what will be used day one. Due to the timeline that NERC has filed with FERC, there is not enough time to adequately evaluate a second methodology.		
Manitoba Hydro	Yes	Please see MH's response to Question 1 regarding the term Single Event Frequency Response Data. Additionally, the discussion in this document is useful in clarifying the intent of the drafting team, but some of this clarification would best be incorporated into the Standard itself. Ex. RSG requirement on page 6. Also on page 7 Attachment A does not specify what validation is and how it is done. Attachment A refers to BA providing FBS data to ERO which then validates and publishes. This should be reflected in R2.
Response: Please refer to our response to Question 1. **The "validation" process is nothing new. The ERO presently validates the information sent in by BAs today. The ERO will not be**		

Organization	Yes or No	Question 7 Comment
performing this process in a vacuum, but will be working with the BAs in the same manner as they presently do.		
NV Energy	Yes	This is a good reference; however see response to Question 6 in that there appears to be a discprepancy between Att A and the Background Document with regard to FRO calculation.
Response: The drafting team has corrected the discrepancy so both documents now agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.		
Cleco Corporation/SPP Standards Review Group	Yes	We appreciate the effort of the SDT in developing the Background Document. It provided insight on how the SDT got the proposed standard to where it is with this posting.
Response: Thank you for your comment.		
Imperial Irrigation District	Yes	
Southwest Power Pool Regional Entity	Yes	
Salt River Project	Yes	
Progress Energy	Yes	
Florida Power & Light Company	Yes	
FPL	Yes	
FMPP	Yes	

Organization	Yes or No	Question 7 Comment
Tucson Electric Power	Yes	
Associated Electric Cooperative Inc	Yes	
South Carolina Electric and Gas	Yes	
Ameren	Yes	
Hydro-Quebec TransEnergie	Yes	
ISO/RTO Council Standards Review Committee/ Independent Electricity System Operator		We do not have an opinion on whether or not the Background Document provides sufficient clarity to the development of the standard. We do, however, suggest that the SDT consider our comments in Q6, above, and move some of the information from Attachments A and B to or combine with the Background Document, to the Background Document to provide all the technical basis and background behind the elements stipulated in the requirements.
Response: Please refer to our response to Question #6.		

8. The SDT has developed a new document titled Attachment B – Process for Adjusting Bias Setting Floor. This document is intended to provide the methodology the ERO will use to reduce the minimum Frequency Bias Setting to become closer to natural Frequency Response. Do you agree that this document provides clear and concise instructions for the ERO to follow? If not, please explain in the comment area.

Summary Consideration: The majority of commenters did not like the word "initially" that was used in the proposed standard. They felt that it caused confusion. The SDT modified the attachment to remove the reference to the word "initially" and added other clarifying language to the document.

Some commenters were concerned with how the calculation of FRO for BAs that have load and generation. The intent was that generation-only BAs would base their settings on generation. Traditional BAs would use load. The SDT revised the table to agree with the proposed standard.

One commenter indicated that the standard was measuring AGC. The SDT disagrees.. There may be some AGC influence in the measurement however the SDT believes that this impact is minor. Based on the data received from the Field Trial, the SDT did not see this phenomenon.

A couple of commenters indicated that the methodology used for calculation of the minimum Frequency Bias Setting could be adverse for a single BA interconnection. The SDT explained that to ensure comparable treatment between BAs with fixed Bias Settings, BAs with a variable Bias Setting report their monthly average Bias for the reporting year. This average will be calculated when frequency is greater than 60.036 Hz or less than 59.964 Hz. The average of the 12 months' Bias values must be equal to or more negative than the Interconnection's minimum Bias Setting.

Organization	Yes or No	Question 8 Comment
Seattle City Light	Negative	Answer: Yes Comments: o LADWP and SCL note that Attachment B seems to be reasonable.
Response: Thank you for your comment.		
Constellation Energy Commodities Group	No	Should be revisited based on the proposed modifications to the requirements.

Organization	Yes or No	Question 8 Comment
Response: The SDT has modified Attachment B, now a Procedure for the ERO to follow in supporting the standard, to reflect modifications to the requirements and suggested changes from the industry.		
MRO NSRF	No	: There could be some confusion caused by the Attachment B due to the use of the word "initially" when the reference is made to the current standard. The drafting team should change the word "initially" to "currently" or strike it to avoid the potential confusion. The second paragraph of Attachment B (which contains the two bullets):The words "initially 1%" in the second bullet contradict with the Table 1 on Attachment B, which states "Initial" and "0.8%". Suggest deleting the parenthetical in the second bullet as when BAL-003-1 is effective it would be referencing an old Standard version. If the initial minimum is intended to be 1% say so in the Table 1.
Response: The SDT has modified Attachment B, now a Procedure for the ERO to follow in supporting the standard, to reflect your suggested changes.		
Texas Reliability Entity	No	1. In Attachment B, we suggest removing the paragraph beginning "The BA calculates . . ." because it appears to be background information that conflicts with the methods provided in this version of the standard for determining minimum bias settings.2. 2. Attachment B, Table 1, refers to "0.8% of peak load or generation." If a BA has both load and generation, will its minimum Frequency Bias Setting be based on its load, its generation, or can it pick the value that it prefers to use?
Response: The SDT agrees and has removed it from the Attachment B, now a Procedure. **The SDT intended that generation-only BAs would base their settings on generation. Traditional BAs would use load. We have revised the table to agree with the proposed standard.**		
Bonneville Power	No	BPA understands the concept and we disagree with it. As the ERO continues to lower the required minimum frequency bias setting for an interconnection, the BA's that

Organization	Yes or No	Question 8 Comment
Administration		have frequency response higher than the 1% will have a higher percentage of the frequency response of the interconnection. Also, this standard is primarily measuring AGC response, not natural frequency response; therefore not lowering the limit is appropriate.
Response: The SDT believes that you may be mixing the Frequency Bias Setting and Frequency Response Measure. As proposed the FRO will be assigned based upon load and generation as defined in Attachment A. Therefore actual Frequency Response will be required to come from the interconnection on that basis. To the extent an entity has a FRM greater than its Interconnection's minimum Frequency Bias Setting, its Frequency Bias Setting may grow as a percent of the Interconnections total Frequency Bias Setting. However, that is not Frequency Response. **The SDT disagrees with your comment concerning AGC. There may be some AGC influence in the measurement however the SDT believes that this impact is minor. Based on the data received from the Field Trial, the SDT did not see this phenomenon.**		
Duke Energy	No	Duke Energy suggests that the SDT consider a term other than "Initial' in the title for Table 1. We suggest "Proposed Frequency Bias Setting" for Table 1. Notwithstanding our suggestion that the criteria/requirements of the minimum FBS in the Attachment be incorporated into the Standard, Duke Energy has the following concerns with what is proposed: As cited in our comments to Question 8 in the last posting (extensive, so not repeated here), the secondary control measures of CPS1, CPS2 and the draft Balancing Authority ACE Limit (BAAL) are tightly coupled to the Frequency Bias Setting (FBS), and a reduction of the FBS will impact the secondary control requirements placed upon the BA. Noted in our response to Question 7 above, the statement on page 9 in the "BAL-003-1 Background Document"is not correct in stating that Attachment B will "ensure there is no negative impact on other Standards".The gradual reduction of the FBS will proportionally tighten the secondary control limits for each Balancing Authority. Even if the "natural" Frequency Response in the Eastern Interconnection remains unchanged for the next several years, under the process described allowing the ERO to annually adjust the minimum FBS for the Interconnection, the FBS will

Organization	Yes or No	Question 8 Comment
		eventually be reduced to a value approximately 10% above the calculated response in magnitude, cutting the current CPS1, CPS2 and BAAL limits in the Eastern Interconnection on average by more than half. The current FBS for the Eastern Interconnection is approximately minus 6500 MW/0.1Hz, estimated "natural" Frequency Response is perhaps around minus 2400 MW/0.1Hz. Unlike CPS1 and BAAL where the measures are based upon the FBS of the BA only, CPS2 (dependent upon the FBS of the BA and the Interconnection) will be significantly limiting to the degree that no change in a BA's own Frequency Response could significantly change its CPS2 limit if the Interconnection FBS drops over time as indicated. At least under CPS1 and the draft BAAL, the BA would have an option of improving its Frequency Response, allowing it to increase its FBS and proportionally the CPS1 and BAAL bounds using the FBS. Conclusion from our last comments submitted: Duke Energy does not believe there is a reliability need pushing the industry to tighten secondary control to the degree discussed above simply as a result of reducing the Frequency Bias Setting. If the calculated Frequency Response of the Interconnection stayed at its current level, what would be the justification for tightening the secondary control requirements of CPS1, CPS2 and the proposed BAAL? Duke Energy supports taking more of the error out of the ACE equation by having the FBS closer to the estimated Frequency Response of the Balancing Authority, however, Duke Energy does not believe the result should be a significant increase in secondary control costs to meet the CPS1, CPS2, or draft BAAL requirements. Duke Energy understands the position placed upon this Standard Drafting Team- the secondary control and reserve requirements are not under the scope of the team, however, proper consideration has not been given in Attachment B to the impact lowering the FBS will have on the industry in terms of the requirements placed upon the BA for secondary control and reserve requirements - especially for meeting CPS2. The research discussed in our comments to the last posting support that reducing the FBS while under CPS1 and the draft BAAL may be achievable, however a CPS2 bound cut potentially in half or lower will place unreasonable bounds on a BA, requiring control actions even when the BA may

Organization	Yes or No	Question 8 Comment
		be operating in support of the Interconnection frequency. Given the significant impacts discussed, Duke Energy believes that additional provisions must be in place for the Industry to approve each subsequent revision to the calculation of the minimum Frequency Bias Setting, rather than leave it as a decision made only by the ERO.

Response: We agree with your comment about the word "initial" in Attachment B, now a Procedure for the ERO to follow in supporting the standard, and have removed the word "initial" from the title to remove the confusion.

We believe that your assessments about the effects on CPS2, BAAL and CPS1 are uncertain because there are complex interactions between the Frequency Bias Setting and the ACE values in these measures that use a Frequency Bias Setting.

We agree that the words in Attachment B, now a Procedure for the ERO to follow in supporting the standard, stating "ensure there is no negative impact on other standards" is an overstatement at this point. We have added language to allow for analysis prior to implementing changes to the minimum Frequency Bias Setting. This is also why we have chosen to go slow with the concept of allowing the frequency bias setting to be reduced below 1% of Peak Load.

We agree with your support of taking more of the error out of the ACE equation by making the FBS closer to the estimated Frequency Response of the Balancing Authority; however, we do not agree that the effects of secondary control can be ignored when we make these changes. Therefore we are proposing a "go slow approach" to making this happen and included checks to confirm there are not unexpected influences injected into the CPS-related calculations.

Based on concerns raised by the industry, the drafting team has modified the Attachment B, now a Procedure for the ERO to follow in supporting the standard, to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.

We support your comment related to the ERO working with the Industry to approve each subsequent revision to the minimum FBS. However, it is this drafting team's understanding that the language in the standard is limited to referencing the ERO and the ERO will develop a process to address the needs of the standard. Therefore, no modification has been made to require any specific coordination between the ERO and the Industry.

Organization	Yes or No	Question 8 Comment
Sacramento Municipal Utility District (SMUD)	No	In addition to the requirements, reducing frequency bias obligation results in generation tripping closer to the set point. It seems that Lowering the Minimum Frequency Bias Setting from 1% to .8% will result in a lower response, which in turn will lower the natural frequency response. Over time it seems this pattern would lead to poorer response.
Response: The SDT is unsure of what your first comment is attempting to say. Therefore the SDT cannot provide a response to your comment without further clarification. **The SDT believes that you may be mixing the Frequency Bias Setting and Frequency Response Measure. As proposed the FRO will be assigned based upon load and generation as defined in Attachment A. Therefore actual Frequency Response will be required to come from the Interconnection on that basis. To the extent an entity has an FRM greater than its Interconnection's minimum Frequency Bias Setting, its Frequency Bias Setting may grow as a percent of the Interconnection's total Frequency Bias Setting. However, that is not Frequency Response.**		
NV Energy	No	In Attachment B, it seems unclear whether the initial FB setting is supposed to be 1% of BA peak load or 0.8% as shown in the table. In general, I was extremely confused about what the required FB setting should be. R5 indicates a percentage of load found in Att B, but Att B indicates the greater of Natural Frequency Response or 1% of peak, and then the table that follows indicates 0.8%. At this point, I have no idea what is being stated for the requirement.
Response: The SDT agrees and has modified the attachment. **The SDT intended that generation-only BAs would base their settings on generation. Traditional BAs would use load. We have revised the table to agree with the proposed standard.**		
Progress Energy	No	PGN supports the collective comments of SERC members. We suggest the SDT consider a term other than "Initial' in the title for Table 1. We suggest "Proposed Frequency Bias Setting" for Table 1

Organization	Yes or No	Question 8 Comment
Response: The SDT agrees with your comments and has made corresponding modifications to the attachment by removing the word, "initial".		
Independent Electricity System Operator	No	Please see our comments under Q6. In brief, we do not agree with including a process description type of document as part of the standard requirement.
Response: Please refer to our response to Question #6.		
ISO/RTO Council Standards Review Committee	No	Please see our comments under Q6. In brief, we do not agree with including a process description type of document as part of the standard requirement. Process description should be regarded guideline document and not a part of the standard requirement.
Response: Please refer to our response to Question #6.		
Tucson Electric Power	No	Reducing a BAs frequency bias setting may have an adverse impact on recovering from a frequency event once you get past the first 8-10 seconds. A larger bias will allow for actual and sustained AGC generator responses. Industry focus should be on generator governor response within the first 8-10 seconds.
Response: The Standard Drafting Team disagrees with your comment. Full recovery is dependent upon the contingent BA recovering from its loss. However, we do agree that secondary frequency support from the non-contingent BAs may not be as robust.		
Northeast Power Coordinating Council	No	Refer to the first comment in Question 6.
Response: Please refer to our response to Question #6.		
Hydro-Quebec TransEnergie	No	The methodology proposed to compute the Minimum Frequency Bias Setting (in MW/0,1Hz) could be adverse for the Quebec Interconnection. Hydro-Quebec uses a

Organization	Yes or No	Question 8 Comment
		variable Bias that is calculated based upon which generator is online and it's droop setting. Under light load condition, we might have a Bias setting that would be under (in absolute value) than the FRM which is the median value, even though the Bias setting would reflect the grid's frequency response. This method, as proposed, would mandate us to have a larger Bias that what is really needed. Unlike Eastern Interconnection, we are not over biased. By implementing this new methodology, it would make us over biased. Having a too large Bias could lead to system instability, based on the results of studies from our control specialists. The Minimum Frequency Bias Setting should take into account the wide load span that we can face. For the variable bias, we could express the Minimum Frequency Bias Setting as a function of monthly peak loads, and remove the Natural Frequency Response term. In addition, there is a gap between Attachment B and the text in R5. See comment 10 for explanation.
Response: To ensure comparable treatment between BAs with fixed Bias Settings, BAs with a variable Bias Setting report their monthly average Bias for the reporting year. This average will be calculated when frequency is greater than 60.036 Hz or less than 59.964 Hz. The average of the 12 months' Bias values must be equal to or more negative than the Interconnection's minimum Bias Setting.		
Xcel Energy	No	There could be some confusion caused by the Attachment B due to the use of the word "initially" when the reference is made to the current standard. The drafting team should change the word "initially" to "currently" or strike it to avoid the potential confusion.
Response: The SDT agrees with your comment and has modified the attachment to remove the word, "initially".		
Florida Power & Light Company	No	There is no technical justification provided either in the attachment or background data for the initial starting value of 0.8%. This is acceptable but is arbitary. Additionally, the last sentense on page 1 of Attachment B should be changed to read " the ERO must reduce (in absolute value) the minimum Frequency Bias Settings for BA's within that Interconnection, by 0.1 percentage point from its previous annual

Organization	Yes or No	Question 8 Comment
		value, to better match the Frequency Bias Setting to the natural Frequency Response or provide technical justification for not implementing the reduction
Response: You are correct, the starting value is arbitrary. The SDT did not want to make a one step change to immediately reduce the minimum Frequency Bias Setting to natural Frequency Response. The SDT believes that a multi-year multi-step process would be better and allows for monitoring the effects on other performance standards. **The SDT believes that the end result would be the same. The present wording allows for collaboration between the ERO and other entities/groups. The SDT is also concerned with putting a requirement on the ERO within an Attachment when there is not a reliability problem if it were not to happen.**		
SERC OC Standards Review Group	No	We suggest the SDT consider a term other than "Initial' in the title for Table 1. We suggest "Proposed Frequency Bias Setting" for Table 1
Response: The SDT agrees with your comment and has modified the attachment by removing the word, "initial".		
South Carolina Electric and Gas	No	We suggest the SDT consider a term other than "Initial' in the title for Table 1. We suggest "Proposed Frequency Bias Setting" for Table 1
Response: The SDT agrees with your comment and has modified the attachment by removing the word, "initial".		
ISO New England Inc	No	We suggest the SDT to first determine if the materials in the revised Attachment A & B are "Guideline" or Technical Background", or are they "requirements". If it is the former, then Requirement R1 should not mention Attachment A at all. If it is the latter, then the as-written Attachment A is a mix bag as it on the one hand describes the ERO's process for supporting the Frequency Response Standard (FRS), in other words, the method and criteria it uses to calculate the frequency bias settings and the FRM, and on the other hand the BA's obligations to support this process. We strongly disagree that the latter requirements be imbedded in an attachment, especially one that is supposed to provide the technical background and guideline for another entity which, by the way, is not held responsible for complying with the

Organization	Yes or No	Question 8 Comment
		proposed method. An appendix is not regarded as a mandatory requirement.
Response: The process is still being developed at NERC but an Attachment would document processes to be utilized without a measurement saying that you failed the standard.		
Southern Company	No	We suggest using the words, 'Proposed Frequency Bias Setting' in the Title of Table 1 instead of the word, 'Initial'.
Response: The SDT agrees with your comment and has modified the attachment by removing the word, "initial".		
ERCOT	No	While there is no problem with the calculation involved, it is unclear why the SDT elected to assign a grid performance element in this standard to the ERO, who has no functional (registered) role in grid performance. Since this is a cook-book calculation and transfer of data on frequency performance, why not assign it to the BA?
Response: The Attachment B, now a Procedure for the ERO to follow in supporting the standard, only outlines a process that the ERO is to use when adjusting the minimum Frequency Bias Setting. The Procedure does not place any grid performance requirement on the ERO. The SDT also believes that some authority should have oversight over the minimum setting to prevent abuses and assure fairness.		
Seattle City Light	Yes	o LADWP and SCL note that Attachment B seems to be reasonable.
Response: The SDT thanks you for your affirmative response and clarifying comment.		
Energy Mark, Inc.	Yes	Comment 15: This Yes answer assumes that the SDT addresses Comment 13 under Question 6 in these comments.
Response: The SDT thanks you for your affirmative response and clarifying comment. The SDT addressed your Comment #13 under Question #6.		
Ameren	Yes	Considering the comments made regarding R5, in question 2, above, which are:

Organization	Yes or No	Question 8 Comment
		R5. While we agree with the requirement of R5, it should not be at the expense of changing the value of L10 in BAL-001, R2, which has been accepted by FERC in Order 693. An accommodation should be made so that any changes to the Frequency Bias Setting according to BAL-003, R5, should not affect the value of L10 used in BAL-001, R2.
Response: The SDT thanks you for your affirmative response and clarifying comment. However, the SDT disagrees with your comment. Since L_{10} is the function of individual Frequency Bias Settings to the sum of all BA Frequency Bias Settings within an Interconnection and establishes operating boundaries, it would be inappropriate to leave L_{10} as is when a Frequency Bias Setting changes.		
Los Angeles Department of Water and Power	Yes	LADWP notes that Attachment B seems to be reasonable
Response: The SDT thanks you for your affirmative response and clarifying comment.		
FPL	Yes	Last paragraph: As stated, would that make the Minimum Frequency Bias Setting 0.7% of peak load or generation? A numerical example shown would help clarify this paragraph.
Response: The SDT thanks you for your affirmative response and clarifying comment. The SDT has added an example to the Background Document.		
Southwest Power Pool Regional Entity	Yes	Need to clarify that 2012 Bias setting will be based on 1% of peak load or generation until approval of BAL-003-1 by FERC establishing the .08% of peak load or generation minimum threshold.
Response: We agree and we have endeavored to do so. The SDT does point out that the proposed minimum for the first year once approved by FERC is 0.9% not 0.08%.		
Associated Electric	Yes	This is a very important document, providing bounds and rationale for and future

Organization	Yes or No	Question 8 Comment
Cooperative Inc		changes, as well as initial settings going into ballot. As such, it is AECI's understanding that, upon going into effect, this BAL-003-1 will utilize these initial settings.
Response: The SDT thanks you for your affirmative response and clarifying comment.		
Imperial Irrigation District	Yes	
SPP Standards Review Group	Yes	
ACES Power Marketing Standards Collaborators	Yes	
Salt River Project	Yes	
FMPP	Yes	
American Electric Power	Yes	
Cleco Corporation	Yes	
Manitoba Hydro	Yes	
Great River Energy	Yes	
Keen Resources Asia Ltd.	Yes	

9. The SDT has provided an additional spreadsheet, FRS Form 2, to assist the Balancing Authority in providing the data needed to comply with the proposed standard. Do you agree that this spreadsheet is useful and the instructions are meaningful? If not, please explain in the comment area.

Summary Consideration: Many of the commenters expressed concern with the fact that the Excel Spreadsheets that were required to be used were in a newer version of Excel than their company was presently using. In response, the SDT developed Excel Spreadsheets that are compatible with earlier versions of Excel.

A couple of commenters expressed concern that the Excel Spreadsheets did not contain all of the information necessary to comply with the analysis required (timing of the event (hour, minute, second). Form 1 contains the time of the event including the hour, minute and second for t(0) and a graph of frequency data for each event in the list. The time for each BA's t(0) may vary from this time due to different sample rates of data and physical proximity to the contingency. Since this standard does not identify an "A Point" or "B Point" but calculates an "A Value" and "B Value", providing an exact time for these provides little value. T(0) is the focus of the measurement process and is the first observed change in frequency of the event. Also added to Form 1, the BA can enter the time zone of its data and the time of t(0) will be converted to the correct time in that zone. We agree that the proper selection of t(0) is important. This can be viewed on the "Graph 20 to 52s" worksheet. When set correctly, the first change in frequency of the event will be exactly in the center of the graph on the vertical grid line.

Some commenters felt that it would be useful if the SDT could develop a completed form as an example to help entities better understand the methodologies used in the form. Form 2 contains actual data for frequency and NAI of an event. Sample data was added for each of the adjustments to demonstrate their use and impact on the analysis.

A couple of commenters question the meaning of "master event list" in FRS Form 2. The "Master event list" refers to the event list contained in each Interconnection's Form 1.

Organization	Yes or No	Question 9 Comment
Seattle City Light	Negative	Answer: No Comments: o LADWP and SCL note that Form 2 is not compatible with prior versions of Excel-it won't even open in Excel 2003 (which is still widely used)- and requests that all spreadsheets and calculation tools developed under 2007-12 be revised to support common software of the past 10 years.

Organization	Yes or No	Question 9 Comment
Response: Excel 2003 versions of all forms have been developed.		
Seattle City Light	No	o LADWP and SCL note that Form 2 is not compatible with prior versions of Excel-it won't even open in Excel 2003 (which is still widely used)-and requests that all spreadsheets and calculation tools developed under 2007-12 be revised to support common software of the past 10 years.
Response: Excel 2003 versions of all forms have been developed.		
Associated Electric Cooperative Inc	No	AECI believes the SDT could spare our industry both confusion and inconsistency, by specifying that identified Interconnection Disturbances include both Point A and Point B to the hour, minute, and second. While this introduces some risk of Entities over-automating their data-reports, the benefits for Eastern Interconnection respondents would be tremendous. Cautions and disclaimers should be placed on both Form 1 and Form 2, to assure respondents manually inspect their frequency data and pinpoint the specific inflection-point samples.
Response: Form 1 contains the time of the event including the hour, minute and second for t(0) and a graph of frequency data for each event in the list. The time for each BA's t(0) may vary from this time due to different sample rates of data and physical proximity to the contingency. Since this standard does not identify an "A Point" or "B Point" but calculates an "A Value" and "B Value", providing an exact time for these provides little value. T(0) is the focus of the measurement process and is the first observed change in frequency of the event. Also added to Form 1, the BA can enter the time zone of its data and the time of t(0) will be converted to the correct time in that zone. We agree that the proper selection of t(0) is important. This can be viewed on the "Graph 20 to 52s" worksheet. When set correctly, the first change in frequency of the event will be exactly in the center of the graph on the vertical grid line.		
Bonneville Power Administration	No	BPA believes the form is not easily understood and is overly complicated for what it is trying to accomplish. BPA believes the form might work for an internal evaluation, just not for an external audit. Compliance is based on this form. BPA believes the standard needs to be simplified and possibly returned to a data gathering standard.

Organization	Yes or No	Question 9 Comment
Response: The addition of "Adjustments" to the analysis did add complexity to the Form. These were added based on comments received from the industry on previous postings. Some of these "Adjustments" may be removed as the field trial progresses if they are not utilized. In the latest Form 2, version 6, the multiple time period averages were removed since the final average period was selected based on the results of the first round of the field trial evaluated last fall. However, Form 2 is important to the standard in that it achieves the requirement of measuring frequency response in the same manner for all Interconnections. Returning Form 2 with Form 1 allows validation of the selection of t(0) which is critical for this requirement. **The SDT does not believe that it can revert back to a "data gathering" standard. The SDT is responding to FERC Directives from Order 693 as well as the FERC Order dated March 18, 2010 which mandated development of a standard addressing the Order 693 directives within six months. FERC later granted an extension to provide a standard addressing these issues by the end of May 2012.**		
FPL	No	FRS Form 2 - Two-second Sample DataInstructions tab/worksheet: What is referred to as or meant by the 'master event list'? 4. - Regarding 2 second sample rate for 25 minutes starting 2 minutes before event begins and 15 minutes after it begins, does this add up to 25 minutes or are additional minutes being required for collection? Also, FPL can report frequency at this rate, but can only report load in MW every four seconds. Move to 4 second sample rate.6-8. - Possible to add button to auto-populate cells C8 and C11 in 'Entry Data' tab from the new column C and cell identifying the desired frequency change time and simplify these steps? 10. - Clarify where the "Copy" button is. Is it the one in the 'Data' tab or worksheet? Entry Data tab/worksheet:Step 6 should also be or be moved to the "Instructions" worksheet.Are the values in column C in the "Data" worksheet labeled "Total Lost Generation" the same as those in column AQ in the "Evaluation" worksheet? If so, why are they not both labeled "Net Actual Interchange"? What is the definition of "Non Conforming Load" in column E?
Response: "Master event list" refers to the event list contained in each Interconnection's Form 1.		

Organization	Yes or No	Question 9 Comment
		The inconsistency in the data sample totals has been corrected. The absolute minimum amount of data required for the full analysis is two minutes before the beginning of the event to 15 minutes after the beginning of the event. The calculation rate of "Load" can be at a different rate than the AGC scan rate. The Load data is not used in measuring performance. The variability of Load can impact measured performance and can be observed on the "BA Load Dampening" worksheet graph. On some Interconnections, load dampening can be observed in the data. Using the historian "data sample" collection option, it will fill the spreadsheet with the same value of Load, changing at the calculation rate. **The "auto populate" of cells C8 and C11 is a good idea. A couple BAs did this during the first phase of the field trail. The problem is that the event time of t(0) in column C was set using 2 second scan data in one part of the Interconnection and the beginning of the event may be shifted one or two scans when frequency is scanned less often. This would make this automation difficult for the value in C8. It is critical for the measure for t(0) be set correctly. The value of C11 is less critical and is not used in the initial primary Frequency Response Measure. It is only used to demonstrate delivery of primary frequency response during the frequency recovery period.** **The location of the "Copy" button has been clarified.** **Step 6 on the "Data Entry" worksheet was added to the "Instructions" worksheet. The value in column C in the "Data" worksheet labeled "Total Lost Generation" is for single BA Interconnections only. It takes the place of "Net Actual Interchange" for multiple BA Interconnections. Column "AO" on the "Evaluation" worksheet is not the same as the "Contingent BA Lost Generation" data on the "Evaluation" worksheet. The "Contingent BA Lost Generation" data is only used by multiple BA Interconnection BAs not Single BA Interconnections. The "Data" worksheet for the "Single BA Interconnection" Forms has an n/a in columns G, H and I and should not be used by BAs in these Interconnections. This is noted on their "Instructions" worksheet. This should explain why they are not labeled the same.** **Non-conforming Load is Load that changes abnormally different than the conventional diurnal load pattern of a Balancing Authority Area. Non-conforming Load becomes significant when the net change within a few minutes is greater than a BA's L_{10} limit. The importance here is that this Load change can be ten times larger than some BAs' FRO and makes measuring the SEFRD inaccurate. An example of non-conforming load would be an arc furnace of a significant size.** **Thank you for your comments and the effort to find each of these items.**
ISO/RTO Council Standards Review Committee	No	If we are not mistaken, Form 2 is added as the last sheet in the Form 1 spreadsheet file. Apart from that, however, there are other sheets added to the previous Form 1. But this Comment form makes no mention of the changes, nor is there a question in

Organization	Yes or No	Question 9 Comment
		the Comment Form asking whether the additional information should be requested. We believe this is a significant change to the standard and many commenters may have missed the opportunity to comment on it. Compared to the previous version, Form 1 has been significantly expanded to include not only additional sheets but much more comprehensive data requirements even on the Data Entry sheet itself. This makes data submission a very time-consuming task but the justification for requiring detailed data entry has not been provided. We question the need for such expansion on data entry requirements. We have yet to see the reason for expanding Form 1 in assisting a BA to provide the data needed to comply with the standard, hence we do not see how adding a Form 2 can help in that regard. We suggest the SDT to keep data requirements to only what is minimally needed to support the FRS reporting process. Where the SDT deems additional data entry sheets to be necessary, it should provide the rationale for expanding from a 2 sheet form into a multiple sheet form for additional data collection. Where the SDT deems the additional data sheet or information not necessary to support FRS reporting, then we suggest the SDT to hide those pages not required for the standard so as to avoid confusion, and/or to remove those analytical pages not directly used in the standard.
Response: The SDT points out that there are no additional data requirements. It is possible that you are seeing more spreadsheets due to them being unhidden. **Form 2 is a separate stand-alone workbook. Form 1 does have a worksheet labeled "BA Form 2 Event Data" that will contain the single event data from each of the BA's Form 2s. Two additional worksheets were added to Form 1 and several worksheets were deleted. The "Time Zone Ref" worksheet was added to allow the ability of the BA to enter the time zone of its data and the spreadsheet will calculate the local time of the event from the UTC time. This was added for the convenience of the BA in collecting the correct data for each event and does not require additional data from the BA. The second worksheet added was a worksheet that displays graphs of frequency for each event and the t(0) selected correctly. This was added to aid the BA with data collection and the selection of t(0) since this seemed to be one of the biggest problems during the first phase of the field trial. This graph worksheet does not require the BA to do anything. It is not used in the analysis and can be deleted. Deleting this worksheet will greatly reduce the size of Form 1. None of the data requirements on Form 1 or Form 2 have changed from previous**		

Organization	Yes or No	Question 9 Comment
versions. The absolute minimum data needed for this standard is the date/time, frequency and NAI in columns A, B and C of the "Data" worksheet in Form 2. Columns D through I have been totally optional and can be left blank. Column J is the Bias setting in the ACE equation and is important to BAs that utilize variable Bias. Column K, BA Load, was added by the drafting team in the beginning to see if Load Dampening could be measured as this has been done for several years on one Interconnection. Column I of the "Data" worksheet is the only optional data that the BA should use when it is the contingent BA during any of the events evaluated. Utilizing this data will allow the BA's SEFRD to be calculated correctly and give the BA a full sample set for the annual median calculation. Form 2 is necessary to standardize the measurement process on all Interconnections. You are free to hide any analytical worksheets on Form 1 and Form 2. You can do this on your "master" Form 2 and then build each Form 2 for each event using this master. These additional worksheets are available for BAs to utilize if they find that their performance is below the FRO and will aid the analysis of the contributing causes.		
Independent Electricity System Operator	No	If we are not mistaken, Form 2 is added as the last sheet in the Form 1 spreadsheet file. Apart from that, however, there are other sheets added to the previous Form 1. But this Comment form makes no mention of the changes, nor is there a question on the additional information requested. We have a concern over this omission of attention or oversight. Compared to the previous version, Form 1 has been significantly expanded to include not only additional sheets but much more comprehensive data requirements even on the Data Entry sheet itself. This makes data submission a very time-consuming task but the justification for requiring detailed data entry has not been provided. We question the need for such expansion on data entry requirements. We have yet to see the reason for expanding Form 1 in assisting a BA to provide the data needed to comply with the standard, hence we do not see how adding a Form 2 can help in that regard. We suggest the SDT to look at the basic need for data submission that would suffice to support the FRS reporting process. Where the SDT deems additional data entry sheets to be necessary, it should provide the rationale for expanding from a 2 sheet form into a multiple sheet form for additional data collection.
Response: The SDT points out that there are no additional data requirements. It is possible that you are seeing more spreadsheets due to them being unhidden.		

Organization	Yes or No	Question 9 Comment
Form 2 is a separate stand-alone workbook. Form 1 does have a worksheet labeled "BA Form 2 Event Data" that will contain the single event data from each of the BA's Form 2s. Two additional worksheets were added to Form 1 and several worksheets were deleted. The "Time Zone Ref" worksheet was added to allow the ability of the BA to enter the time zone of its data and the spreadsheet will calculate the local time of the event from the UTC time. This was added for the convenience of the BA in collecting the correct data for each event and does not require additional data from the BA. The second worksheet added was a worksheet that displays graphs of frequency for each event and the t(0) selected correctly. This was added to aid the BA with data collection and the selection of t(0) since this seemed to be one of the biggest problems during the first phase of the field trial. This graph worksheet does not require the BA to do anything. It is not used in the analysis and can be deleted. Deleting this worksheet will greatly reduce the size of Form 1. None of the data requirements on Form 1 or Form 2 have changed from previous versions. The absolute minimum data needed for this standard is the date/time, frequency and NAI in columns A, B and C of the "Data" worksheet in Form 2. Columns D through I have been totally optional and can be left blank. Column J is the Bias setting in the ACE equation and is important to BA's that utilize variable Bias. Column K, BA Load, was added by the drafting team in the beginning to see if Load Dampening could be measured as this has been done for several years on one Interconnection. Column I of the "Data" worksheet is the only optional data that the BA should use when it is the contingent BA during any of the events evaluated. Utilizing this data will allow the BA's SEFRD to be calculated correctly and give the BA a full sample set for the annual median calculation. Form 2 is necessary to standardize the measurement process on all Interconnections. You are free to hide any analytical worksheets on Form 1 and Form 2. You can do this on your "master" Form 2 and then build each Form 2 for each event using this master. These additional worksheets are available for BAs to utilize if they find that their performance is below the FRO and will aid the analysis of the contributing causes.		
Los Angeles Department of Water and Power	No	LADWP notes that Form 2 is not compatible with prior versions of Excel-it won't even open in Excel 2003 (which is still widely used)-and requests that all spreadsheets and calculation tools developed under 2007-12 be revised to support common software of the past 10 years.
Response: Excel 2003 versions of all forms have been developed.		
Tucson Electric Power	No	TEP feels that Form 2 is a useful tool for internal BA use and should not be used for compliance purposes.
Response: Form 2 is not intended to be used to reflect compliance but rather for consistency in reporting.		

Organization	Yes or No	Question 9 Comment
Form 2 was developed so consistent analysis of each event could be validated. During the first round of the field trial, many BAs selected the incorrect t(0), some provided data that was filtered or utilized data compression techniques that caused the analysis to be incorrect. With Form 2, the selection of t(0) can be quickly evaluated and data quality reviewed. The proper selection of t(0) can be made and Form 1 corrected providing validated consistent results.		
MRO NSRF	Yes	: It would be useful if the drafting team could develop a completed form as an example to help entities better understand the methodologies used in the form
Response: All versions of Form 2 contain actual data for frequency and NAI of an event. Sample data was added for each of the adjustments to demonstrate their use and impact on the analysis.		
Xcel Energy	Yes	It would be useful if the drafting team could develop a completed form as an example to help entities better understand the methodologies used in the form.
Response: All versions of Form 2 contain actual data for frequency and NAI of an event. Sample data was added for each of the adjustments to demonstrate their use and impact on the analysis.		
Ameren	Yes	We agree that the spreadsheet is meaningful, but still needs to be vetted through the field trial process, with improvements made based on experience in its use.
Response: We completely agree.		
Imperial Irrigation District	Yes	
Northeast Power Coordinating Council	Yes	
SERC OC Standards Review Group	Yes	
SPP Standards Review Group	Yes	

Organization	Yes or No	Question 9 Comment
Southwest Power Pool Regional Entity	Yes	
Salt River Project	Yes	
Progress Energy	Yes	
Southern Company	Yes	
Energy Mark, Inc.	Yes	
Florida Power & Light Company	Yes	
FMPP	Yes	
ISO New England Inc	Yes	
NV Energy	Yes	
American Electric Power	Yes	
South Carolina Electric and Gas	Yes	
Cleco Corporation	Yes	
Manitoba Hydro	Yes	
Constellation Energy Commodities Group	Yes	

Organization	Yes or No	Question 9 Comment
Great River Energy	Yes	
Hydro-Quebec TransEnergie	Yes	
Duke Energy	Yes	
Keen Resources Asia Ltd.	Yes	

10. Please provide any other comments (that you have not already provided in response to the questions above) that you have on the draft standard BAL-003-1.

Summary Consideration: Many of the commenters referenced other questions in the comments. The SDT asked them to review the response to those earlier questions rather than repeating the responses here.

Several commenters pointed out that there was a discrepancy between the Background Document and Attachment A regarding the calculation of the BA FRO. The SDT has corrected the reference so both documents agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.

Several other commenters indicated that Supplemental Regulation Service was not an appropriate method to provide Frequency Response. The SDT agrees that it is inappropriate to expect supplementary regulation to transfer Frequency Response successfully, however the SDT did not want to prevent any innovative solution that will transfer Frequency Response through the use of a pseudo-tie among Balancing Authorities. Also, the SDT believes that Balancing Authorities exchanging Supplementary Regulation via a pseudo-tie have to be consistent in the removal or inclusion of Supplementary Regulation in their actual net interchange measurement as well as in all events across the measurement period.

Many commenters were concerned that the BA could be responsible for supplying an infinite amount of Frequency Response. They indicated that a BA could not prepare for this in its planning process. The SDT agrees that the proposed standard was not clear on this subject and added language in the "Criteria for Selection of Events" section of the revised Attachment A to limit the amount of Frequency Response a BA would be required to provide in order to be compliant with the standard.

Some commenters were concerned with the wording in Requirement R5. They indicated that the wording needed to say "greater than or" instead of "at least". The SDT removed the requirement and combined it with the revised Requirement R2 and the new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.

Many commenters did not agree with requiring the BA to provide Frequency Response. The NERC Functional Model and FERC both cited the BA as the responsible entity for providing Frequency Response. T There are several different methods available to the BA to provide Frequency Response and the SDT has included these in the Background Document.

Some commenters were concerned with the threshold that the SDT recommended for the Eastern Interconnection. Florida sees a greater change in frequency for a given contingency than for a comparable event elsewhere **in** the East. This is the reason for the higher first step of UFLS in Florida. Having all Eastern Interconnection Balancing Authorities carry extra frequency responsive reserves to protect against a target minimum frequency of 59.7 Hz would not protect Florida against a contingency inside Florida, but would require the other BAs in the Eastern Interconnection to continuously carry about 4,000 MW of frequency

responsive reserves to protect against a false trip in Florida if frequency fell below 59.7 Hz but over 59.5 Hz. This is a contingency on the order of 7,000 MW or more. The drafting team compromised and gave the entire Interconnection an obligation based on 59.96Hz.

A few commented did not agree with lowering the minimum Frequency Bias Setting. Early research by Nathan Cohn on interconnected power system operations found that control is optimum if a BA's Bias Setting is equal to its natural Frequency Response. If there were to be a difference between the two values, it is preferable to be slightly over-biased. The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.

Some commenters had concerns about the use of the RSG as a means to provide Frequency Response, and the SDT modified the Background Document to further explain how an RSG (now FRSG) could supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."

A couple of commenters indicated that the median was not the proper method to use for the calculation of the FRM. Statisticians note that the median is a more accurate measure of central tendency than the mean when analyzing a sample that is small and or where scores vary widely. This is the case when estimating a BA's Frequency Response. While the median is not perfect, the median approaches a BA's typical performance after 15-20 observations and more observations give a higher confidence in the estimate of the BA's performance.

Organization	Yes or No	Question 10 Comment
MRO NSRF	Negative	It is not clear if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of FR expected on a total basis. Balancing Authorities need to know for how many tenths of a hertz they are to respond so they

Organization	Yes or No	Question 10 Comment
		can determine how to plan to meet this requirement. The documents do not appear to provide any boundary on the maximum amount of FR that a BA will provide, i.e. it is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz (e.g. what if freq dips to 59.0? Is the BA expected to provide a limitless amount of frequency response?). Also, is that event excluded from the list used to calculate the Balancing Authorities' response or is it included with an expectation that it counts the same as any other event. Without a clear statement of what is expected, including whether there is a limit on that expectation or not, the Balancing Authorities cannot know what is expected of them and therefore cannot plan appropriately. In the first paragraph of R5 delete "at least" and replace with "greater than or". This phrase would now read "…absolute value is greater than or equal to one of the following:" "Equal to or greater than" accurately identifies the expectation, the current phrasing will lead to confusion and mis-interpretation. Bullet #1 of R5: The minimum % is based upon the "estimated yearly Peak Demand". During the NERC webinar it was mentioned that this minimum would move to being based on historical reporting of Peak Demand. Where does the SDT stand on this item? Please provide clarification.
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.** **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		

Organization	Yes or No	Question 10 Comment
Muscatine Power & Water	Negative	"MPW agrees with the comments submitted by the MRO-NSRF."
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.** **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		
JDRJC Associates	Negative	Support Midwest ISO Comments
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.** **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		
Lincoln Electric System	Negative	Please see comments submitted by the MRO NSRF. (See comments for Question 5 submitted by the MRO NSRF.)
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified**		

Organization	Yes or No	Question 10 Comment
the requirement and believes we have implemented the intent of your suggestion. **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		
Madison Gas and Electric Co.	Negative	Please see the MRO NSRF comments
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.** **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		
Midwest Reliability Organization	Negative	Please see the comments submitted by MRO NSRF. As MRO Sector 10 we agree with MRO NSRF position and recommendation to vote negative for this ballot.
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.** **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		
Muscatine Power & Water	Negative	"MPW agrees with the comments submitted by the MRO-NSRF."

Organization	Yes or No	Question 10 Comment
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.** **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		
Nebraska Public Power District	Negative	NPPD joins it's comments with comments submitted by the Midwest Reliability Organization - NERC Standards Review Forum (MRO NSRF) submitted on December 8, 2011.
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified the requirement and believes we have implemented the intent of your suggestion.** **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		
Omaha Public Power District	Negative	Please see MRO's comments submitted via Comment Form.
Response: The SDT agrees with you that there was not a clear statement as to the maximum amount of Frequency Response that a BA would have to provide. The SDT has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide. **The SDT has removed Requirement R5 and combined it into Requirement R2 and a new Requirement R3. The SDT has modified**		

Organization	Yes or No	Question 10 Comment
the requirement and believes we have implemented the intent of your suggestion. **The SDT has corrected the reference so that both Attachment A and the Background Document agree. The drafting team is proposing to use historical information rather than forecasted information for the allocation of the Frequency Response Obligation.**		
FirstEnergy Corp.; FirstEnergy Energy Delivery; FirstEnergy Solutions;Ohio Edison Company	Abstain	FirstEnergy appreciates the hard work of the drafting team but needs more time to review the standard with internal business units and with our RTO. Therefore at this time we must abstain.
Response: The SDT thanks you for your clarifying comment.		
	Abstain	As a qualified professional statistician I abstain from voting "affirmative" or "negative" on this standard because it violates two fundamental statistical best practices. 1. In the Standard, the definition of Frequency Response Measure (FRM) is statistically wrong. The median is an improper statistical measure of Frequency Response because --it truncates large excursions which are the specific subject of Frequency Response control, not normal operating frequency errors which are self-correcting and are the subject of CPM control; --it is non-linear; --it is non-summable over the interconnection; in other words, the individual BA medians don't add up to the interconnection median, in complete incompatibility with CPM control which requires summability of BA performances into the interconnection's performance. Moreover, it is mathematically impossible to sum the medians of the BAs in a Reserve Sharing Group (RSG) into the RSG's median: in other words, the RSG's median cannot represent the sum of the medians of its members. The last paragraph on page 5 of the Background Document is patently wrong, invented, and supported in no probability & statistics literature whatsoever. As a practicing statistician, I hereby give testimony to the utter falsehood of the statement that "In general, statisticisns use the median as the best measure of central tendency when a

Organization	Yes or No	Question 10 Comment
		population has outliers." (See http://www.robertblohm.com/BestStatistic.doc for an explanation of "best statistic" which is a highly technical and central topic in modern probability theory and statistics.) Also, "outliers" are falsely and rhetorically claimed to be "noise" when in fact they are the "events" that are the specific subject of Frequency Response. It is well known that they do not "fit" a normal distribution. They are distinct from the normal operating errors that are the subject of CPM control. The paragraph does correctly conclude that the linear regression more accurately incorporates outliers than the median does, although the paragraph uses rhetoric by calling this improvement "skew" as if it is distortionary when, in fact, the median distorts the reality. 2. The sample pre-selection described in Attachment A, Event Selection, Criteria 2 & 7, violates the fundamental statistical procedure of unbiased sampling. A population is governed by a single "process" which, when stationary, is represented by a fixed probability distribution. In this case the population is several years of events (which are the subject of Frequency Response), not of normal operating control errors which are the subject of CPM control. A sample is governed by a single process that approximates the process governing the population as the sample gets larger, in this case if it includes several years of data. Samples are measured "as they come", no triage/filtering allowed, and they are called "stratified" when their distribution approximates the population distribution. Unlike normal operating errors, samples of events are not evenly distributed over a year. The attempt in criteria 2 & 7 to pre-select only certain events, and not others, in such a way that the selected events occur evenly throughout the year, is papently wrong because it is trying to "fit" events into a process (even distribution over time) that does not govern events, but that instead governs normal operating errors that are the subject of CPM control, not of this Frequency Response standard. In other words, criteria 2 & 7 confuse Frequency Response with CPM, and events with normal operating errors. The result is a false, biased sample which destroys the integrity of this standard. Paragraph 4 on page 5 of the Background Document, on the other hand, provides a statistically correct description of event selection without sample pre-selection and should

Organization	Yes or No	Question 10 Comment
		followed instead of the erroneous criteria 2 & 7 in Attachment A. The reason I do not vote "negative": the risk-based approach to determining FRM, that the Background Document mentions in paragraph 4 of page 4 is being evaluated by the drafting team for application in this standard, should be considered for deployment as soon as possible to replace the administered method currently proposed in this standard, because the administered method lacks any technical justification. No such justification was ever attempted in the development of this standard. The administrative method of determining FRM is therefore but a highly dubious "quick fix" until the risk-based method is evaluated and implemented. The administrative method is in fact perverse because it discourages BAs from reducing their contribution to frequency error by refusing to reduce the BA's FRO accordingly, and because it encourages BAs to contribute to frequency error without increasing their FRO.

Response: The word “average” is a generic term to represent central tendency. The term is often used synonymously with the arithmetic “mean”.
The issue with measuring Frequency Response is that a BA’s calculated performance (as opposed to actual performance) is highly variable event to event. This is particularly true for a single BA in a multi-BA Interconnection.

Calculated Frequency Response has a very large noise to signal ratio. A 5,000 MW BA in the East typically is only called to contribute about 10-15 MW for the loss of a large unit. Its minute to minute Load changes can easily wash this contribution out. An arithmetic mean or regression analysis will be influenced by noise-induced outliers.

Statisticians note that the median is a more accurate measure of central tendency than the mean when analyzing a sample that is small and or where scores vary widely. This is the case when estimating a BA’s Frequency Response.

A regression would be appropriate if you were trying to forecast “calculated” frequency response for a BA in a multi-BA Interconnection.

While not perfect, the median approaches a BA’s typical performance after 15-20 observations. More observations give a higher

Organization	Yes or No	Question 10 Comment
confidence in the estimate of the BA's performance.		
Associated Electric Cooperative, Inc.	Affirmative	Please see comments submitted by John Bussman of AECI. Thanks, Chris Bolick
Response: Please refer to our earlier question responses to Mr. Bussman's comments.		
Southwest Power Pool, Inc.	Negative	Please refer to the IRC Standards Review Committee comments which SPP is a party to for our concerns and recommendations for this standard.
Response: The SDT cannot find any comments submitted by the IRC Standards Review Committee.		
City Utilities of Springfield, Missouri	Affirmative	SPRM supports the comments from SPP.
Response: The SDT cannot find any comments submitted by the IRC Standards Review Committee.		
Oklahoma Gas and Electric Co.	Affirmative	See comments submitted by the Southwest Power Pool
Response: The SDT cannot find any comments submitted by the IRC Standards Review Committee.		
Electric Reliability Council of Texas, Inc.	Affirmative	The Applicability of BAL-003-1 should be clarified. Specifically, Section 1.2 should be changed from "Reserve Sharing Groups (where applicable)" to "Reserve Sharing Group whose intent includes meeting Frequency Response Obligations". Regarding Data Retention: 1. As the standard is currently drafted, both the BA and the RSG would be required to retain data or evidence to show compliance with requirements R1 and M1. It is unclear whether this is the intention, or whether it would be acceptable that just one or the other would maintain such records. 2. In the first and second paragraph, the reference to 'three calendar years' should be specified to be the 'previous three calendar years'. 3. In the third paragraph, it should be clarified who is required to keep

Organization	Yes or No	Question 10 Comment
		information related to non compliance if the BA belongs to an RSG – the BA or the RSG or both. 4. In the fourth paragraph, it should be clarified for what length of time the last audit records must be retained.
Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. **1 & 3 - The SDT believes that the reporting entity would be the responsible entity to maintain records. The SDT also believes that once a BA has declared itself as part of an FRSG then the FRSG would be the responsible entity with the obligation to maintain records.** **2 - The SDT agrees with your second comment and has made this modification.** **4 – The last audit record should be kept until the next audit.**		
Midwest ISO, Inc.	Affirmative	We would like to thank the drafting team for developing a standard responsive to the FERC Orders.
Response: The SDT thanks you for your affirmative response and clarifying comment.		
SCE&G	Affirmative	We feel that frequency response is a function of a contingency event and the Purpose Statement should recognize this relationship. We suggest the following insertion in the Purpose Statement. Purpose: To require sufficient Frequency Response from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations (due to a contingency event) and supporting frequency until the frequency is restored. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting.

Organization	Yes or No	Question 10 Comment
Response: The SDT thanks you for your affirmative response and clarifying comment. The SDT believes that the Purpose Statement you are recommending is basically the same as what the SDT is proposing. For this reason the SDT has decided to propose their Purpose Statement for use in the proposed standard.		
SERC Reliability Corporation	Affirmative	Please see comments submitted by the SERC Operating Committee standards subgroup for technical suggestions to improve the standard.
Response: Please refer to the earlier question for the SDTs responses.		
Tennessee Valley Authority	Affirmative	Comments submitted by SERC OC Standards Review Group. TVA votes affirmative with comments previously submitted by SERC.
Response: Please refer to the earlier questions for the SDTs responses.		
Louisville Gas and Electric Co.	Negative	We support the comments in the SERC OC Standards Review Group Comments.
Response: Please refer to the earlier questions for the SDTs responses.		
AEP, AEP Marketing, AEP Service Corp.	Negative	AEP's negative ballot is primarily due to our concerns regarding R1. Comments are being submitted via electronic form by Thad Ness on behalf of American Electric Power.
Response: Please refer to our response for Question #1.		
Alberta Electric System Operator	Negative	Besides the standard, the posting has two attachments, supporting material and two forms. It is not clear how enforcement will be applied given the array of explicit and implicit requirements throughout this package, and the use of undefined terminology, which will be subject to interpretations. In the SDT response to our comments to the first draft of this standard it was stated that "The expectation is events will be selected by the Balancing Authorities. The Balancing Authority may exclude events from consideration for specific conditions

Organization	Yes or No	Question 10 Comment
		such as data quality issues. " Based on the SDT's response, it is our understanding that, for the purpose of the FRM calculation, BAs could exclude or include events based on specific conditions consideration, such as data quality or event suitability (e.g. BA separation from the Interconnection). However, the standard as currently drafted, does not have any provisions to this effect. Please include such provisions in the body of the standard.
Response: The drafting team has modified the Requirements and Attachments to address the concerns raised by the comments that requirements were in the Attachments. In order to explain the process, the drafting team believes the information needs to be attached to the standard such that it cannot be changed without input from the industry. **The SDT recognizes that data may not be available for specific events and therefore has provided in FRS Form 1 a means to exclude an event. Additionally if an entity has separated from an Interconnection this could be reason for excluding that event from its FRM calculation since the frequency it would be responding to would not be the Interconnection wide frequency. The risk caused by excluding events is that the measurement process has shown that a limited number of events does not provide suitable calculation.**		
Ameren Energy Marketing Co.; Ameren Services	Negative	We believe that this is good start to a worthwhile standard, but the following issues need to be addressed in this standard: (1) The FRM methodology has not been fully vetted through the field trial process. (2)Adjusting the minimum of the Frequency Bias Setting, while an appropriate adjustment for AGC control in the ACE equation, should not be at the expense of L10 as used in BAL-001, R2. (3) The absence of any resource specific frequency response requirement in NERC standards is an issue that must be address somewhere. As the resource portfolio of our industry changes(expedited by recent EPA rulemaking), the resources used for traditional primary frequency response are becoming a lower percentage of the mix. New resources and existing resources that have not provided primary frequency response need to be incorporated into the available frequency response discussion. (4) BAL-003 is only applicable for an interconnected system, conditions that are

Organization	Yes or No	Question 10 Comment
		created by islanding and other emergences are not address here(nor should they), but need to be address within the EOP family of standards, so that adequate primary frequency response is available during emergency situations.

Response: (1) – The issue with measuring Frequency Response is that a BA's calculated performance (as opposed to actual performance) is highly variable event to event. This is particularly true for a single BA in a multi-BA Interconnection.

Calculated Frequency Response has a very large noise to signal ratio. A 5,000 MW BA in the Eastern Interconnection typically is only called to contribute about 10-15 MW for the loss of a large unit. Its minute to minute Load changes can easily wash this contribution out. An arithmetic mean or regression analysis will be influenced by noise-induced outliers.

Statisticians note that the median is a more accurate measure of central tendency than the mean when analyzing a sample that is small and or where scores vary widely. This is the case when estimating a BA's Frequency Response.

A regression would be appropriate if you were trying to forecast "calculated" frequency response for a BA in a multi-BA Interconnection.

While not perfect, the median approaches a BA's typical performance after 15-20 observations. More observations give a higher confidence in the estimate of the BA's performance.

- The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.

(2) - The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.

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The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR. **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient Frequency Response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **(3) – The SDT agrees that the issue you cite should not be covered in this standard. The SDT will forward this comment on to the appropriate entity at NERC.**		
PJM Interconnection, L.L.C.	Negative	PJM does not believe that the BA should be the entity responsible for the frequency response obligation, moreover the SDT has not sufficiently vetted the issue of applying the response requirements on an entity that cannot provide that service. PJM is concerned that the proposed draft does not explicitly cover the FERC Order 693 directives in the proposed requirements and rather addresses the directives indirectly in the attachments. This matter of mandatory vs. informational attachments must be formally clarified before approval can be given for this approach. PJM does not agree with the additional clarifying phrases being incorporated into the requirements. Explanatory phases should be included as text boxes as proposed in NERC's Risk Based Methodology.
Response: The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.		

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Potomac Electric Power Co.	Negative	The proposed standard is not reliability centered and will not improve reliability. 5) Potomac Electric Power Company supports the comments provided by PJM.
		Response: The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a**

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need for a generator performance obligation, they are encouraged to submit a SAR to that effect. Attachments that are referenced within a Requirement are mandatory and enforceable. The SDT has been instructed to include a "reliability outcome" within the requirements. The SDT will forward your concerns about the wording to the Standards Committee Quality Review group for consideration.		
Atlantic City Electric Company	Negative	See comments submitted by David Thorne in Segment 1, Potomac Electric Power Company
Response: The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR. There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost. Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect. Attachments that are referenced within a Requirement are mandatory and enforceable. The SDT has been instructed to include a "reliability outcome" within the requirements. The SDT will forward your concerns about the wording to the Standards Committee Quality Review group for consideration.		
Avista Corp.	Negative	This standard should be designed for each interconnection explicitly rather than one size fits all. Frequency is an interconnection issue and response is driven by the interconnection's topology. One size does not fit all for interconnections. This

Organization	Yes or No	Question 10 Comment
		standard should be designed around the explicit needs of each interconnection. Reducing frequency bias obligation is detrimental to reliability. It seems that Lowering the Minimum Frequency Bias Setting from 1% to .8% will result in a lower response, which in turn will lower the natural frequency response. Over time it seems this pattern would lead to poorer response.
Response: The SDT believes that an Interconnection has the capability to request a variance (especially one that is more restrictive), however the SDT has tried to prevent the need for variances by respecting the individuality of each of the Interconnections in setting Interconnection Frequency Excursion Threshold Values, Interconnection Frequency Response Obligations and the Frequency Bias Setting Minimums as noted in Attachment A. **Early research by Nathan Cohn[5] on interconnected power system operations found that control is optimum if a BA's Bias Setting is equal to its natural Frequency Response. If there were to be a difference between the two values, it is preferable to be slightly over-biased.** **The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.**		
Beaches Energy Services; City of Bartow, Florida; Tampa Electric Co.	Negative	We thank the SDT for their hard work and diligence in moving this Project forward. However, I have some concerns that cause me to not support the standard in its current form. In general, I believe that there has not been sufficient prudency review for the standard, especially R1, to justify a performance based standard around a Frequency Response Measure. I also believe that the proposed standard does not meet the intent of the Final SAR

[5] *Control of Generation and Power Flow on Interconnected Systems*, John Wiley & Sons, 1967

Organization	Yes or No	Question 10 Comment
		or Supplemental SAR. The "Final SAR" was to develop methods by which a performance based standard would eventually be developed. The Final SAR states: "The proposed standard's intent is to collect data needed to accurately model existing Frequency Response. There is evidence of continuing decline in Frequency Response in the three Interconnections over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be modeled, and the reasons for the decline in Frequency Response can be identified. Once the reasons for the decline in Frequency Response are confirmed, requirements can be written to control Frequency Response to within defined reliability parameters." BAL-003-1 is beyond the scope of this "Final SAR". For instance, "the reasons for the decline in Frequency Response" were not confirmed to our knowledge; and the field trial is not completed to our knowledge. The Supplemental SAR adds to the scope of the Final SAR: "To provide a minimum Frequency Response Obligation for the Balancing Authority to achieve, methods to obtain Frequency Response and provide a consistent method for calculating the Frequency Bias Setting for a Balancing Authority. In addition, the standard will specify the optimal periodicity of Frequency Response surveys." Please note that the Standards Development Roadmap does not confirm whether this Supplemental SAR was ever approved; hence, I question whether this is actually part of the scope of the SDT. Be that as it may, the Supplemental SAR does not eliminate the pre-requisite contained in the Final SAR to determine the reasons for the decline in frequency response and confirm them before establishing "defined reliability parameters". In addition, the standard does not meet the scope requirements of the Supplemental SAR.
Response: The SDT is responding to FERC Directives from Order 693 as well as the FERC Order dated March 18, 2010 which mandated development of a standard addressing the Order 693 directives within six months. FERC later granted an extension to provide a standard addressing these issues by the end of May 2012. **The SDT agrees that the original SAR was strictly for data collection. However, a supplemental SAR was developed to address the FERC March 18, 2010 Order and was subsequently approved by the industry.**		

Organization	Yes or No	Question 10 Comment
Constellation Energy Commodities Group	Negative	Please see submitted comments for additional detail behind the negative vote.
Response: Please see the SDT responses to your comments to the earlier questions.		
Energy Mark, Inc.	Negative	The issue of Median, Mean, Regression needs to be resolved using Field Trial data. This should be able to be completed before the end of January 2012. The FRO and Minimum Bias Setting allocations should be determined using a single allocation method and a single data set. Wording changes are needed in the Requirements to indicate compliance in all cases for all BAs. In general, although this standard has many weaknesses, its implementation with small modifications will be better than failure to implement it.
Response: The drafting team is recommending use of the median for the purposes of determining a BA FRM over multiple events. This decision is based on the determination that, while it may not be perfect, it is better than the other alternatives available at this time. The drafting team recognizes that in the future a better methodology might be found; based on the data available at this time the median allows us to move forward to implement a response requirement. **The drafting team understands your concern of using the historical numbers for the FRO allocation and the projected number as the basis for the minimum Frequency Bias Setting. However, after discussions, the drafting team believes that at this time, minimizing the changes to the current Frequency Bias Setting process provides better comparability for the purpose of evaluating the impacts of reducing the minimum setting requirement. In the alternative, the drafting team feels that allocating the FRM based on historical data provides less room to game the process since the numbers used for allocation can be verified independently.** **The SDT has modified the requirements and believes that your concern has now been addressed.** **The SDT thanks you for your comment.**		
Energy Mark, Inc.	Negative	The Time Horizon for R1 is Operations Assesment. It should be Real Time. Frequency

Organization	Yes or No	Question 10 Comment
		Response is a service that is automatic. It does not require operator action to activate the service. It requires that the operator set-up the system to provide the automatic response before an event requiring Frequency Response occurs. Unlike other Real Time services, if the operator fails to set-up the system to provide this service before Real Time, there is no action that the operator can take to provide the service in response to an event. Many other actions in the standards required by the system operator are considered to be Real Time because the operator can take action after an event occurs. It does not make sense to consider an action that must be taken before Real Time as Operations Assessment.
Response: The requirement does not fall into a single category. The operator is constantly taking actions some of which were set in a "longer term" horizon, some in a "real-time" horizon and this is an after-the-fact measure.		
Fort Pierce Utilities Authority	Negative	FPUA supports the comments submitted by Florida Municpal Power Agency (FMPA) through the formal comment process.
Response: Please refer to the SDT response to the comments received from FMPA in the earlier questions.		
Hydro One Networks, Inc.	Negative	Hydro One is casting a negative vote for this project. We support and subscribe to the comments submitted by NPCC on behalf of its members. In summary, the comments are: 1 o Use of 59.6 Hz as an Eastern Interconnection UFLS instead of an actual value of either 59.5 Hz or 59.7 Hz. 2 o Use of installed capacity in determining the Frequency Response Obligation. 3 o The sampling interval should be tuned on a per Interconnection basis to support HQTE's characteristics. 4 o NPCC does not advocate the use of supplemental regulation as a method of procuring frequency response. 5 o BAL-003-1 is applicable only to Balancing Authorities and Reserve Sharing

Organization	Yes or No	Question 10 Comment
		Groups. A common concern that has been expressed in the industry is that the burden of compliance is being placed solely on Balancing Authorities while the main sources of discretional frequency response are generators. 6 o Balancing Authorities must be able to provide sufficient frequency response and be able to and the proper frequency bias settings applied in their AGC systems are necessary. 7 o In the formula for determining the Balancing Authority's FRO allocation, installed capacity is used. Is there a clear and consistent definition for installed capacity? Considering the growth of wind energy development, the delivered energy from wind generation over longer time horizons will be substantially less than the machine nameplate ratings. 8 o The background document refers to the use of peak generation instead of installed capacity. Which shall be used? o Additional minor issues for the SDT consideration that should be addressed: ? A link should be provided in the standard to FRS Form 1, or instructions provided for how entities may find the form. ? In the definitions, FRS should be spelled out before using the acronym.
Response: 1 - Florida sees a greater change in frequency for a given contingency than for a comparable event elsewhere in the East. This is the reason for its higher first step of UFLS in Florida. Having all Eastern Interconnection Balancing Authorities carry extra frequency responsive reserves to protect against a target minimum frequency of 59.7 Hz would not protect Florida against a contingency inside Florida, but would require the other BAs in the Eastern Interconnection to continuously carry about 4,000 MW of frequency responsive reserves to protect against a false trip in Florida if frequency fell below 59.7 Hz but over 59.5 Hz. This is a contingency on the order of 7,000 MW or more. The drafting team compromised and gave the entire Interconnection an obligation based on 59.96Hz. **2, 7 & 8 – The SDT has modified both the Background Document and Attachment A to be consistent. The calculation uses "historical data" to circumvent the problem you have described.**		

Organization	Yes or No	Question 10 Comment
3 – The SDT adjusted the event selection Criteria to address concerns related to response driving frequency back to the pre-event level during the B value measurement period. We believe that this adjustment addresses your concern. 4 – The SDT has a section in the Background Document addressing methods of obtaining Frequency Response. The drafting team believes the following are valid methods of obtaining Frequency Response: • Regulation services. • Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration. • Through a tariff (e.g. Frequency Response and regulation service). • From generators through an interconnection agreement. • Contract with an internal resource or Loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response). Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation. 5 – The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR. There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not		

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outweigh the effort and cost. **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.** **6 – The SDT agrees with you comment.** **Additional minor issues** **The Forms will be put on a NERC website and announced once the standard is approved.** **The definition no longer reference FRS Form 1.**		
Independent Electricity System Operator	Negative	The complete IESO's comments on the revised standard are provided through the electronic comment form. The summary below highlights IESO's major concerns with the revised standard: 1)The definition for Frequency Response Measure (FRM): The proposed FRM definition: "The median of all the Frequency Response observations reported annually on FRS Form 1" is problematic. It references an FRS Form 1 which is not included in the definition itself but is in fact an attachment to the standard. In the current NERC Glossary of Terms, there is no such precedence that a definition must rely on the requirements or details in a standard for completeness. Also, it is very cumbersome that when changes are made to FRS Form 1, the definition must be posted for industry comment and balloting, and vice versa. When other standards begin using the term, there will be cross references between standards. This further complicates the update/maintenance problem without any appreciable value. (See complete comment in Section Q1 in the electronic comment form) 2)Attachment A: Attachment A should include only the event selection process and calculations associated with the requirements, including an explanation of what is necessary if variable Frequency Bias Settings are implemented. If other "requirements" need to be specified, such as the reporting time frame stipulated on page 3 of Attachment A, they should be moved to the standard itself but not imbedded in an attachment. (See complete comment in Section Q6 in the electronic

Organization	Yes or No	Question 10 Comment
		comment form) 3)The expanded FRS Form 1 and the addition of a Form 2 ask for data entry that is excessive and whose value has not been demonstrated. (See complete comment in Section Q9 in the electronic comment form)

Response: 1) The SDT has modified the definition to no longer reference FRS Form 1. The definition now reads "The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz."

2) The intent of Attachment A is to describe the process that will be used. There is no intent to require a filing on a certain date and to have the BA prove to the auditor that a filing was made on that date. Rather the requirement is to have an FRM that provides at least the response required of a BA based on it's FRO and provide a high-level overview of the mechanical parts of the process. The drafting team has modified the Requirements and Attachments to address the concerns raised by the comments that indicated requirements were in the Attachments. In order to explain the process, the drafting team believes the information needs to be attached to the standard such that it cannot be changed without input from the industry.

3) The SDT points out that there are no additional data requirements. It is possible that you are seeing more spreadsheets due to them being unhidden.

Form 2 is a separate stand-alone workbook. Form 1 does have a worksheet labeled "BA Form 2 Event Data" that will contain the single event data from each of the BA's Form 2s. Two additional worksheets were added to Form 1 and several worksheets were deleted. The "Time Zone Ref" worksheet was added to allow the BA to enter the time zone of its data and have the spreadsheet calculate the local time of the event from the UTC time. This was added for the convenience of the BA in collecting the correct data for each event and does not require additional data from the BA. The second worksheet added was a worksheet that displays graphs of frequency for each event and the t(0) selected correctly. This was added to aid the BA with data collection and the selection of t(0) since this seemed to be one of the biggest problems during the first phase of the field trial. This graph worksheet does not require the BA to do anything. It is not used in the analysis and can be deleted. Deleting this worksheet will greatly reduce the size of Form 1. None of the data requirements on Form 1 or Form 2 have changed from previous versions. The absolute minimum data needed for this standard is the date/time, frequency and NAI in columns A, B and C of the "Data" worksheet in Form 2. Columns D through I have been totally optional and can be left blank. Column J is the Bias setting in the ACE equation and is important to BA's that utilize Variable Bias. Column K, BA Load, was added by the drafting team in the beginning to see if Load Dampening could be measured as this has been done for several years on one Interconnection. Column I of the

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"Data" worksheet is the only optional data that the BA should use when it is the contingent BA during any of the events evaluated. Utilizing this data will allow the BA's SEFRD to be calculated correctly and give the BA a full sample set for the annual median calculation. Form 2 is necessary to standardize the measurement process on all Interconnections. You are free to hide any analytical worksheets on Form 1 and Form 2. You can do this on your "master" Form 2 and then build each Form 2 for each event using this master. These additional worksheets are available for BAs to utilize if they find that their performance is below the FRO and will aid the analysis of the contributing causes.		
ISO New England, Inc.	Negative	ISO New England will not vote to approve the standard because it fails to place requirements on generators to provide frequency response. There are four substantive problems: 1 • Using 59.6 Hz as an Eastern Interconnection UFLS instead of an actual value of either 59.5 Hz or 59.7 Hz 2 • Using installed capacity in determining the Frequency Response Obligation 3 • The sampling interval needs to be tuned on a per Interconnection basis to support HQTE's characteristics 4 • Do not advocate the use of supplemental regulation as a method of procuring frequency response Additionally, the SDT must decide on what the purpose of this standard is. If it is to respond to Order 693 then the standard misses the point of defining how often to run Frequency Response Surveys; it does not crisply define the "Interconnection" obligations. If the SDT does want to focus on performance then the issue of who is the default provider must be addressed. As the IRC has noted previously, all BAs do not own the service providers. To create standards that apply to entities that are dependent on other function entities to comply with a standard requirement is of great concern.
Response: 1 - Florida sees a greater change in frequency for a given contingency than for a comparable event elsewhere in the East. This is the reason for their higher first step of UFLS in Florida. Having all Eastern Interconnection Balancing Authorities carry extra frequency responsive reserves to protect against a target minimum frequency of 59.7 Hz would not protect Florida against a		

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		contingency inside Florida, but would require the other BAs in the East to continuously carry about 4000 MW of frequency responsive reserves to protect against a false trip in Florida if frequency fell below 59.7 Hz but over 59.5 Hz. This is a contingency on the order of 7,000 MW or more. The drafting team compromised and gave the entire Interconnection an obligation based on 59.96Hz. 2 – The SDT has modified both the Background Document and Attachment A to be consistent. The calculation uses "historical data" to circumvent the problem you have described. 3 – The SDT adjusted the event selection Criteria to address concerns related to response driving frequency back to the pre-event level during the B value measurement period. We believe that this adjustment addresses your concern. 4 – The SDT has a section in the Background Document addressing methods of obtaining Frequency Response. The drafting team believes the following are valid methods of obtaining Frequency Response: • Regulation services. • Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration. • Through a tariff (e.g. Frequency Response and regulation service). • From generators through an interconnection agreement. • Contract with an internal resource or Loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response). Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation. The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.

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JEA	Negative	JEA is not comfortable with a performance based standard as written without more field testing to ensure that net interchange is not skewed by load and generation changes that are not a function of frequency. Since frequency response has components from load and generation resources, and load is not controllable for the most part, seems this standard should be directed at specific generator response methods from the GO/GOP's. This is a wide reaching standard. And, this is a performance standard (if it doesn't perform as designed, it is a violation). Because of this, more testing needs to be completed so we know the model is correct. We are not sure we know how to ensure compliance. Don't agree the standard needs to be performance based.
Response: Based on the studies performed by the SDT, the drafting team believes that a calculation of the median of multiple		

Organization	Yes or No	Question 10 Comment
events addresses the concerns raised by the noise being inside a single event. The studies from the field trial show a convergence of the measurement after approximately 20 to 25 events. **The SDT is responding to FERC Directives from Order 693 as well as the FERC Order dated March 18, 2010 which mandated development of a standard addressing the Order 693 directives within six months. FERC later granted an extension to provide a standard addressing these issues by the end of May 2012.**		
Kansas City Power & Light Co.	Negative	The proposed Standard BAL-003-1 does not consider the real time operating conditions under which this standard should apply. There are no considerations for the complexities introduced by capacity energy agreements between BA's nor consideration of the differing level of Interconnection Frequency Response needed at times of minimum interconnection load conditions and interconnection peak load conditions.
Response: The method for determining the FRO is based upon the determination of the largest contingency that could occur at any time and does not vary based upon time of day or system conditions. Since the largest contingency could occur at any time, the minimum Frequency Response Obligation necessary to manage the contingency will not be dependent upon the differing conditions that can occur during different times of the day like those referred to in the question.		
Lakeland Electric	Negative	In general; here has not been sufficient prudency review for the standard, especially R1, to justify a performance based standard around a Frequency Response Measure. Refer to comments submitted by FMPA on LAK behalf.
Response: The SDT is responding to FERC Directives from Order 693 as well as the FERC Order dated March 18, 2010 which mandated development of a standard addressing the Order 693 directives within six months. FERC later granted an extension to provide a standard addressing these issues by the end of May 2012. **Please refer to the SDT response to the comments received from FMPA in the earlier questions.**		
Liberty Electric Power LLC	Negative	Voting no due to SDT addressing FERC directives with attachments instead of in the standard requirements.
Response: The SDT disagrees with your concern about addressing FERC directives within an attachment. If a requirement		

Organization	Yes or No	Question 10 Comment
references specific performance in an Attachment, then the performance described in the Attachment is mandatory and enforceable.		
Manitoba Hydro	Negative	The Applicability of BAL-003-1 should be clarified. Specifically, Section 1.2 should be changed from "Reserve Sharing Groups (where applicable)" to "Reserve Sharing Group whose intent includes meeting Frequency Response Obligations". Regarding Data Retention: 1. As the standard is currently drafted, both the BA and the RSG would be required to retain data or evidence to show compliance with requirements R1 and M1. It is unclear whether this is the intention, or whether it would be acceptable that just one or the other would maintain such records. 2. In the first and second paragraph, the reference to 'three calendar years' should be specified to be the 'previous three calendar years'. 3. In the third paragraph, it should be clarified who is required to keep information related to non compliance if the BA belongs to an RSG – the BA or the RSG or both. 4. In the fourth paragraph, it should be clarified for what length of time the last audit records must be retained.
Response: The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members." The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. **1 & 3 - The SDT believes that the reporting entity would be the responsible entity to maintain records. The SDT also believes that once a BA has declared themselves as part of a FRSG then the FRSG would be the responsible entity to maintain records.** **2 - The SDT agrees with your second comment and has made this modification.** **4 – The last audit record should be kept until the next audit.**		

Organization	Yes or No	Question 10 Comment
New Brunswick Power Transmission Corporation	Negative	The compliance burden should not fall on the BA as the provider of Frequency Response (i.e. Primary Control response). In this case the BA per se has no assets, moreover the primary response service providers have no obligations to provide the service, thus the BA potentially could face a situation where there is no physical service to be purchased but there is a mandated standard to comply with. The idea of creating a Primary Response Market as some have proposed does not work without an obligation on some entity to physically provide that service.
Response: The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.**		
New York State Department of Public Service, National Association of Regulatory Utility Commissioners	Negative	After review of the standard and draft comments to be submitted by industry participants, it appears that there are many areas of the proposed standard that require clarification.
Response: The SDT thanks you for your participation. Please be more specific about what needs clarification so the SDT can address your specific concerns.		

Organization	Yes or No	Question 10 Comment
Northeast Power Coordinating Council	Negative	This standard as written does not place requirements on generators to provide frequency response. There are four substantive problems: 1 • Using 59.6 Hz as an Eastern Interconnection UFLS instead of an actual value of either 59.5 Hz or 59.7 Hz. 2 • Using installed capacity in determining the Frequency Response Obligation. 3 • The sampling interval needs to be tuned on a per Interconnection basis to support HQTE's characteristics. 4 • Do not advocate the use of supplemental regulation as a method of procuring frequency response. It must be decided as to what the purpose of this standard is. If it is to respond to Order 693 then the standard misses the target of defining how often to run Frequency Response Surveys; it does not crisply define the "Interconnection" obligations. If performance is the focus, then the issue of who is the default provider must be addressed. All BAs do not own the service providers. To create standards that apply to entities that are dependent on other functional entities to comply with a standard requirement is of great concern. FRS Form 1 is listed as being an Associated Document. Will it be attached to the standard? The acronym FRS is used in the standard. FRS should be spelled out before its acronym is used. If FRS Form 1 will not be an appendix or an attachment to the document, then a link should be provided to it, or instructions given on how to find it.
Response: 1 - Florida sees a greater change in frequency for a given contingency than for a comparable event elsewhere in the East. This is the reason for their higher first step of UFLS in Florida. Having all Eastern Interconnection Balancing Authorities carry extra frequency responsive reserves to protect against a target minimum frequency of 59.7 Hz would not protect Florida against a contingency inside Florida, but would require the other BAs in the Eastern Interconnection to continuously carry about 4000 MW		

Organization	Yes or No	Question 10 Comment
		of frequency responsive reserves to protect against a false trip in Florida if frequency fell below 59.7 Hz but over 59.5 Hz. This is a contingency on the order of 7,000 MW or more. The drafting team compromised and gave the entire Interconnection an obligation based on 59.96Hz. 2 – The SDT has modified both the Background Document and Attachment A to be consistent. The calculation uses "historical data" to circumvent the problem you have described. 3 – The SDT adjusted the event selection Criteria to address concerns related to response driving frequency back to the pre-event level during the B value measurement period. We believe that this adjustment addresses your concern. 4 – The SDT has a section in the Background Document addressing methods of obtaining Frequency Response. The drafting team believes the following are valid methods of obtaining Frequency Response: • Regulation services. • Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration. • Through a tariff (e.g. Frequency Response and regulation service). • From generators through an interconnection agreement. • Contract with an internal resource or Loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response). Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation. The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits. The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for

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New Brunswick System Operator	Negative	Please see comments submitted by the NPCC Reliability Standards Committee and the IRC Standards Review Committee
Response: 1 - Florida sees a greater change in frequency for a given contingency than for a comparable event elsewhere in the East. This is the reason for their higher first step of UFLS in Florida. Having all Eastern Interconnection Balancing Authorities carry extra frequency responsive reserves to protect against a target minimum frequency of 59.7 Hz would not protect Florida against a contingency inside Florida, but would require the other BAs in the East to continuously carry about 4,000 MW of frequency responsive reserves to protect against a false trip in Florida if frequency fell below 59.7 Hz but over 59.5 Hz. This is a contingency on the order of 7,000 MW or more. The drafting team compromised and gave the entire Interconnection an obligation based on 59.96Hz. 2 – The SDT has modified both the Background Document and Attachment A to be consistent. The calculation uses “historical data” to circumvent the problem you have described. 3 – The SDT adjusted the event selection Criteria to address concerns related to response driving frequency back to the pre-event level during the B value measurement period. We believe that this adjustment addresses your concern. 4 – The SDT has a section in the Background Document addressing methods of obtaining Frequency Response.		

Organization	Yes or No	Question 10 Comment
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approved. The definition no longer reference FRS Form 1.		
New York Independent System Operator	Negative	The NYISO's comments are included with both the Joint IRC/SRC and Joint NPCC RSC comments.

Response: 1 - Florida sees a greater change in frequency for a given contingency than for a comparable event elsewhere in the East. This is the reason for their higher first step of UFLS in Florida. Having all Eastern Interconnection Balancing Authorities carry extra frequency responsive reserves to protect against a target minimum frequency of 59.7 Hz would not protect Florida against a contingency inside Florida, but would require the other BAs in the Eastern Interconnection to continuously carry about 4,000 MW of frequency responsive reserves to protect against a false trip in Florida if frequency fell below 59.7 Hz but over 59.5 Hz. This is a contingency on the order of 7,000 MW or more. The drafting team compromised and gave the entire Interconnection an obligation based on 59.96Hz.

2 – The SDT has modified both the Background Document and Attachment A to be consistent. The calculation uses "historical data" to circumvent the problem you have described.

3 – The SDT adjusted the event selection Criteria to address concerns related to response driving frequency back to the pre-event level during the B value measurement period. We believe that this adjustment addresses your concern.

4 – The SDT has a section in the Background Document addressing methods of obtaining Frequency Response.

The drafting team believes the following are valid methods of obtaining Frequency Response:

- **Regulation services.**
- **Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration.**
- **Through a tariff (e.g. Frequency Response and regulation service).**
- **From generators through an interconnection agreement.**
- **Contract with an internal resource or Loads (The drafting team encourages the development of a NAESB business practice for**

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Rochester Gas and Electric Corp.	Negative	RG&E supports comments to be submitted to NPCC.
Response: 1 - Florida sees a greater change in frequency for a given contingency than for a comparable event elsewhere in the East. This is the reason for their higher first step of UFLS in Florida. Having all Eastern Interconnection Balancing Authorities carry extra frequency responsive reserves to protect against a target minimum frequency of 59.7 Hz would not protect Florida against a contingency inside Florida, but would require the other BAs in the East to continuously carry about 4,000 MW of frequency		

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Orlando Utilities Commission	Negative	Per LPPC comments
Response: The SDT is not sure of the entity you are referencing (LPPC). Therefore, the SDT cannot respond to your comment without further clarification.		
Portland General Electric Co.	Negative	PGE agrees with the WECC whitepaper including the comments and concerns.
Response: see WECC comments.		
PPL Electric Utilities Corp.; PPL Generation LLC	Negative	The PPL Companies do not support proposed Reliability Standard BAL-003-1 (Frequency Response and Frequency Bias Setting) primarily because PPL believes it inappropriately subjects Reserve Sharing Groups (RSGs) to the proposed requirements. The proposed Applicability provision states that the mandatory reliability requirements would be applicable to (1) Balancing Authorities and (2) Reserve Sharing Groups (where applicable). However, it is unclear how the proposed requirements would be applicable to an RSG. RSGs typically do not provide a mechanism for sharing automatic Frequency Response. The BA Frequency Response

Organization	Yes or No	Question 10 Comment
		Obligation (FRO) is a formula based on BAs and the Interconnection and has nothing to do with RSGs. Rather, RSGs collectively respond to requests for activation of contingency reserves generally after the request is made by a member Balancing Authority. The Standard Drafting Team should therefore remove RSGs from the Applicability section and should remove all other references to RSGs in the proposed standard.
Response: The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."		
PPL EnergyPlus LLC	Negative	Please refer to PPL's corporate comments.
Response: The SDT has modified the Background Document to further explain how an RSG (now FRSG) can be used to supply Frequency Response. The SDT has defined a new term "Frequency Response Sharing Group (FRSG)" because it believes that using the presently defined term "Reserve Sharing Group" could cause confusion. The new definition reads "A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members."		
Seattle City Light	Negative	LADWP and SCL support project 2007-12's general approach to frequency response, and is prepared to support the ballot once several problematic details are corrected. o LADWP and SCL note that the time allowed to analyze the final "official" set of 25 events for each year, from Dec 15 to Jan 10, is relatively short and coincides with the holiday vacation season
Response: The ERO will be posting preliminary events throughout the year. The criteria contained in Attachment A should allow an entity to evaluate events as they occur. This coupled with the Forms 1 & 2 should allow an entity to be looking forward throughout the year. In addition the standard allows 30-days for providing information.		

Organization	Yes or No	Question 10 Comment
Seattle City Light	Negative	SCL would like to see addressed in the Standard how the case is to be addressed where a BA simply has no frequency response information to provide, as could happen for a small 1-2 generator BA which has its generators out of service for an extended period for maintenance or upgrades. Assuming the BA purchases frequency response services from another entity during this period, is the BA out of compliance with the proposed Standard simply because it has no data report? And how is its next-year obligation to be computed? These issues should be addressed in the Measures or Additional Compliance information. If these are issues for "lawyers" as the Standards Drafting Team indicated during the November 14, 2011, webinar then the team should engage a NERC lawyer to resolve them prior to releasing the Standard for ballot. o Finally, SCL points out that the proposed Standard introduces a new obligation on applicable entities to maintain frequency responsive reserves. Although this obligation does not appear to be unreasonable or problematic in general, compliance may prove difficult for some entities and in some localized areas.

Response: The SDT has a section in the Background Document addressing methods of obtaining Frequency Response.

The drafting team believes the following are valid methods of obtaining Frequency Response:

- **Regulation services.**
- **Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration.**
- **Through a tariff (e.g. Frequency Response and regulation service).**
- **From generators through an interconnection agreement.**
- **Contract with an internal resource or loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response).**

Organization	Yes or No	Question 10 Comment
Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation.		
Public Utility District No. 1 of Snohomish County/Snohomish County PUD No. 1	Negative	Public Utility District No. 1 of Snohomish County supports the comments filed by Seattle City Light.
Response: The ERO will be posting preliminary events throughout the year. The criteria contained in attachment A should allow an entity to evaluate events as they occur. This coupled with the Forms 1 & 2 should allow an entity to be looking forward throughout the year. In addition the standard allows 30-days for providing information. **The SDT has a section in the Background Document addressing methods of obtaining Frequency Response.** **The drafting team believes the following are valid methods of obtaining Frequency Response:** • **Regulation services.** • **Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration.** • **Through a tariff (e.g. Frequency Response and regulation service).** • **From generators through an interconnection agreement.** • **Contract with an internal resource or Loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response).** **Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation.**		
South California Edison	Negative	SCE's "No" vote, like the WECC position, regarding Project 2007-12 is based on the

Organization	Yes or No	Question 10 Comment
Company		following five points: 1) Clarification is needed whether there will/ will not be conflicts between proposed Requirement R3 and the requirements of FERC-approved regional reliability standard BAL-004-WECC-1 - Automatic Time Error Correction 2) Confusion exists between Attachment A and the Background Document: 2a) Attachment A states peak load allocation is based on "Projected" Peak Loads and Generation, versus 2b) The Background Document which states it will use "historical" Peak Load and Generation. 3) Reducing frequency bias obligation is detrimental to reliability. It seems that Lowering the Minimum Frequency Bias Setting from 1% to .8% will result in a lower response, which in turn will lower the natural frequency response. Over time it seems this pattern would lead to poorer response. 4) There is no clear statement of what is expected from the Balancing Authorities and whether or not there is a limit on that expectation. 5) Why are there no requirements on governor installation, settings, and operation for a frequency response standard?
Response: 1) The SDT has removed Requirement R3. The SDT believes that this requirement is duplicative of BAL-005-0.1b Requirements R6 & R7. **2) The SDT has modified both the Background Document and Attachment A to be consistent. The calculation uses "historical data" to circumvent the problem you have described.** **3) Early research by Nathan Cohn[6] on interconnected power system operations found that control is optimum if a BA's Bias Setting is equal to its natural Frequency Response. If there were to be a difference between the two values, it is preferable to be slightly over-biased.**		

[6] *Control of Generation and Power Flow on Interconnected Systems*, John Wiley & Sons, 1967

Organization	Yes or No	Question 10 Comment
		The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations. **4) The SDT understands your concern and has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide** **5) The NERC *Functional Model Technical Document* identifies the BA as the entity that manages and deploys Frequency Response. This is because a BA controls the amount and distribution of spinning reserves and also has some control over interruptible resources. This is similar to the relationship between the TOP and voltage control. Even though the TOP may not own generators or capacitor banks, the TOP is still responsible for controlling voltage within limits.** **The industry-approved Standards Authorization Request (SAR) for BAL-003 did not include a performance obligation for generators. The drafting team is obliged to stay within the bounds of its SAR.** **There are two primary reasons the SAR did not apply a performance obligation on generators. First, there are thousands of generators in North America. It would be many times more costly and difficult to implement a standard that measures all generators and verifies performance is properly calculated. Secondly, given the fact that there presently is sufficient frequency response in all Interconnections, the value of implementing a performance obligation on generators at this time would not outweigh the effort and cost.** **Again, the drafting team cannot include requirements beyond the bounds of its SAR. If the commenter(s) believes there is a need for a generator performance obligation, they are encouraged to submit a SAR to that effect.**
Western Area Power Administration	Negative	1. Reducing frequency bias obligation is a detriment to reliability of interconnection and the proposed standard aims to reduce the bias obligation from the current minimum level of 1% load to 0.8% and subsequently to a lower percentage. 2. The proposed standard is very confusing and complex in regard to data collection

Organization	Yes or No	Question 10 Comment
		and compliance. 3. The proposed standard is encompassing reserve sharing group (where applicable), why? What reserve sharing group operates AGC? It is not clear whether the compliance period is monthly or yearly for R1 & R5. The issue of non-binding standard and whether it serves a purpose to go through complicated data submission and found in compliance or out of compliance without any consequences.

Response: 1. Early research by Nathan Cohn[7] on interconnected power system operations found that control is optimum if a BA's Bias Setting is equal to its natural Frequency Response. If there were to be a difference between the two values, it is preferable to be slightly over-biased.

The drafting team has proposed to bring Bias Setting and natural Frequency Response more in line. The process to do this is outlined in a Procedure developed by the SDT which replaces Attachment B. The Procedure manages a "go slow" approach to making this happen and includes checks to confirm there are not unexpected influences injected into the CPS-related calculations. Based on concerns raised by the industry, the drafting team has modified the Procedure to make the initial minimum Bias Setting 0.9% of peak and has included a provision that the ERO will evaluate the impact caused by a change in minimum Bias Setting. The evaluation will look at both frequency performance and impact on CPS-related compliance calculations.

3. The SDT has modified the Background Document to provide additional information and clarity.

4. The SDT modified R1 so that it no longer applies to an RSG _ the SDT defined new term, "Frequency Response Sharing Group" to address stakeholder concerns that the RSG is not the correct entity. The definition of Frequency Response Sharing Group is:

A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members.

3. Requirement R1 is calculated on an annual basis. The SDT has removed Requirement R5 and combined it into Requirement R2

[7] *Control of Generation and Power Flow on Interconnected Systems*, John Wiley & Sons, 1967

Organization	Yes or No	Question 10 Comment
and new Requirement R3. **The SDT made modifications to Attachment A to try to distinguish mandatory performance assigned to the BA from process steps performed by the ERO.**		
Xcel Energy, Inc.	Negative	It is not clear if there is an upper limit to the amount of frequency response expected of the Balancing Authorities under this standard. Except for Table 2 in Attachment A, there is no discussion of an amount of FR expected on a total basis. Balancing Authorities need to know for how many tenths of a hertz they are to respond so they can determine how to plan to meet this requirement. The documents do not appear to provide any boundary on the maximum amount of FR that a BA will provide, i.e. it is not clear what will happen if an event occurs in the Eastern Interconnection that causes the frequency to drop to less than 59.6 Hz (e.g. what if freq dips to 59.0? Is the BA expected to provide a limitless amount of frequency response?). Also, is that event excluded from the list used to calculate the Balancing Authorities' response or is it included with an expectation that it counts the same as any other event. Without a clear statement of what is expected, including whether there is a limit on that expectation or not, the Balancing Authorities cannot know what is expected of them and therefore cannot plan appropriately.
Response: The SDT understands your concern and has added language in Attachment A that caps the amount of Frequency Response that a BA will be required to provide.		
	Negative	59.6 Hz should be used as the Eastern Interconnection URLS. Installed capacity should always be used determining an area's frequency response obligation. I question the use of supplemnetal regulation as a method of procuring frequency response. Is this an acceptable practice throughout all NERC Regions? Each Balancing Authority must be able to provide the required or calculated frequency response and be able to incorporate the proper frequency bias settings in

Organization	Yes or No	Question 10 Comment
		the Balancing Authority's AGC system. A link should be provided in the proposed standard to FRS Form 1.

Response: Florida sees a greater change in frequency for a given contingency than for a comparable event elsewhere in the East. This is the reason for their higher first step of UFLS in Florida. Having all Eastern Interconnection Balancing Authorities carry extra frequency responsive reserves to protect against a target minimum frequency of 59.7 Hz would not protect Florida against a contingency inside Florida, but would require the other BAs in the East to continuously carry about 4,000 MW of frequency responsive reserves to protect against a false trip in Florida if frequency fell below 59.7 Hz but over 59.5 Hz. This is a contingency on the order of 7,000 MW or more. The drafting team compromised and gave the entire Interconnection an obligation based on 59.96Hz.

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The drafting team believes the following are valid methods of obtaining Frequency Response:

- **Regulation services.**
- **Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration.**
- **Through a tariff (e.g. Frequency Response and regulation service).**
- **From generators through an interconnection agreement.**
- **Contract with an internal resource or Loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response).**

Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation.

Organization	Yes or No	Question 10 Comment
The SDT agrees with you comment. The Forms will be put on a NERC website and announced once the standard is approved.		

END OF REPORT

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Unofficial Comment Form

Frequency Response Technical Conferences

Please use the electronic comment form to submit comments on the Frequency Response Technical Conferences held on May 22, 2012 and May 24, 2012. These comments will be posted on the project webpage as part of the development record and considered by the FRSDT as it continues to develop BAL-003. Comments must be submitted by **June 15, 2012.** If you have questions please contact Darrel Richardson (email) or by telephone at (609) 613-1848.

Background Information:

NERC recently held two technical conferences on Frequency Response. The first conference was held on May 22, 2012 in Arlington, VA and the second was held in Denver, Colorado on May 24, 2012. The purpose of these conferences was to obtain industry input on the development of a Frequency Response standard. The information provided in the conferences primarily dealt with the following three areas.

1. The work that has been done on the standard to date
2. Which Functional Entity should be responsible for Frequency Response.
3. How to measure Frequency Response

A complete set of presentations from the conferences can be found at the following link.

http://www.nerc.com/filez/standards/Frequency_Response-RF.html

NERC is requesting industry comments pertaining to the information provided in the conferences or suggestions for further consideration in the development of a Frequency Response standard. Please share your thoughts on the Technical Conference and the associated subject matter below.

Enter All Comments in Simple Text Format.

1. **Please provide any comments on the Technical Conference and associated subject matter in the comment area below.**

   Comments:

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Frequency Response Technical Conferences

Comment Period: May 30 – June 15, 2012

Now Available

NERC recently held two technical conferences on Frequency Response. The first conference was held on May 22, 2012 in Arlington, VA and the second was held in Denver, Colorado on May 24, 2012. The purpose of these conferences was to obtain industry input on the development of a Frequency Response standard. The information provided in the conferences primarily dealt with the following three areas.

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For more information or assistance, please contact Monica Benson at monica.benson@nerc.net.

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Atlanta, GA 30326
404-446-2560 | www.nerc.com

Name (9 Responses)
Organization (9 Responses)
Group Name (6 Responses)
Lead Contact (6 Responses)
Contact Organization (6 Responses)
Question 1 (0 Responses)
Question 1 Comments (15 Responses)

Individual
Don Tench on Behalf of ENBALA
ENBALA Power Networks
I. INTRODUCTION ENBALA Power Networks (ENBALA) respectfully submits these comments in response to the North American Electric Reliability Corporation (NERC) Technical Conference on Frequency Response held in Arlington VA on May 22, 2012 and Denver CO on May 24, 2012. ENBALA rewards large electricity users for participation in the Smart Grid. The ENBALA Power Network enables industrial, commercial and municipal partners to be financially rewarded for the inherent flexibility of their electrical equipment. Resource partners incur no cost in connecting to this platform and receive payments for helping to bring continuous balance to the electricity system. The purpose of these conferences was to provide background on the development, and implementation of BAL-003-1 - Frequency Response Standard (FRS) and to explain the rationale and considerations for the Requirements and their associated compliance information as well as to solicit feedback from industry participants on the standard. ENBALA provides these comments in support of draft standard BAL-003-1 II. BACKGROUND The requirement to continuously balance load and generation to maintain stable frequency is a critically important aspect of interconnected power system operation. Frequency Response is the characteristic of load and generation within Balancing Authorities and Interconnections that reacts or responds to changes in load-resource balance and resulting changes in system frequency. Primary Frequency Control is defined by NERC as those actions provided by the Interconnection to arrest and stabilize frequency in response to frequency deviations, typically caused by a significant system loss. Primary Control comes from mechanical inertia, followed by automatic generator governor response, load response (typically from motors), and other devices that provide an immediate response based on local (device-level) control systems. Primary Frequency Response (PFR) is the first stage of overall frequency control and is the response, which begins immediately, of resources and load to a locally sensed change in frequency to arrest that change in frequency. This is distinct from Secondary Frequency Control, defined to be those actions provided by an individual BA or its Reserve Sharing Group to correct the resource – load unbalance that created the original frequency deviation, which will restore both Scheduled Frequency and Primary Frequency Response. Secondary Control comes from automated dispatch from a centralized control system. The original Standards Authorization Request (SAR) to establish mandatory standards with respect to this critical requirement were established in BAL-003-0, finalized on June 30, 2007. In Order No. 693, the Federal Energy Regulatory Commission (FERC) directed additional changes to this standard . We interpret the objective of the FERC direction to be to establish concrete measures and allocation of Interconnection Frequency Response to ensure continued reliable operation III. COMMENTS Presentations and discussion at the conference provided the following understanding; - The system currently has enough PFR to operate reliably. The concern is that continuing decline could result in unreliability at a future date. The immediate concern is to ensure that the decline on the Eastern Interconnection is halted. - Approximately 30% of generators provide governor response and hence primary frequency control at any time in the Eastern and Western Interconnections. - Primary Frequency Response (PFR) should not be viewed as event driven but rather as continuous control. - The draft standard has been written to give the Balancing Authority (BA) responsibility to meet the standard. The main issue with this is a concern that BA's are being given responsibility but do not have the requisite authority to impose requirements on participants (eg. generators) to provide the PFR. The discussion at the conference focused almost exclusively on the ability of generators to supply PFR through governor action. This is not surprising given the fact that the interconnected power system is based on rotating machines (for the most part) and that speed governors are a necessary part of generator control systems and have been providing PFR for many years. However, there is growing evidence that some generation operators prefer not to provide this service as only a fraction of generators actually

provide PFR to the interconnection at any time. Many reasons were discussed that generators do not provide response, ranging from regulatory restrictions, environmental restrictions, and operation at full output, economic choices to make the plant more efficient, and physical constraints, among others. But in our opinion, all of these reasons come down to a fundamental consideration – the generators must sacrifice some efficiency to provide PFR. This is not a surprising outcome. Prior to electricity deregulation many 'ancillary services ' provided by generators were considered to be delivered at low or no cost. However, organized electricity markets have shown that these services have considerable value. Primary Frequency Response is another example. This is not to say that generators may not be the most effective way to provide the majority of PFR. However, generation resources may not be the least cost supplier of PFR. It is important to recognize that this service has a cost and different technologies are able to provide the service at different costs. These costs vary even amongst generation technologies. In addition, there are alternatives to providing all PFR from generation. ENBALA's experience in providing Secondary Frequency Control (SFC) to organized markets has shown that aggregated mid-sized commercial and industrial facilities can provide very high quality SFC, demonstrably better performance than the majority of generation. This technology can be extended to provide localized PFR as well. It is our opinion that PFR from load can be of higher 'quality' than that provided by generation. The ability of individual aggregated loads to increase or decrease nearly instantaneously in response to frequency provides an immediate stabilizing influence on frequency that works together with generator inertia to arrest frequency deviations more quickly than generation alone. Recent studies by California ISO identify that this response can be several times more valuable than slower generation response. Given the facts that; PFR is a valuable reliability service, the cost of providing PFR varies with technology, decisions must be made with respect to who will provide PFR, and alternatives exist to continuing with the provision of generator only PFR, we respectfully make the following suggestions; - The standard should continue as drafted and not limit the technology to provide PFR (eg. generators only) - PFR should be recognized as a reliability service in the same manner as other ancillary services. - The standard should apply to an entity like the BA, as drafted, that has defined responsibility for balancing load and generation - Mechanisms should be developed to procure PFR sufficient to meet NERC standards, on an economic basis either through market or tariff provisions IV. CONCLUSION It is ENBALA's belief that unless the value of Primary Frequency Response can be made transparent to the marketplace, efficient alternatives will not be implemented and inefficient decisions with respect to existing technologies will be made leading to higher costs for consumers. Treatment of PFR as a market priced reliability service will allow the industry to determine the most efficient and effective way to provide necessary Frequency Response, independent of changes taking place in the supply mix of generation. Respectfully Submitted,

Individual

Robert Blohm

Keen Resources Asia Ltd.

17-year NERC veteran's, long-standing active FRS drafting team contributor's, ex NERC Standards Committee member's, and Columbia-University-postgraduated statistician's expert comments on "Avoiding a Trifecta of Statistics Errors in the NERC Frequency Response Standard". Please review my 6-slide powerpoint presentation downloadable at http://www.robertblohm.com/3FRSissues.pptx or http://www.robertblohm.com/3FRSissues.ppt and submitted but never posted for inclusion in the technical conference. The last 3 slides highlight the following 3 fundamental statistics errors in the FRS as drafted so far: (1) confusion of (the correct probabilistic measure of "largest contingency" consisting of) "largest event to occur at least as often as once in 10 years" with (the incorrect probabilistic measure of "largest contingency" consisting of) "largest event in the last 10 years" which may be the "largest event to occur at least as often as once in MUCH MORE THAN 10 years"; (2) sampling of frequency responses to events that is not true "random", "unbiased" or "stratified" sampling which requires samples that are distributed unevenly over time just like the population of responses to events is: every month or season of the year cannot be forced to have the same number of samples; otherwise what is being measured is not the population of responses to events, but something else (like responses to regular small operating errors that are the domain of CPS, not the FRS) with a probability density over time in the shape of a flat-top box; (3) use of a median measure of frequency-response performance, which is impossible for 3 reasons: because there is a practical infinity of possible Frequency Responsive Reserve Sharing Groups or overlap regulation arrangements, because use of the median incents the formation of those whose actual provision of

frequency response is over-represented by the median and would in that case deteriorate below the actual minimum amount required for system reliability, and because use of the median disincents the formation of those whose actual provision of of frequency response is under-represented by the median. The first 3 slides clarify the following 3 technical points: (1) the resistance of load to adjust to sudden change in generation output prompts frequency (but not generator output) to change and to thereby involuntarily change the load whose resistance to that adjustment prompts frequency to change even more and only until the sudden generation output change is reversed enough in order first to stop the frequency change and then begin to reverse the frequency change; [The involuntary load response/adjustment provides the energy used by generation inertia to immediately slow down frequency change until frequency response is deployed to stop and begin to reverse the frequency change as illustrated in this 4-slide powerpoint presentation of 4 errors in the Cummings presentation's slide of frequency response http://www.robertblohm.com/CummingsVsIllianLoadResponse.pptx or http://www.robertblohm.com/CummingsVsIllianLoadResponse.ppt . The 2 graphs depicted therein show that load response and inertia are inseparable and provide the entirety of frequency response during more than the initial half of the 5 or 6 second pre-arresting period, and this supports the next slide.] (2) the FRS is a standard for "system" frequency response (the 1st of NERC's 2 glossary definitions of "frequency response"), not for "equipment" frequency response (the 2nd of NERC's 2 glossary definitions of "frequency response"); the FRS is a BA-Response System Operation and Measurement Standard, not a Connection and Maintenance Standard for Individual Pieces of Equipment; in other words, all sharp large-enough tie-line and frequency changes of whatever kind for whatever reason are counted (“summed”) and managed (and included in the probability density curve of frequency events and responses thereto), not just measurements of a construed pure machine response to one single imagined un-overlapped change (shorn of supposed "contaminants" of an idealized "equipment" reality non-existent at actual "system" level); (3) the probability density function of frequency events that are un-uniformly distributed over time governs the FRS and is different from the standard normal distribution of operating errors (that governs CPS) that are evenly distributed over time in a uniform distribution.
Group
Dominion
Connie Lowe
Dominion
Dominion agrees that resources other than generators could supply some limited frequency response, but believe that all resources providing reliability-related services should be subject to applicable NERC reliability standards. We also agree that relationships can exist between reliability and compensation, especially in organized markets. In order for generators to be able to respond to a low frequency event, they would need to operate slightly below their maximum output. The Balancing Authority is the entity best suited to make the determination of how to balance efficiency and reliability. There may be financial consequences for resources that do not meet their assigned schedule and we encourage further discussion of this with NAESB to determine whether this issue might be ripe for discussions and possible solutions from NERC (reliability) and NAESB (commercial/financial). As noted in the Duke presentation, alignment is also needed in the new NERC standards and Glossary of terms (clarification is needed on specific terms used by engineering vs. the Generator Operator) as it pertains to frequency response.
Individual
Terry Bilke
MISO
The standard sets a rational backstop for reliability without forcing undue costs for undefined improvements in reliability. My primary concern is the reliability gap created for variable bias BAs. There is no discernible reason why a variable bias BA should ever have a bias less negative than say 30% of its FRO. The variable bias BA should also have an average annual bias at least 90% of its FRO. This can be managed through the year and still will be well less than the current obligation under BAL-003-0. Since there is no firm technical guidance on how variable bias is to be set, to leave this gap will cause a mass movement of BAs to report as variable bias entities. It will also leave the door open to gaming to artificially improve CPS and DCS and BAAL performance.
Group

SPP Standards Review Group
Robert Rhodes
Southwest Power Pool
Requirement 3 of the standard covers the use of variable bias. However, the requirement does not establish a minimum limit for variable bias. In order to prevent what could be perceived as a way to 'game' the requirement, we would suggest incorporating a minimum limit on variable bias that does not allow the value to be positive.
Individual
John Seelke
Public Service Enterprise Group
PSEG Comments on Project 2007-12 – Frequency Response A. SUMMARY OF COMMENTS 1. The standard drafting team (SDT) for Project 2007-12 has not explained how compliance with draft standard BAL-003-1 is achievable; therefore, a key goal of Order 693 has not been met. a. BAL-003-1's objectives (from the project's web page) states "There is evidence of continuing decline in Frequency Response in the three Interconnections over the past 10 years, but no confirmed reason for the apparent decline." If one does not know why Frequency Response is declining, how can a BA ensure itself that it has sufficient Frequency Response in its area to meet its obligation? b. BAL-003-1 assigns Balancing Authorities (BAs) the requirement to meet a Frequency Response Obligation for their respective areas. However, BAs have no the authority to set requirements for suppliers of Frequency Response service: Generator Owners (GOs) as well as demand response resources. 2. Two existing standards (BAL-001-0.1a and BAL-002-0) also address Frequency Response. However, the pro forma Open Access Transmission Tariff (OATT) contained ancillary services associated with these standards prior to the standards being approved. a. The SDT needs to explain the relationship between BAL-001-0.1a, BAL-002-0, and draft standard BAL-003-1 since they all address an aspect of Frequency Response. b. BAL-003-1's objectives (from the project's web page) do not include a statement that having sufficient Frequency Response is necessary to arrest the frequency decline within the first seconds of a disturbance so that underfrequency load shedding (UFLS) is minimized. 3. There is no OATT ancillary service for the service in draft standard BAL-003-1. Unless commercial terms are established which define the relationship between BAs and Frequency Response providers, BAL-003-1 will not be implementable. Because commercial terms need to be defined in the OATT, we encourage NERC to work with FERC's Office of Energy Market Regulation and/or its Office of Energy Policy and Innovation to initiate proceeding with the goal of developing a new ancillary service – Primary Frequency Response Service. 4. A plot of frequency versus time after the sudden loss of generation is only contained in presentations for the technical conferences, but a plot is not in any of BAL-003-1's documents. Such a plot is needed in the standard (or in an attachment to it) so that the familiar reference points – A, B, and C – can be used in the standard's documents. 5. With regard to setting the Frequency Response Obligation by Interconnections in BAL-003-1: a. How can two Interconnections (Eastern and Quebec), which are not Registered Entities, comply with the requirement in Attachment A to set a Frequency Response Obligation? b. The SDT should explain its rationale for choosing "the largest category C (N-2) event identified" as the basis for setting an Interconnection's Frequency Response Obligation. 6. Project 2010-14-1 is related to Project 2007-10, and the two project teams should coordinate on these items: a. Both SDTs should put themselves in the position of a BA that must comply with R3 and all its subparts in draft standard BAL-012-1 and develop a hypothetical implementation plan for a BA to meet its Frequency Response Obligation. b. Both SDTs should work together to explain the relationship between Regulating Reserve, Contingency Reserve, and Frequency Response Reserve contained in BAL-012-1. B. REGULATORY BACKGROUND When FERC approved BAL-003-0 – Frequency Response and Bias – in Order 693, it issued NERC a directive in P. 375: …the Commission directs the ERO to develop a modification to BAL-003-0 through the Reliability Standards development process that: … (3) defines the necessary amount of Frequency Response needed for Reliable Operation for each balancing authority with methods of obtaining and measuring that the frequency response is achieved." The standard drafting team for Project 2007-12 is currently addressing all but one of the items in the Order 693 directive. See below: Order 693, P. 375 (3) Directive Addressed by SDT? 1. Define the necessary amount of Frequency Response for each BA Yes 2. Define methods of obtaining Frequency Response No 3. Define methods of measuring that Frequency Response is achieved Yes This second item is critical. "Methods" can describe technical options, but it can also describe process options. While the project's "Frequency Response Background Document" dated October 2011 has a section on "methods of obtaining Frequency

Response" on p. 11, that section has six bullet points on the topic. The points are not integrated into a coherent approach that explains how compliance is achievable. Draft standard BAL-003-1 assigns BAs the requirement to meet a Frequency Response Obligation for their respective areas. However, BAs have no the authority to set requirements for suppliers of Frequency Response service: GOs as well as demand response resources. In addition, there are no OATT provisions that will compensate suppliers for the service BAs will ask them to provide. C. TECHNICAL COMMENTS 1. BAL-001-0.1a and BAL-002-0 NERC's Glossary defines of Frequency Response and Frequency Bias as follows: Frequency Response: (Equipment) The ability of a system or elements of the system to react or respond to a change in system frequency. (System) The sum of the change in demand, plus the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 Hertz (MW/0.1 Hz). Frequency Bias: A value, usually expressed in MW/0.1 Hz, set into a Balancing Authority [Area Control Area] ACE algorithm that allows the Balancing Authority to contribute its frequency response to the Interconnection. Two existing standards are related to draft standard BAL-003-1. a. BAL-001-0.1a – Real Power Control Performance – addresses maintenance of frequency, within limits, by a BA in a steady-state (no disturbance) environment by measuring ACE. This requires BAs to have sufficient Regulating Reserve. The ACE equation includes a component for Frequency Bias. This component adjusts ACE when frequency deviates from 60 Hz, allowing a BA to contribute its Frequency Response to the Interconnection. In the OATT, this service is Schedule 3 – Regulation and Frequency Response. b. BAL-002-1– Disturbance Control Performance – requires BAs to provide sufficient Contingency Reserve so that ACE can be returned to its pre-disturbance level within 15 minutes. In the OATT, this service is incorporated into two schedules: Schedule 5 – Operating Reserve – Spinning Reserve Service and Schedule 6 – Operating Reserve – Supplemental Reserve Service. In both standards, the needed ancillary services were in the OATT PRIOR to the standards being approved. The reliability standards set performance requirements while the OATT sets the commercial structure for compensating providers. To meet the requirements of BAL-001-0.1a and BAL-002-1, BAs need Frequency Response (equipment) so that they have the "ability… to react or respond to a change in system frequency." Maintaining ACE is a Frequency Response service, but it is different from the type of service in draft standard BAL-003-1 and as described in the technical conference. The SDT should explain the relationship of all three standards since they all address an aspect of Frequency Response. 2. Draft BAL-003-1 Objectives The objectives of Project 2007-12 are excerpted below from its web page: Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. Failure to maintain frequency can disrupt the operation of equipment and initiate disconnection of power plant equipment to prevent them from being damaged, which could lead to wide-spread blackouts. THERE IS EVIDENCE OF CONTINUING DECLINE IN FREQUENCY RESPONSE IN THE THREE INTERCONNECTIONS OVER THE PAST 10 YEARS, BUT NO CONFIRMED REASON FOR THE APPARENT DECLINE (emphasis added). The proposed standard would set a minimum Frequency Response obligation for each Balancing Authority, provide a uniform calculation of Frequency Response and Frequency Bias Settings that transition to values closer to natural Frequency Response, and encourage coordinated AGC operation. This statement has two shortcomings. First, the emphasized sentence above is discouraging because if one does not know why Frequency Response is declining, how can a BA ensure itself that it has sufficient Frequency Response in its area to meet its obligation? The standard should describe how a BA might comply with its Frequency Response Obligation in an appendix. (See the comments in Section D below.) Second, it makes no mention that having sufficient Frequency Response is necessary TO ARREST FREQUENCY DECLINE WITHING THE FIRST SECONDS OF A DISTURBANCE SO THAT UNDERFREQUENCY LOAD SHEDDING (UFLS) IS MINIMIZED. 3. Graphics A plot of frequency versus time after the sudden loss of generation is only contained in the presentations for the technical conferences, not in any of BAL-003-1's documents. Such a plot is needed in the standard (or in an attachment to it) so that the familiar reference points – A, B, and C – can be used in the standard's documents. 4. Physical response to loss of generation The workshop did a good job in explaining what occurs physically within an Interconnection after generation is lost. Those are summarized below for the SDT to review for any misunderstanding. a. At point A (pre-disturbance), an unspecified amount of generation is lost. b. Between point A and point C (the frequency nadir), several changes occur: i. Due to the loss of generation, load is greater than generation, and in response to this imbalance, generators "slow down" and frequency drops. Each generator's loss of speed releases power to serve the load, albeit at a reduced frequency. Generators with greater mass are preferred since they have more stored rotating power to release. Frequency

Bias setting in each BA's ACE equation allows this power to flow into the Interconnection. ii. Load is also reduced when frequency is reduced because loads such as motors slow down also and consume less power. Load reduction aids in arresting frequency decline. However, unless the frequency decline triggers the first UFLS step, no connected is lost. iii. Generator governors begin to respond. A generator's governor that can increase output when frequency declines provided certain characteristics are met. 1) The generator must be operating below its maximum capacity that can be achieved under automatic (i.e. non-operator intervention) operation. A generator with a 100 MW capacity and operating at 80 MW has "head room" to respond while the same generator operating at 100 MW cannot. 2) The governor's "dead band," which defines a range (+/-) of frequency changes that do not activate the governor, must not be so wide so as to effectively disable the governor from responding to frequency changes during a disturbance. 3) The governor cannot be overridden by "outer loop controls" on the generator. These controls countermand the governor's response, keeping the generator's output level unchanged. Governor response is the last to occur – it begins within seconds after the disturbance and continues until the generators with active governors reach their maximum capacity or until frequency is restored. In addition, properly devised demand response resources can substitute for governor-responsive generators. c. At point B, frequency is stabilized. All of items above occur automatically, without operator intervention. Collectively, these actions are referred to the "primary response" of the Interconnection to loss of generation. Subsequent responses involve operator actions that eventually return system frequency and ACE to a pre-disturbance ACE target. These subsequent responses are not the objective of draft BAL-003-1, but they are the objective of BAL-002-1. 5. Frequency Response Obligation Determination Regarding the Frequency Response Obligation for an Interconnection, Attachment A in draft BAL-003-1 states "Each Interconnection will establish target contingency protection criteria," with the default target "based on the largest category C (N-2) event identified." We have several questions: a. How can two Interconnections (Eastern and Quebec), which are not Registered Entities, comply with the requirement in Attachment A to set a Frequency Response Obligation? In fact, no Interconnection is listed in the Applicability section of BAL-003-1. b. We assume that "category C" in the Attachment A language above references Table 1 in the current TPL standards, but that should be clarified by the SDT. Does the SDT intend to restrict the category C events to those that only result in the loss of two Elements? This question is asked because category C in Table 1 is described as "Event(s) resulting in the loss of two or more (multiple) elements." c. The default target contingency in Attachment A is greater than minimum Contingency Reserve requirement in BAL-002-1 (R3.1), which is based on "the most severe single contingency." Why was the minimum requirement in BAL-002-1 not used? The SDT should explain its rationale for choosing "the largest category C (N-2) event identified" as the basis for setting an Interconnection's Frequency Response Obligation. 6. Frequency Response Obligation Measurement We summarized Frequency Response Obligation measurement below for the SDT to review for any misunderstanding. a. Frequency Response will be measured at point B due to technical limitations in measuring each BA's point C. However, point C can be measured for an Interconnection. Because the C to B ratio is highly consistent within an Interconnection, measuring the response at B also measures the decline at C is achieved. b. For compliance purposes, each BA's performance in meeting its Frequency Response Obligation will be based upon its median Frequency Response of at least 25 events, expressed in megawatts per 0.1 Hertz (MW/0.1 Hz). D. FREQUENCY RESPONSE OPTIONS The discussion below is not inclusive, and the SDT is encouraged to provide guidance on compliance as recommended in Section C.2 above. 1. Value high inertia generators. Generators that are on line and spinning, even if loaded to their maximum capacity, provide MW by slowing down, and generators with greater mass are preferred. In engineering parlance, this is termed the inertia constant, H, which, for a given generator is: H = (Stored kinetic energy in megajoules at synchronous speed)/(Generator rating in MVA) Generators with a greater H constant have more value in arresting frequency decline than similarly rated generators with a lower H constant. 2. Value interruptible load on underfrequency relays. Many utilities have interruptible loads, and some of these could be configured to be shed load based upon frequency steps that are above the first UFLS step. As an example, direct load control programs for cycling residential air conditioners and water heaters could be configured to interrupt all appliances on the program for several minutes after a disturbance, with the appliances gradually restored after the frequency decline is arrested. 3. For generators that provide primary Frequency Response through governor action, value rapid response. The rate of increase in generator output due to governor response is both governor and prime-mover specific. The governor's droop determines how much it will increase signal generator power to increase when frequency declines. Also, generators with rapid power increase capability,

such as simple cycle gas turbines, can deliver the governor's signal to increase power more quickly. The more rapid a generator's response capability, the more it should be valued. a. Generators providing primary Frequency Response through governor action or automatically curtailed interruptible load also provide "Operating Reserve – Spinning," which is a component of Operating Reserve. It is defined in the NERC Glossary as follows: Operating Reserve – Spinning The portion of Operating Reserve consisting of: i. Generation synchronized to the system and fully available to serve load within the Disturbance Recovery Period following the contingency event; or ii. Load fully removable from the system within the Disturbance Recovery Period following the contingency event. The term "Disturbance Recovery Period" is used in BAL-002-1, and its default value is 15 minutes. To minimize UFLS activation, which can occur within seconds after a disturbance, primary Frequency Response is the key requirement, and the 15 minute time frame in Operating Reserve – Spinning is not relevant. However, a GO that provides primary Frequency Response via an active governor or a demand response provider that provides automatically curtailed interruptible load is also providing Operating Reserves – Spinning. E. OATT PROVISIONS Unless commercial terms are established which define the relationship between BAs and Frequency Response providers (GOs and demand response resources), BAL-003-1 will not be implementable. Because commercial terms need to be defined in the OATT, we encourage NERC to work with FERC's Office of Energy Market Regulation and/or its Office of Energy Policy and Innovation to initiate proceeding with the goal of developing a new ancillary service – Primary Frequency Response Service. This service would address automatic Frequency Response within a short time frame (up to about 30 seconds) after a disturbance. Overlap between Spinning Reserve Service and Primary Frequency Response Service would need to be addressed. F. COORDINATION WITH PROJECT 2010-14.1 After preparing the majority of our comments, a first-time request for comments on a related project, Project 2010-14.1 – Phase 1 of Balancing Authority Reliability-based Controls Reserves – was posted on June 4. This project includes a new draft standard BAL-012-1 that has a proposed definition for Frequency Response Reserve – "An amount of reserve automatically responsive to locally sensed frequency deviation during the primary control time frame." That definition is similar to the ancillary service proposed above. Both SDTs should put themselves in the position of a BA that must comply with R3 and all its subparts in draft standard BAL-012-1 and develop a hypothetical implementation plan for a BA to meet its Frequency Response Obligation. If they did, they would understand why BAs have little understanding of what they must do to comply with draft BAL-003-1. Both SDTs work together to explain the relationship between Regulating Reserve, Contingency Reserve, and Frequency Response Reserve contained in BAL-012-1.
Group
Bonneville Power Administration
Chris Higgins
Transmission Reliability Program
Chris Higgins Bonneville Power Administration Transmission Reliability Program cmiggins@bpa.gov 360-418-2132 Submitting on behalf of the BPA's AGC team. BPA continues to fundamentally disagree with the approach that BAL-003-1 is developing into. Please reference BPA's extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found here: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf. BPA also believes that having a special interest group present their perspective on the standard and a consultant provide a sales pitch in relation to load response was inappropriate and ill-served.
Individual
Don McInnis
Florida Power & Light
The conference was very informative. Of particular interest was who should be responsible for providing frequency response. The assignment to the BA was well supported and logically presented. The details presented in the conference were different than those in the original version of the standard i.e. the frequency selected to protect for was modified from 59.7 to " prevailing". The prevailing frequency if prevailing is interpreted as dominant is 59.3Hz yet the standards team choose 59.5Hz without explanation or justification. There was also a lack of technical justification in increasing the frequency bias minimum from the original 0.8% to 0.9%. While a minimum should be established there should be no link to frequency response as the two are no longer related.
Individual

Bob Frost
Portland General Electric
1. BAL-003-1, Attachment A, states that the ERO will provide quarterly posting of candidate frequency events. It then states it will post the final list of frequency excursion events used for standard compliance by December 15 each year. Because the quarterly postings are only candidates and the median frequency response is the measure, Balancing Authorities cannot always be certain they will be compliant with the Standard until December 15. 2. FRS Form 1, sheet “Data Entry”, requests entry by the Balancing Authority of next year’s FRO (cell O31). However, per Attachment A, this information is provided by the ERO only after Form 1 is submitted by the Balancing Authority. A Balancing Authority is only able to estimate their FRO. 3. FRS Form 2, sheet “Entry Data”, has the Balancing Authority modify formulas for cells C8 and C11 in order to identify the beginning and recovery from the event. This is tedious as Form 2 must be completed a minimum of 25 times each year. The spreadsheet should be authored so that the user does not need to modify formulas. The sheet “Data” on Form 2 could have cells adjacent to the data that are marked to identify these points.
Group
MISO Standards Collaborators
Marie Knox
MISO
We have a strong concern related to the handling of variable bias. The drafting team is fully removing the floor for the minimum amount of bias for these BAs and only asks bias to be equal to natural frequency response when frequency is off normal. There should always be some bias (perhaps 40% of FRO) provided to the Interconnection and there should be some minimum annual average. This can be managed through the year and still will be well less than the current obligation under BAL-003-0. Since there is no firm technical guidance on how variable bias is to be set, to leave this gap will cause a mass movement of BAs to report as variable bias entities. It will also leave the door open to gaming to artificially improve CPS, DCS and BAAL performance. For example, an algorithm that takes bias to a small positive number once each 15 minutes would assure the BA will never fail DCS or BAAL.
Group
LG&E and KU Services
Brent Ingebrigtson
LG&E and KU Services
LG&E and KU Services have two comments/questions related to the material presented at the FR Technical Conference: 1. Data was presented that illustrates a decline in the Frequency Response of the Eastern Interconnect for the period 1994 through 2010. Since FR is partially related to the amount of on-line generation available at the time of the contingency, has the SDT investigated the amount of spinning reserves typically available on the Eastern Interconnect during the same 1994 to 2010 period? If so, was there a correlation between the decline of Frequency Response and available spinning reserve? 2. During the conference, mention was made that there is a cost for obtaining Frequency Response – mainly the cost of unused spinning generator capacity. However, no data, analysis or estimates were presented as to what these costs might be. Cost estimates for attaining the desired amount of Frequency Response would be useful to the industry and FERC in evaluating the proposed Frequency Response standard.
Individual
Michael Goggin
American Wind Energy Association
AWEA appreciates the opportunity to comment on NERC’s ongoing work on frequency response standards. Based on the presentations at NERC’s May 2012 technical conferences on frequency response issues, it appears that consensus exists around three important points, which we would like to highlight in our comments. We are pleased that these points appear to be embodied in the ongoing work of the standards drafting team on frequency response (BAL-003-1). 1. The balancing authority (BA) should be the entity responsible for meeting a frequency response standard. This responsibility would fit in well with a BA’s existing responsibilities for maintaining system frequency within acceptable bounds, such as CPS 1&2 and DCS requirements. Just as a BA currently obtains the reserves and other services required to meet these frequency standards and operates according to these standards, the BA is the logical entity for taking on those responsibilities for frequency

response. The BA is the only entity that has a real-time awareness of overall power system needs and capabilities, and is thus ideally suited for meeting a frequency response standard. 2. A BA's selection of resources to provide frequency response service should be market-based. As was explained at the technical conferences, different resources have widely divergent costs for providing frequency response. Many resources are likely to be able to provide significant frequency response at very low cost, while other resources are likely to face significantly higher costs for providing this service. For example, maintaining the capability to provide sustained frequency response from a wind plant would require holding the wind plant below its operating capability at all times, foregoing significant production of near-zero-marginal cost, zero emissions wind energy. As a result, under normal operating conditions, the wind plant's opportunity cost for providing frequency response capability is likely to be significantly higher than the cost for many other generating resources, which would be able to save on fuel costs by operating below their maximum output. Innovative technologies, including some forms of demand response and energy storage, are also likely to be able to provide frequency response at relatively low cost. The BA is well-positioned to use a market-based mechanism to select the least-cost frequency response resources from the available resources, as conditions change in real-time. This market-based incentive should also provide sufficient incentive for most potential resources to install any equipment necessary to provide frequency response. The market mechanism should be designed to pay for performance, so that frequency response resources are incentivized to provide services with the maximum value for the power system. 3. The decline in frequency response on the Eastern U.S. power system pre-dates the introduction of wind energy and appears to have been caused by changes in how conventional power plants are operated, and not in any way tied to the increased use of wind energy. As NERC noted in comments submitted to FERC on October 14, 2010: "Frequency response of the interconnected North American electric systems has shown a significant decline for several years. The reasons for the decline are numerous, including: • A trend toward larger governor deadband settings, exceeding the historical typical setting of ±36 millihertz (mHz); • Use of steam turbine sliding pressure controls; • Loading units to 100 percent of capacity leaving no "headroom" for response to losses of generation; • Blocked governor response; • Once-through boilers; • Gas Turbine inverse response; • Withdrawal of primary frequency response of generators by MW setpoints, resulting in limited time of response; and • Changes in the frequency response characteristics of the load. These changes have been evolving for some time and are not the direct result of the emergence of renewable resources such as wind and solar." Data presented at the technical conference indicated that only around 30% of generators are currently providing frequency response. Much of the decline in frequency response provision appears to result from generator owners maximizing efficiency and minimizing costs under current market structures. Implementing a market-based mechanism to select the least-cost frequency response resources from the available resource pool would allow conventional generators to be appropriately compensated for any costs they incur for providing frequency response while simultaneously selecting the least-cost resources for the power system. The technical conference also discussed the fact that only 1/3 of the 30% of generators that are providing frequency response (so 10% of the total generation fleet) sustain that frequency response for more than a short period of time. Part of the problem appears to be that some current energy imbalance tariff provisions may penalize generators that increase their output beyond the scheduled amount, and therefore generators are limiting the duration of frequency response following a system disturbance to avoid imbalance penalties. At the technical conference, there appeared to be widespread support for reforming those energy imbalance tariff provisions to remove that perverse incentive, which is commendable.

Group

ISO/RTO Standards Review Committee

Albert DiCaprio

PJM

Introduction The undersigned members of the ISO/RTO Standards Review Committee (SRC) appreciate that NERC provided the opportunity to comment upon NERC's Frequency Response Technical Conference. The Conference addressed an important topic in which the SRC is deeply interested – primary control. The SRC notes that the Conference's presentation of the various and diverse perspectives of this topic highlighted the continued need to resolve and address several issues: • The need for a common language for discussion • The need for an objective analysis of a reliability need • Given the proof of such an objective reliability need, there is a need to define the quantitative parameters involved in measuring the objective • The need to justify the creation of a

mandatory standard that is relevant to the current and future BES. That includes: o Reviewing relevancy of old standards o Clarifying discussions o Objectively assigning responsibilities Discussion Terminology/Common Language The SRC noted that the presenters did not share a common set of terms. The term Frequency Response was used to address issues that are separated by time frames and that deserve separate discussions. Frequency Response was used generically to mean any activity related to controlling frequency. Frequency Response was also used to mean undirected control (such as the change in generator output caused by a governor). Frequency Response was used to mean directed control (aka secondary control). It was also used to mean the Area Control Error equation. Rather than relying on the broad and ill-defined term Frequency Response, the SRC suggests that either newly minted terms be created or that more traditional terms such as Primary Control Response and Secondary Control Response be used. All too often the presenters crossed the traditional boundaries thereby decreasing the clarity (and the value) of the discussion. There was also a tendency to use the term “Service” for both the traditional Ancillary Services (Load Following (aka Economic Dispatch); Spinning reserves; Supplemental reserves; Regulation service (aka AGC); Reactive and voltage control service; Black start) and for conditions that exist (i.e. the reaction from generators to changes in frequency). There is a tendency to equate Frequency Control through tie-line bias (typically this is AGC or secondary control) with Primary control (Dave Lemmons); Bias vs. Beta (is also a secondary control issue but it is linked because the parameters themselves are related to the primary response experienced; but they drive secondary control problems and solutions). In short the Bias is a 1st order approximation of what the magnitude of primary response that goes into the ACE equation to drive secondary control. Unless care is taken with the terms, it is easy to envision differences in discussions. Good resolutions of problems caused on the secondary control system were presented (Terry Bilke) but that need is relatively independent of this SDT. For our comments the SRC will focus on Primary Control response and use the terms primary, primary response, or primary frequency response rather than Frequency Response. Need The SRC notes that the presenters offered a variety of reasons for a “Frequency Response” standard: • Because the governor response in the Eastern Interconnection changed (or appears to be changing) • To avoid Under-Frequency Load Shedding relay operation • To avoid problems for Secondary control (valid need but not a valid justification for Primary Frequency control standard) (Howard Illian) • FERC Order 693 o Determine the appropriate periodicity of frequency response surveys o Define necessary amount of Frequency Response for reliable operations with methods of obtaining response and measuring that the frequency response is achieved • FERC Technical Conference The SRC observes that the presenters are attempting to address the goal of operating at a reasonable margin away from both UFLS (under-frequency) and OFR (over-frequency) settings, and to avoid any single event (contingency) causing those relays to activate. The SRC fully supports that objective. Several presenters mentioned the above objective and addressed the amount of post-event governor response, i.e. response that was activated after the frequency was arrested. Presenters recognized that not all suppliers are generators, and not all generators have governors, and not all of those generators respond in the same way. They also note that BAs do not all own generators. One presenter documented that the Eastern Interconnection has the worst post event response but also has the highest frequency arrest level (i.e. are farthest from a relay trip point) Most presenters expressed preference to impose Frequency response production requirements on BAs. Most presenters want to focus on the Eastern Interconnection. The SRC believes the requirement addressing primary frequency response must: • Relate to the frequency nadir point not the post event response • Apply to and be assigned to “ALL” Functional Entities registered for that applicable group • Reflect the capabilities of the functional entity to provide the mandated service. • Address both supply capabilities as well as appropriateness of relay settings If the objective is to avoid tripping relays and to minimize the risk of tripping those relays then the requirement must focus on that objective. Some presenters stated that it is traditional and simply easier to focus a Frequency Response requirement on BAs. Others stated that there were too many suppliers to impose a frequency response mandate on the suppliers. The SRC as well as NERC have stated the intention to have performance based standards and to move away from procedural requirements. The majority of the Technical Conference presenters focused on procedural solutions (i.e. governor response) and tried to indicate that both generation and demand response could serve as response providers. Bob Cummings of NERC showed that the typical worst response of the EI was equal to or higher than the best responses in ERCOT or WECC. In effect the concern about lack of post event response does not reflect the margin of reliability experienced even with the “hockey stick” response. Given the fact that none of the presenters proposed increasing the ERCOT and WECC responses to be as effective as the EI response, the observed decrease in the Eastern

interconnection could be seen as a type of “right-sizing” of response – i.e. the east is now coming closer to the rest of North America. Supply The SRC does recognize the change in frequency response in the EI, but is concerned that mandating ill-advised requirements on the wrong applicable entities will foster the loss of the provision of primary response service and not help it. If the “supply” requirement is placed on a coordinator, then the energy producing assets have no incentive to provide a service that takes away from other more lucrative products. If the requirement is placed on a subset of suppliers then those suppliers will likely mimic the suppliers in the other subset and not offer any service at all. The idea of focusing on one given solution – governor response – creates disincentives for new technologies. The Industry is now adopting those innovations without a mandate and should be allowed to continue that expansion without the threat of a standard that would impede such expansion. Suggestions The SRC believes there is a need for more open presentations including people not as focused on governors. The majority of presenters were experts in a given area. Their expertise seemed to preclude exploration of other options than the current option/approach. It should be noted that a Governor-centric requirement violates Order 693’s mandate to be resource neutral. It is time to have a discussion of the role of coordinators (like RCs, TOPs and BAs) who can and do use a palette of tools and services to address a given system condition without being obligated to answer for non-production. An alternative could be that such entities are required to provide assessment and analysis but not production; or they are required to arrange for, purchase, or otherwise provide capacity (not energy) capable of providing the primary frequency response. Many of the presenters seemed to be in a vertically integrated industry where the coordinator is the owner and operator. That is no longer universally true. A primary frequency response service for an interconnection may be calculated as discussed by the presenters, but the mandate must be developed so that the default entity will be obligated to provide or purchase the obligation (thus opening the opportunity to all new innovations). Should that be the LSEs who use the service; the suppliers who provide the service; the coordinators who integrate all of the services; or to allow a combination without specifying “how” it must be done? Other SRC Considerations raised by presenters’ comments It is invalid to avoid imposing a requirement on the appropriate applicable entity simply because there are many of them; if other standards apply to the same applicable entities then this one can also. Speed should not be a driver contrary to what one presenter stated. As presenters said we are fine today without any mandatory standard for primary control. This prompts the question “why the need for speed?” Because we can correct problems with the requirements later, via SARs, is NOT a justification for creating an inaccurate standard. Why should TOPs be permitted to set relays anywhere, but GOPs be obligated to set governors to avoid those relays? Focusing on improving details of what we have today does not make today’s paradigm better!!!! A standard should not serve as a field test for an idea!!!!

Individual

Laura Lee

Duke Energy

Duke Energy appreciates having the opportunity to participate in the Frequency Response Technical Conference. It was a very helpful for our team to hear the issues that were brought by others to the discussion, along with the opinions of NERC staff, the Frequency Response Standard Drafting Team (FRRSDT), and FERC staff. Duke Energy provides the following comments and proposed resolutions to some of the issues we believe should be addressed. Frequency Response Obligation (FRO) As the FRRSDT reviews all of the issues discussed and subsequent comments provided, we ask that consideration be given to drilling down to the “root cause” of the issues, to see what is driving them. We have found one of the root causes of a few issues to be the allocation of the FRO. In the current proposal, a BA’s FRO is the Interconnection Frequency Response Obligation applied to the ratio of the BA’s generation and load at peak divided by the Interconnection BA totals of generation and load at peak. Including generation in the allocation helps accommodate treatment of generation-only BAs (representing perhaps one percent of the total generation in the Interconnection), but in the process creates issues for both individual generating resources and all other BAs. Duke Energy believes that the FRO allocation should be based upon load only, based upon the numerous issues and inequities that an FRO allocation based upon load and generation would otherwise create, including but not limited to: a) An FRO allocation based upon generation at peak treats resources on a non-comparable basis within a “traditional” (load and generation) BA, biased against resources dedicated to peaking operation (CTs as an example), and in favor of resources which may not operate at peak capacity during such times (wind resources as an example). b) A third party resource added to a BA footprint

would add to the BA's response requirement, but the third party resource would have no requirement to provide frequency response. If such resources are only providing peaking energy to off-system loads, the generation would add to the response requirement for the BA for the year, though the resources may run a small fraction of that time. Even if the resources were capable of providing frequency response when online, they may do little to compensate the BA for the increased year-round requirement. The allocation methodology creates the issue that the BA must now address – compensation for the increased response requirement or some other tariff provision to make it whole. c) The allocation methodology creates a gaming opportunity – a strategy to purchase external energy across the peak would be a small premium to pay to achieve a reduced Frequency Response Obligation for the year – but a large price to pay for the BA with the resources selling off-system outside its control. d) Discussed further below, the inclusion of generation in the FRO allocation creates a significant discrepancy between the methodology used to determine the FRO and the methodology used to determine the minimum Frequency Bias Setting. In our opinion, these are among the issues that neither the BAs nor the resources need to face. An allocation based upon the load within the BA rather than load plus generation would resolve them. An additional modification to enhance equitable treatment and eliminate gaming is the use of total energy for the period rather than peak loads in the FRO allocation. There is uncertainty that the use of 12 monthly peaks accurately represents the load benefiting from the continuous provision of Frequency Response. Similar to the gaming discussed above for generation, BAs capable of "peak shaving" are able to reduce a year-round requirement based upon a few hours of operation. Duke Energy proposes that the determination of a BA's FRO be the Interconnection FRO applied to the ratio of the BA's NEL (for those submitting EIA-714 reports, this would be the annual total in column e of Part II, Schedule 3; for others, this would be the sum of LSE NELs in the BA as reported for determination of NERC and Regional fees) divided by the Interconnection BA totals of these NELs. Basing the FRO allocation upon annual energies rather than peak loads eliminates the potential for a year-round FRO to be pushed to others by peak shaving if a peak value is used. The FRO for generation-only BAs (representing approximately 1% of the total generation within an Interconnection) can be set to a fixed percentage of total capacity, similar to current requirements for calculating the Frequency Bias Setting. Frequency Bias Setting (FBS) Notwithstanding our concern raised in the past that the secondary control measures are too tightly bound to the FBS and believing that in some cases the FBS is used as a convenient measure of BA size, Duke Energy agrees with the proposal to gradually reduce the magnitude of the FBS to some margin above the natural Frequency Response of the Interconnection. However, as proposed in the "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard" dated February 21, 2012, the allocation of the FBS reduction would be a margin based upon peak load or peak generation, rather than a margin based upon a methodology similar to that used for the allocation of the Frequency Response Obligation. As an example, based upon the proposed FRO allocation using load plus generation at peak, two BAs with the same peak load, but with differing levels of generation at peak due to off-system transactions, would have a different FRO allocation; however, these two BAs would be given the same minimum Frequency Bias Setting based upon a percentage of peak load only. A generation-only BA with the same amount of generation as a traditional BA serving a similar amount of load, would have an FRO allocation approximately half that of the traditional BA, however these two BAs would be given the same minimum FBS. Under the proposed procedure for reducing the magnitude of the FBS, the generation-only BA would always have a minimum FBS set almost twice what it would need to have compared to the traditional BA. We believe that the incremental reduction in the FBS will not achieve an equitable allocation in its final state. Duke Energy believes that the minimum FBS for each BA should be reduced in magnitude to a fixed percentage above each BA's FRO (but no lower individually than its FRM), while assuring that the Interconnection FBS remains at some margin above the Interconnection FRM. The current procedure posted for the FBS reduction will not achieve that equitable allocation, as the minimum FBS will always be based upon a different methodology than the FRO allocation in its current form. Upon request, Duke Energy can provide a procedure which could be used for determining the minimum FBS which would allow the minimum FBS for each BA to be incrementally reduced in magnitude over time based upon the FRO allocation, and ensure that the Interconnection FBS remains at some margin above the Interconnection FRM. However, given the timeline for moving this standard forward, Duke Energy would propose that consideration be given to basing the FRO allocation on load only as discussed above, setting a value for the generation-only BAs, and returning to the issue of aligning the methodologies used for the FRO allocation and minimum FBS calculation at a later time. Variable Frequency Bias Setting Duke Energy disagrees with the FRRSDT's proposal not to require a minimum

FBS for BAs using a Variable FBS in multiple BA Interconnections. There are no defined requirements on how a Variable FBS SHALL be calculated, yet its use changes not only the ACE measured against the BAL-001 secondary control requirements, but also the bounds of those secondary control requirements. Overall, Duke Energy questions whether the proposed standard should continue to allow the use of a Variable FBS in calculating ACE or secondary control performance. Duke Energy does not question the value of a BA implementing the logic of a variable FBS in its generation control algorithm, along with other factors to more efficiently control resources, however its operation should be measured in a manner consistent with all other BAs. Nathan Cohn was of the opinion that the secondary control assistance provided by the FBS should be a shared obligation. In the publication "IEEE Transactions on Power Systems, Vol. 3, No. 3, August 1988", Cohn noted the following in the article VARIABLE, NON-LINEAR TIE-LINE FREQUENCY BIAS FOR INTERCONNECTED SYSTEMS CONTROL: "The very conditions that create a variable frequency response to which an area bias is linked as in the subject paper would create a variable level of bias assistance by the area in fulfilling system needs." Nathan Cohn goes on to state, "It is of course recognized that the extent of bias assistance to be scheduled by individual areas is, as are all operating practices, a matter for system operating personnel to determine. This discusser suggests, however, that there are potential advantages in bias assistance based on a common percentage-of-peak for all areas. It would provide an equitable, cooperative, and democratic systems approach." As supported by the statements of Cohn, Duke Energy believes that the assistance provided by the FBS should be a shared obligation equally applied to all BAs by using a fixed FBS in the calculation of ACE and secondary control performance. BAL-003-1 Documents The document, "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard" dated February 21, 2012, no longer has a reference to being "Attachment B" to the draft BAL-003-1 standard. Duke Energy would appreciate clarification of whether this document is within the scope of what will be eventually be included in the ballot of Project 2007-12 — Frequency Response, and what process would be required to make any subsequent revisions to the procedure.
Individual
Rebecca Moore Darrah
MISO
The Midwest Independent Transmission System Operator, Inc. ("MISO") appreciates the opportunity to comment on the technical conferences that NERC recently held on Frequency Response issues, and, in particular, the proposed changes to BAL-003. MISO adds only two brief comments here. MISO agrees with the proposed change in BAL-003-1 with respect to the calculation of minimum amount of frequency response to be provided by a Balancing Authority (this is the Frequency Response Obligation under Requirement R1 of BAL-003-1). The allocation of Frequency Response Obligation among Balancing Authorities in an Interconnection is to be based on peak load data, which is a reasonable approach to determining what proportion of frequency response should be contributed to each Balancing Authority. MISO also agrees with the manner of calculating each Balancing Authority's Frequency Response Obligation under Requirement R1; the proposal by the Standards Drafting Team will ensure that adequate frequency response is provided by each Balancing Authority. At the same time, the Standards Drafting Team should reconsider its approach to variable bias. Balancing Authorities with variable bias are not subject to some of the requirements. Variable bias methodologies are not identified, and that lack of an identified methodology opens the opportunity for individual Balancing Authorities to engage in gaming (such as having bias go to zero or a small positive number every 15 minutes to ensure DCS and BAAL is never failed).

Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed:

1. The Standards Committee approved the SAR for posting on January 13, 2005.
2. The SAR was posted for industry comment from January 17, 2005 through February 17, 2005.
3. Reply comments and a revised SAR were posted for a second industry comment period from April 4, 2006 through May 3, 2006.
4. Reply comments and a revised SAR were posted for a third industry comment period from February 8, 2007 through March 9, 2007.
5. Standards Committee approved moving the project into the standards development phase on July 12, 2007.
6. The Standards Committee appointed the Standard Drafting Team on August 13, 2007.
7. The draft standard was posted for a 30 day formal comment period from February 4, 2011 through March 7, 2011.
8. The draft standard was posted for a 45-day formal comment period and a 10 day initial ballot from October 25, 2011 through December 8, 2011.

Proposed Action Plan and Description of Current Draft:

This is the third posting of the proposed standard and its associated documents for a 30 day formal comment period and a successive 10 day ballot, from October 5, 2012 through November 5, 2012.

Future Development Plan:

Anticipated Actions	Anticipated Date
1. Respond to comments submitted within the comment period and with the successive ballot.	January, 2013
2. Conduct a recirculation ballot for ten days.	January, 2013
3. BOT adoption.	February, 2013

Definitions of Terms used in the Standard

Frequency Response Measure (FRM)

The median of all the Frequency Response observations reported annually by Balancing Authorities or Frequency Response Sharing Groups for frequency events specified by the ERO. This will be calculated as MW/0.1Hz.

Frequency Response Obligation (FRO)

The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection. This will be calculated as MW/0.1Hz.

Frequency Bias Setting

A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's inverse Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems.

Frequency Response Sharing Group (FRSG)

A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.

A. Introduction

Title: Frequency Response and Frequency Bias Setting

Number: BAL-003-1

Purpose: To require sufficient Frequency Response from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored to its scheduled value. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting.

Applicability:

1.1. Balancing Authority

1.1.1 The Balancing Authority is the responsible entity unless the Balancing Authority is a member of a Frequency Response Sharing Group, in which case, the Frequency Response Sharing Group becomes the responsible entity.

1.2. Frequency Response Sharing Group

Effective Date:

1.3. In those jurisdictions where regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after Board of Trustees adoption.

1.4. In those jurisdictions where regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after Board of Trustees adoption.

B. Requirements

R1. Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation. *[Risk Factor: Medium][Time Horizon: Real-time Operations]*

R2. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO and shall use this Frequency Bias Setting until directed to change by the ERO. *[Risk Factor: Medium][Time Horizon: Operations Planning]*

R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is: *[Risk Factor: Medium][Time Horizon: Operations Planning]*

3.1 Less than zero at all times, and

3.2 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz.

R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either: *[Risk Factor: Medium][Time Horizon: Operations Planning]*

- The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or
- The Frequency Bias Setting shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.

C. Measures

M1. Each Frequency Response Sharing Group or Balancing Authority that is not a member of a Frequency Response Sharing Group shall have evidence such as dated data plus documented formula in either hardcopy or electronic format that it achieved an annual FRM)in accordance with the methods specified by the ERO in Attachment A with data from FRS Form 1 reported to the ERO as specified in Attachment A) that is equal to or more negative than its FRO to demonstrate compliance with Requirement R1.

M2. The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service shall have evidence such as a dated document in hard copy or electronic format showing the ERO validated Frequency Bias Setting was implemented into its ACE calculation within the implementation period specified or other evidence to demonstrate compliance with Requirement R2.

M3. The Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing variable Frequency Bias shall have evidence such as a dated report in hard copy or electronic format showing the average clock-minute average Frequency Bias Setting was less than zero and during periods when the clock-minute average frequency is outside of the

range 59.964 Hz to 60.036 Hz was equal to or more negative than its Frequency Response Obligation to demonstrate compliance with Requirement R3.

M4. The Balancing Authority shall have evidence such as a dated operating log, database or list in hard copy or electronic format showing that when it performed Overlap Regulation Service, it modified its Frequency Bias Setting in its ACE calculation as specified in Requirement R4 to demonstrate compliance with Requirement R4.

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

The Regional Entity is the Compliance Enforcement Authority except where the responsible entity works for the Regional Entity. Where the responsible entity works for the Regional Entity, the Regional Entity will establish an agreement with the ERO or another entity approved by the ERO and FERC (i.e. another Regional Entity), to be responsible for compliance enforcement.

1.2. Compliance Monitoring and Assessment Processes:

Compliance Audits

Self-Certifications

Spot Checking

Compliance Investigation

Self-Reporting

Complaints

1.3. Data Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

The Balancing Authority shall retain data or evidence to show compliance with Requirements R1, R2, R3 and R4, Measures M1, M2, M3 and M4 for the current year plus the previous three calendar years unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The Frequency Response Sharing Group shall retain data or evidence to show compliance with Requirement R1 and Measure M1 for the current year plus the previous three calendar years unless directed by its Compliance Enforcement

Authority to retain specific evidence for a longer period of time as part of an investigation.

If a Balancing Authority or Frequency Response Sharing Group is found non-compliant, it shall keep information related to the non-compliance until found compliant or for the time period specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all subsequent requested and submitted records.

1.4. Additional Compliance Information

For Interconnections that are also Balancing Authorities, Tie Line Bias control and flat frequency control are equivalent and either is acceptable.

2.0 Violation Severity Levels

R#	Lower VSL	Medium VSL	High VSL	Severe VSL
R1	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO
R2	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation

	Service and uses a fixed Frequency Bias Setting failed to implement the validated Frequency Bias Setting value into its ACE calculation within the implementation period specified but did so within 5 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 5 calendar days but less than or equal to 15 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 15 calendar days but less than or equal to 25 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting did not implement the validated Frequency Bias Setting value into its ACE calculation in more than 25 calendar days from the implementation period specified by the ERO.
R3	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 1% but by at most 10%.	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 10% but by at most 20%.	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 20% but by at most 30%.	The Balancing Authority that is a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response obligation by more than 30%..
R4	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing

	Overlap Regulation Services with combined footprint setting-error less than or equal to 10% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 10% but less than or equal to 20% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 20% but less than or equal to 30% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 30% of the validated or calculated value. OR The Balancing Authority failed to change the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services.

E. Regional Variance

None

F. Associated Documents

Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard

FRS Form 1

FRS Form 2

Frequency Response Standard Background Document

G. Version History

Version	Date	Action	Change Tracking
0	April 1, 2005	Effective Date	New
1		Complete Revision under Project 2007-12	Revision

Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed:

1. The Standards Committee approved the SAR for posting on January 13, 2005.
2. The SAR was posted for industry comment from January 17, 2005 through February 17, 2005.
3. Reply comments and a revised SAR were posted for a second industry comment period from April 4, 2006 through May 3, 2006.
4. Reply comments and a revised SAR were posted for a third industry comment period from February 8, 2007 through March 9, 2007.
5. Standards Committee approved moving the project into the standards development phase on July 12, 2007.
6. The Standards Committee appointed the Standard Drafting Team on August 13, 2007.
7. The draft standard was posted for a 30 day formal comment period from February 4, 2011 through March 7, 2011.
8. The draft standard was posted for a 45-day formal comment period and a 10 day initial ballot from October 25, 2011 through December 8, 2011.

Proposed Action Plan and Description of Current Draft:

This is the third posting of the proposed standard and its associated documents for a 30 day formal comment period and a successive 10 day ballot, from October 5, 2012 through November 5, 2012.

Future Development Plan:

Anticipated Actions	Anticipated Date
1. Respond to comments submitted within the comment period and with the successive ballot.	January, 2013
2. Conduct a recirculation ballot for ten days.	January, 2013
3. BOT adoption.	February, 2013

Definitions of Terms used in the Standard

Frequency Response Measure (FRM)

The median of all the Frequency Response observations reported annually by Balancing Authorities or Frequency Response Sharing Groups for frequency events specified by the ERO~~on FRS Form 1~~. This will be calculated as MW/0.1Hz.

Frequency Response Obligation (FRO)

The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection. This will be calculated as MW/0.1Hz.

Frequency Bias Setting

A number~~value~~, ~~(~~either ~~a~~ fixed or variable ~~Frequency Bias)~~, usually expressed in MW/0.1 Hz, included in~~set into~~ a Balancing Authority's Area Control Error equation to account for~~that allows~~ the Balancing Authority's inverse Frequency Response contribution ~~to contribute its Frequency Response~~ to the Interconnection, and discourage response withdrawal through secondary control systems.

Frequency Response Sharing Group (FRSG)

A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.

A. Introduction

Title: Frequency Response and Frequency Bias Setting

Number: BAL-003-1

Purpose: To require sufficient Frequency Response from the Balancing Authority to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored to its scheduled value. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting.

Applicability:

1.1. Balancing Authority

~~1.1.~~**1.1.1** The Balancing Authority is the responsible entity unless the Balancing Authority is a member of a Frequency Response Sharing Group, in which case, the Frequency Response Sharing Group becomes the responsible entity.

~~1.1.1~~**1.2.** Frequency Response~~eserve~~ Sharing Group ~~(where applicable)~~

Effective Date:

~~1.2.~~**1.3.** In those jurisdictions where regulatory approval is required, Requirements R2, R3 and R4 ~~and R5~~ of this standard shall become effective the first calendar day of the first calendar quarter 12 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R2, R3 and~~,~~ R4 ~~and R5~~ of this standard shall become effective the first calendar day of the first calendar quarter 12 months after Board of Trustees adoption.

~~1.3.~~**1.4.** In those jurisdictions where regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after Board of Trustees adoption.

B. Requirements

R1. Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG~~(BA) or Reserve Sharing Group (RSG)~~ shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported ~~detailed~~ in accordance with Attachment A ~~and calculated on FRS Form 1~~) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG~~or RSG~~ to maintain ~~an adequate level of Frequency Response in the~~ Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation. *[Risk Factor: Medium][Time Horizon: Real-time Operations~~Operations Assessment~~]*

R2. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving~~participating in~~ Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as ~~(fixed or variable)~~ validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period~~beginning on the date~~ specified by the ERO and shall use this Frequency Bias Setting until directed to change by the ERO~~to ensure effectively coordinated Tie Line Bias control~~. *[Risk Factor: Medium][Time Horizon: Operations Planning]*

R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is:~~operate its Automatic Generation Control (AGC) in Tie Line Bias mode to ensure effectively coordinated control, unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area.~~ *[Risk Factor: Medium][Time Horizon: Operations Planning~~Real-time Operations~~]*

3.1 Less than zero at all times, and

~~3.1~~3.2 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz.

R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either~~the sum of the Frequency Bias Settings of the participating Balancing Authorities as validated by the ERO or calculate the Frequency Bias Setting based on the entire area being combined and thereby represent the Frequency Response for the combined area being controlled.~~: *[Risk Factor: Medium][Time Horizon: Operations Planning]*

- The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or
- The Frequency Bias Setting shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.

~~**R3.** In order to ensure adequate control response, each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is at least equal to one of the following: *[Risk Factor: Medium][Time Horizon: Operations Planning]*~~

- ~~The minimum percentage of the Balancing Authority Area's estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B.~~

~~The minimum percentage of the Balancing Authority Area's estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as specified by the ERO in accordance with Attachment B.~~

C. Measures

M1. Each ~~The~~ Frequency Response Sharing Group or Balancing Authority that is not a member of a Frequency Response Sharing Group ~~or Reserve Sharing Group~~ shall have evidence such as dated data plus documented formula in either hardcopy or electronic format that it achieved an annual FRM)in accordance with the methods specified by the ERO in Attachment A with data from FRS Form 1 reported to the ERO as specified in Attachment A) that~~with data to show that its FRM~~ is equal to or more negative than its FRO to demonstrate compliance with Requirement R1.

M2. The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service shall have evidence such as a dated document in hard copy or electronic format showing the ERO validated Frequency Bias Setting was implemented~~entered~~ into its ACE calculation within the implementation period~~on the date~~ specified or other evidence to demonstrate compliance with Requirement R2.

M3. The Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing variable Frequency Bias shall have evidence such as a dated report~~operating log, database or list~~ in hard copy or electronic format showing the average clock-minute average Frequency Bias Setting was less than zero and during periods when the clock-minute average frequency is outside of the range 59.964 Hz to 60.036 Hz was equal to or more negative than its Frequency Response Obligation ~~or operator interviews supported by other evidence showing the AGC operating mode including explanation when operating in other than Tie Line Bias mode~~ to demonstrate compliance with Requirement R3.

~~**M4.**~~ The Balancing Authority shall have evidence such as a dated operating log, database or list in hard copy or electronic format showing that when it performed Overlap Regulation Service, it modified its Frequency Bias Setting in its ACE calculation as specified in Requirement R4~~when Overlap Regulation Service is provided including Frequency Bias Setting calculation to~~ to demonstrate compliance with Requirement R4.

~~**M5.**~~**M4.** ~~The Balancing Authority shall have evidence such as dated data plus documented formula to support the calculation retained in either hardcopy or electronic format showing the monthly average Frequency Bias Setting or other evidence to demonstrate compliance with Requirement R5.~~

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

The Regional Entity is the Compliance Enforcement Authority except where the responsible entity works for the Regional Entity. Where the responsible entity

works for the Regional Entity, the Regional Entity will establish an agreement with the ERO or another entity approved by the ERO and FERC (i.e. another Regional Entity), to be responsible for compliance enforcement.

1.2. Compliance Monitoring and Assessment Processes:

Compliance Audits

Self-Certifications

Spot Checking

Compliance ~~Violation~~ Investigation~~s~~

Self-Reporting

Complaints

~~Periodic Data Submittals~~

1.3. Data Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

The Balancing Authority shall retain data or evidence to show compliance with Requirements R1, R2, R3 and~~,~~ R4 ~~and R5~~, Measures M1, M2, M3 and~~,~~ M4~~, and M5~~ for the current year plus the previous three calendar years unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The Frequency Response~~eserve~~ Sharing Group shall retain data or evidence to show compliance with Requirement R1 and Measure M1 for the current year plus the previous three calendar years unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

If a Balancing Authority or Frequency Response~~eserve~~ Sharing Group is found non-compliant, it shall keep information related to the non-compliance until found compliant or for the time period specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all subsequent requested and submitted records.

1.4. Additional Compliance Information

For Interconnections that are also Balancing Authorities, Tie Line Bias control and f~~F~~lat ~~F~~frequency control are equivalent and either is acceptable.

2.0 Violation Severity Levels

R#	Lower VSL	Medium VSL	High VSL	Severe VSL
R1	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO, and the Balancing Authority's, or Frequency Response~~eserve~~ Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO, and the Balancing Authority's, or Frequency Response~~eserve~~ Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO, and the Balancing Authority's, or Frequency Response~~eserve~~ Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO, and the Balancing Authority's, or Frequency Response~~eserve~~ Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO
R2	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting failed to implement the validated Frequency Bias Setting value into its ACE calculation within the implementation period~~on the date~~ specified but did so within 5 calendar days from the implementation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 5 calendar days but less than or equal to 15 calendar days from the implementation period~~ollowing the~~	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 15 calendar days but less than or equal to 25 calendar days from the implementation period~~ollowing the~~	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting did not implement the validated Frequency Bias Setting value into its ACE calculation in more than 25 calendar days from the implementation period~~ollowing the date~~ specified by the ERO.

	periodollowing the date specified by the ERO.	date specified by the ERO.	date specified by the ERO.	
R3	N/AThe Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 1% but by at most 10%.	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 10% but by at most 20%.N/A	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 20% but by at most 30%.N/A	The Balancing Authority that is a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response obligation by more than 30%..The Balancing Authority not receiving Overlap Regulation service failed to operate AGC in Tie Line Bias mode and such operation would not have had an Adverse Reliability Impact on the Balancing Authority's Area.
R4	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with

	combined footprint setting-error less than or equal to 105% of the validated or calculated~~correct~~ value.	combined footprint setting-error more than 105% but less than or equal to 2015% of the validated or calculated~~correct~~ value.	combined footprint setting-error more than 2015% but less than or equal to 3025% of the ~~correct~~ validated or calculated value.	combined footprint setting-error more than 3025% of the ~~correct~~ validated or calculated value. OR The Balancing Authority failed to change the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services.
~~R5~~	~~The absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting was less than or equal to 5% below the minimum specified by the ERO.~~	~~The absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting was more than 5% but less than or equal to 15% below the minimum specified by the ERO.~~	~~The absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting was more than 15% but less than or equal to 25% below the minimum specified by the ERO.~~	~~The absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting was more than 25% below the minimum specified by the ERO.~~

E. Regional Variance

None

F. Associated Documents

~~Attachment A - Frequency Response Standard Supporting Document~~

~~Attachment B – Process for Adjusting Bias Setting Floor~~Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard

FRS Form 1

FRS Form 2

Frequency Response Standard Background Document

G. Version History

Version	Date	Action	Change Tracking

0	April 1, 2005	Effective Date	New
1		Complete Revision under Project 2007-12	Revision

Attachment A

BAL-003-1 Frequency Response & Frequency Bias Setting Standard

Supporting Document

Frequency Response Obligation (FRO) for the Interconnection

The ERO, in consultation with regional representatives, has established a target contingency protection criterion for each Interconnection. The default target listed in Table 1 is based on the largest category C (N-2) event identified except for the Eastern Interconnection, which uses the largest event in the last 10 years. Additionally, this contingency protection criterion includes uncertainty adjustments at a 95 % confidence level to prevent Point C from encroaching on the interconnection's highest Under Frequency Load Shed (UFLS) step for credible contingencies. The Obligation for each Interconnection in Table 1 is calculated by dividing the Target Protection Criteria MWs by 10 times the difference between the starting frequency and the Prevailing UFLS First Step. This number is then multiplied by the C to B Ratio to arrive at a MW/0.1 Hz number. In the Eastern Interconnection there is an additional adjustment for the event nadir being below the Value B due to primary frequency response withdrawal. This Interconnection Frequency Response Obligation (FRO) includes uncertainty adjustments at a 95 % confidence level. Detailed descriptions of the calculations used in Table 1 below are defined in the *Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard*.

Interconnection	Eastern	Western	ERCOT	HQ	Units
Starting Frequency	**59.974**	**59.976**	**59.963**	**59.972**	Hz
Prevailing UFLS First Step	**59.5**	**59.5**	**59.3**	**58.5**	Hz
Base Delta Frequency	**0.474**	**0.476**	**0.663**	**1.472**	Hz
CC_{ADJ}	**0.007**	**0.004**	**0.012**	**N/A**	Hz
Delta Frequency (DF_{CC})	**0.467**	**0.472**	**0.651**	**1.472**	Hz
CB_R	**1.000**	**1.625**	**1.377**	**1.550**	Hz
Delta Frequency (DF_{CBR})	**0.467**	**0.291**	**0.473**	**0.949**	Hz
BC'_{ADJ}	**0.018**	**N/A**	**N/A**	**N/A**	
Max. Delta Frequency	**0.449**	**0.291**	**0.473**	**0.949**	
Resource Contingency Criteria	**4,500**	**2,740**	**2,750**	**1,700**	MW
Credit for LR		**300**	**1,400**		MW
IFRO	**-1,002**	**-840**	**-286**	**-179**	MW/0.1 Hz

Table 1: Interconnection Frequency Response Obligations

**The Eastern Interconnection UFLS set point listed is a compromise value set midway between the stable frequency minimum established in PRC-006-1 (59.3 Hz) and the local protection UFLS setting of 59.7 Hz used in Florida and Manitoba.*

***In the Base Obligation measure for ERCOT, 1400 MW (Load Resources triggered by Under Frequency Relays at 59.70 Hz) was reduced from its Contingency Protection Criteria level of 2750 MW to get 239 MW/0.1 Hz. This was reduced to accurately account for designed response from Load Resources within 30 cycles.*

An Interconnection may propose alternate FRO protection criteria to the ERO by submitting a SAR with supporting technical documentation.

Balancing Authority Frequency Response Obligation (FRO) and Frequency Bias Setting

The ERO will manage the administrative procedure for annually assigning an FRO and implementation of the Frequency Bias Setting for each Balancing Authority. The annual timeline for all activities described in this section are shown below.

For a multiple Balancing Authority interconnection, the Interconnection Frequency Response Obligation shown in Table 1 is allocated based on the Balancing Authority annual load and annual generation. The FRO allocation will be based on the following method:

$$\mathrm{FRO_{BA}} = \mathrm{FRO_{Int}} \times \frac{\mathrm{Annual\ Gen_{BA}} + \mathrm{Annual\ Load_{BA}}}{\mathrm{Annual\ Gen_{Int}} + \mathrm{Annual\ Load_{Int}}}$$

Where:

- Annual $\mathrm{Gen_{BA}}$ is the total annual "Output of Generating Plants" within the Balancing Authority Area (BAA), on FERC Form 714, column c of Part II - Schedule 3.
- Annual $\mathrm{Load_{BA}}$ is total annual Load within the BAA, on FERC Form 714, column e of Part II - Schedule 3.
- Annual $\mathrm{Gen_{Int}}$ is the sum of all Annual $\mathrm{Gen_{BA}}$ values reported in that interconnection.
- Annual $\mathrm{Load_{Int}}$ is the sum of all Annual $\mathrm{Load_{BA}}$ values reported in that interconnection.

The data used for this calculation is from the most recently filed Form 714. As an example, a report to NERC in January 2013 would use the Form 714 data filed in 2012, which utilized data from 2011.

Balancing Authorities that are not FERC jurisdictional should use the Form 714 Instructions to assemble and submit equivalent data to the ERO for use in the FRO Allocation process.

Balancing Authorities that elect to form a FRSG will calculate a FRSG FRO by adding together the individual BA FRO's.

Balancing Authorities that elect to form a FRSG as a means to jointly meet the FRO will calculate their FRM performance one of two ways:

- Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or
- Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that that contains the sum of each participant's individual event performance.

Balancing Authorities that merge or that transfer load or generation are encouraged to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation to the Interconnection remains the same and so that CPS limits can be adjusted.

Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit their FRS Form 1.

Once the ERO reviews the data submitted in FRS Form 1 and FRS Form 2 for all Balancing Authorities, the ERO will use FRS Form 1 data to post the following information for each Balancing Authority for the upcoming year:

- Frequency Bias Setting
- Frequency Response Obligation (FRO)

Once the data listed above is fully posted, the ERO will announce the three-day implementation period for changing the Frequency Bias Setting if it differs from that shown in the timeline below.

A BA using a fixed Frequency Bias Setting sets its Frequency Bias Setting to the greater of (in absolute value):

- Any number the BA chooses between 100% and 125% of its Frequency Response Measure as calculated on FRS Form 1
- Interconnection Minimum as determined by the ERO

For purposes of calculating the minimum Frequency Bias Setting, a Balancing Authority participating in a Frequency Response Sharing Group will need to calculate its stand-alone Frequency Response Measure using FRS Form 1 and FRS Form 2 to determine its minimum Frequency Bias Setting.

A Balancing Authority providing Overlap Regulation will report the historic peak demand and generation of its combined BAs' areas on FRS Form 1 as described in Requirement R4.

There are occasions when changes are needed to Bias Settings outside of the normal schedule. Examples are footprint changes between Balancing Authorities and major changes in load or generation or the formation of new Balancing Authorities. In such cases the changing Balancing Authorities will

work with their Regions, NERC and the Resources Subcommittee to confirm appropriate changes to Bias Settings, FRO, CPS limits and Inadvertent Interchange balances.

If there is no net change to the Interconnection total Bias, the Balancing Authorities involved will agree on a date to implement their respective change in Bias Settings. The Balancing Authorities and ERO will also agree to the allocation of FRO such that the sum remains the same.

If there is a net change to the Interconnection total Bias, this will cause a change in CPS2 limits and FRO for other Balancing Authorities in the Interconnection. In this case, the ERO will notify the impacted Balancing Authorities of their respective changes and provide an implementation window for making the Bias Setting changes.

Frequency Response Measure (FRM)

The Balancing Authority will calculate its FRM from Single Event Frequency Response Data (SEFRD), defined as: "the data from an individual event from a Balancing Authority that is used to calculate its Frequency Response, expressed in MW/0.1Hz" as calculated on FRS Form 2 for each event shown on FRS Form 1. The events in FRS Form 1 are selected by the ERO using the *Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard*. The SEFRD for a typical Balancing Authority in an Interconnection with more than one Balancing Authority is basically the change in its Net Actual Interchange on its tie lines with its adjacent Balancing Authorities divided by the change in Interconnection frequency. (Some Balancing Authorities may choose to apply corrections to their Net Actual Interchange (NA_I) values to account for factors such as nonconforming loads. FRS Form 1 and 2 shows the types of adjustments that are allowed. Note that with the exception of the Contingent BA column, any adjustments made must be made for all events in an evaluation year. As an example, if an entity has non-conforming loads and makes an adjustment for one event, all events must show the non-conforming load, even if the non-conforming load does not impact the calculation. This ensures that the reports are not utilizing the adjustments only when they are favorable to the BA.) The ERO will use a standardized sampling interval of approximately 16 seconds before the event up to the time of the event for the pre-event NA_I, and frequency (A values) and approximately 20 to 52 seconds after the event for the post-event NA_I (B values) in the computation of SEFRD values, dependent on the data scan rate of the Balancing Authority's Energy Management System (EMS).

All events listed on FRS Form 1 need to be included in the annual submission of FRS Forms 1 and 2. The only time a Balancing Authority should exclude an event is if its tie-line data or its Frequency data is corrupt or its EMS was unavailable. FRS Form 2 has instructions on how to correct the BA's data if the given event is internal to the BA or if other authorized adjustments are used.

Assuming data entry is correct FRS Form 1 will automatically calculate the Balancing Authority's FRM for the past 12 months as the median of the SEFRD values. A Balancing Authority electing to report as an FRSG or a provider of Overlap Regulation Service will provide an FRS Form 1 for the aggregate of its participants.

To allow Balancing authorities to plan its operations, events with a “Point C” that cause the Interconnection Frequency to be lower than that shown in Table 1 above (for example, an event in the Eastern Interconnection that causes the Interconnection Frequency to go to 59.4 Hz) or higher than an equal change in frequency going above 60 Hz may be included in the list of events for that interconnection. However, the calculation of the BA response to such an event will be adjusted to show a frequency change only to the Target Minimum Frequency shown in Table 1 above (in the previous example this adjustment would cause Frequency to be shown as 59.5 Hz rather than 59.4 HZ) or a high frequency amount of an equal quantity. Should such an event happen, the ERO will provide additional guidance.

Timeline for Balancing Authority Frequency Response and Frequency Bias Setting Activities

Described below is the timeline for the exchange of information between the ERO and Balancing Authorities (BA) to:

- Facilitate the assignment of BA Frequency Response Obligations (FRO)
- Calculate BA Frequency Response Measures (FRM)
- Determine BA Frequency Bias Settings (FBS)

Target Date	Activity
April 30	The ERO reviews candidate frequency events and selects frequency events for the first quarter (December to February).
May 10	Form1 is posted with selected events from the first quarter for BA usage by the ERO.
May 15	The BAs receive a request to provide load and generation data as described in Attachment A to support FRO assignments and determining minimum FBS for BAs.
July 15	The BAs provide load and generation data as described in Attachment A to the ERO.
July 30	The ERO reviews candidate frequency events and selects frequency events for the second quarter (March to May).
August 10	Form1 is posted with selected events from the first and second quarters for BA usage by the ERO.
October 30	The ERO reviews candidate frequency events and selects frequency events for the third quarter (June to August)
November 10	Form1 is posted with selected events from the first, second, and third quarters for BA usage by the ERO.
November 20	If necessary, the ERO provides any updates to the necessary Frequency Response.
November 20	The ERO provides the fractional responsibility of each BA for the Interconnection's FRO and Minimum FBS to the BAs.
January 30	The ERO reviews candidate frequency events and selects frequency events for the fourth quarter (September to November).

2nd business day in February	Form1 is posted with all selected events for the year for BA usage by the ERO.
February 10	The ERO assigns FRO values to the BAs for the upcoming year.
March 7	BAs complete their frequency response sampling for all four quarters and their FBS calculation, returning the results to the ERO.
March 24	The ERO validates FBS values, computes the sum of all FBS values for each Interconnection, and determines L10 values for the CPS 2 criterion for each BA as applicable.
Any time during first 3 business days of April (unless specified otherwise by the ERO)	The BA implements any changes to their FBS and L10 value.

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Implementation Plan for BAL-003-1 – Frequency Response & Frequency Bias Setting Standard

Prerequisite Approvals

There are no other reliability standards or Standard Authorization Requests (SARs), in progress or approved, that must be implemented before this standard can be implemented.

Modified Standards

BAL-003-0.1b should be retired at midnight of the day immediately prior to the Effective Date of BAL-003-1 in the Jurisdiction in which the new standard is becoming effective.

New or Modified Definitions

The following definitions shall become effective when BAL-003-1 Requirements R2, R3, R4 and R5 become effective:

Frequency Response Measure (FRM): The median of all the Frequency Response observations reported annually on FRS Form 1.

Frequency Response Obligation (FRO): The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection.

Frequency Bias Setting: A number~~value~~, either fixed or variable, usually expressed in MW/0.1 Hz, included in~~set into~~ a Balancing Authority's Area Control Error equation to account for ~~algorithm that allows~~ the Balancing Authority's Frequency Response contribution~~to contribute its frequency response~~ to the Interconnection and discourage withdrawal through secondary control systems.

The existing definition of Frequency Bias Setting should be retired at midnight of the day immediately prior to the Effective Date of BAL-003-1 in the Jurisdiction in which the new standard is becoming effective.

The proposed revised definition for "Frequency Bias Setting" is incorporated in the following NERC approved standards:

- BAL-001-0.1a Real Power Balancing Control Performance
- BAL-004-0 Time Error Correction
- BAL-004-1 Time Error Correction
- BAL-005-0.1b Automatic Generation Control

Compliance with Standards

Once this standard becomes effective, the responsible entities identified in the applicability section of the standard must comply with the requirements. These include:

- Balancing Authorities
- Reserve Sharing Groups

Proposed Effective Date

Compliance with BAL-003-1 shall be implemented over a two-year period, as follows:

- In those jurisdictions where regulatory approval is required, Requirements R2, R3, R4 and R5 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R2, R3, R4 and R5 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after Board of Trustees adoption.

- In those jurisdictions where regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after Board of Trustees adoption.

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Implementation Plan for BAL-003-1 – Frequency Response & Frequency Bias Setting Standard

Prerequisite Approvals

There are no other reliability standards or Standard Authorization Requests (SARs), in progress or approved, that must be implemented before this standard can be implemented.

Modified Standards

BAL-003-0.1b ~~Requirements R1, R2, R3, R4 and R6~~ should be retired midnight of the day immediately prior to the Effective Date of~~when~~ BAL-003-1 in the Jurisdiction in which the new standard is becoming ~~becomes~~ effective.

~~BAL-003-0 Re1quirement R5 should be retired as outlined in the following table.~~

~~For those Balancing Authorities that serve native load:~~

- ~~May 2011 through December 2011 -0.8% of peak/0.1 Hz~~
- ~~January 2012 through December 2012 -0.6% of peak/0.1 Hz~~
- ~~January 2013 through December 2013 -0.4% of peak/0.1 Hz~~
- ~~January 2014 through December 2014 -0.2% of peak/0.1 Hz~~
- ~~January 2015 through -0.0% of peak/0.1 Hz~~

~~For those Balancing Authorities that do not serve native load:~~

- ~~May 2011 through December 2011 -0.8% of upcoming years maximum generation/0.1 Hz~~
- ~~January 2012 through December 2012 -0.6% of upcoming years maximum generation/0.1 Hz~~
- ~~January 2013 through December 2013 -0.4% of upcoming years maximum generation/0.1 Hz~~
- ~~January 2014 through December 2014 -0.2% of upcoming years maximum generation/0.1 Hz~~
- ~~January 2015 through -0.0% of upcoming years maximum generation/0.1 Hz~~

~~The FRR drafting team, NERC and the NERC Resources Subcommittee will observe the impact on frequency and will implement a reversion plan should frequency performance decline.~~

New or Modified Definitions

The following definitions shall become effective when BAL-003-1 Requirements R2, R3, R4 and R5 become effective:

116-390 Village Boulevard, Princeton, New Jersey 08540-5721
Phone: 609.452.8060 ▪ Fax: 609.452.9550 ▪ www.nerc.com

Frequency Response Measure (FRM): The median of all the Frequency Response observations reported annually on FRS Form 1.

Frequency Response Obligation (FRO): The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection.

Frequency Bias Setting: A number, either a fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems.

The existing definition of Frequency Bias Setting should be retired midnight of the day immediately prior to the Effective Date of BAL-003-1 in the Jurisdiction in which the new standard is becoming effective.

The proposed revised definition for "Frequency Bias Setting" is incorporated in the following NERC approved standards:

- BAL-001-0.1a Real Power Balancing Control Performance
- BAL-004-0 Time Error Correction
- BAL-004-1 Time Error Correction
- BAL-005-0.1b Automatic Generation Control

Compliance with Standards

Once this standard becomes effective, the responsible entities identified in the applicability section of the standard must comply with the requirements. These include:

- Balancing Authorities
- Reserve Sharing Groups

Proposed Effective Date

Compliance with BAL-003-1 shall be implemented over a two-year period, as follows:

- In those jurisdictions where regulatory approval is required, Requirements R2~~1~~, R3, R4 and R5~~4~~ of this standard shall become effective the first calendar day of the first calendar quarter 12 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R2~~1~~, R3, R4 and R5~~4~~ of this standard shall become effective the first calendar day of the first calendar quarter 12 months after Board of Trustees adoption.
- In those jurisdictions where regulatory approval is required, Requirements R1~~2~~ of this standard shall become effective the first calendar day of the first calendar quarter 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R1~~2~~ of this standard shall become effective the first calendar day of the first calendar quarter 24 months after Board of Trustees adoption.

Event Selection Process

This procedure outlines the ERO process for supporting the Frequency Response Standard (FRS). A Procedure revision request may be submitted to the ERO for consideration. The revision request must provide a technical justification for the suggested modification. The ERO shall post the suggested modification for a 45-day comment period and discuss the revision request in a public meeting. The ERO will make a recommendation to the NERC BOT, which may adopt the revision request, reject it, or adopt it with modifications. Any approved revision to this Procedure shall be filed with FERC for informational purposes.

Event Selection Objectives

The goals of this procedure are to outline a transparent, repeatable process to annually identify a list of frequency events to be used by Balancing Authorities (BA) to calculate their Frequency Response to determine:

- Whether the BA met its Frequency Response Obligation, and
- An appropriate fixed Bias Setting.

Event Selection Criteria

1. The ERO will use the following criteria to select FRS frequency excursion events for analysis. The events that best fit the criteria will be used to support the FRS. The evaluation period for performing the annual Frequency Bias Setting and the Frequency Response Measure (FRM) calculation is December 1 of the prior year through November 30 of the current year.
2. The ERO will identify 20 to 35 frequency excursion events in each Interconnection for calculating the Frequency Bias Setting and the FRM. If the ERO cannot identify 20 frequency excursion events in a 12 month evaluation period satisfying the criteria below, then similar acceptable events from the subsequent year's evaluation period will be included with the data set by the ERO for determining FRS compliance. This is described later.
3. The ERO will use three criteria to determine if an acceptable frequency excursion event for the FRM has occurred:
    a. The change in frequency as defined by the difference from the A Value to Point C and the arrested frequency Point C exceeds the excursion threshold values specified for the Interconnection in Table 1 below.
        i. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline.
        ii. Point C is the arrested value of frequency observed within 12 seconds following the start of the excursion.

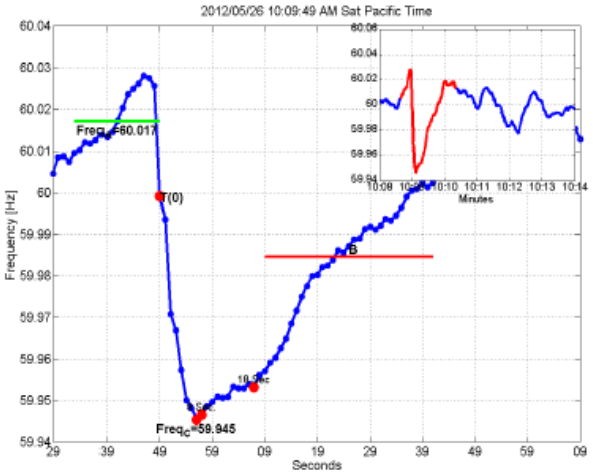
Interconnection	A Value to Pt C	Point C (Low)	Point C (High)
East	0.04Hz	< 59.96	> 60.04
West	0.07Hz	< 59.95	> 60.05
ERCOT	0.15Hz	< 59.90	> 60.10
HQ	0.30Hz	< 59.85	> 60.15

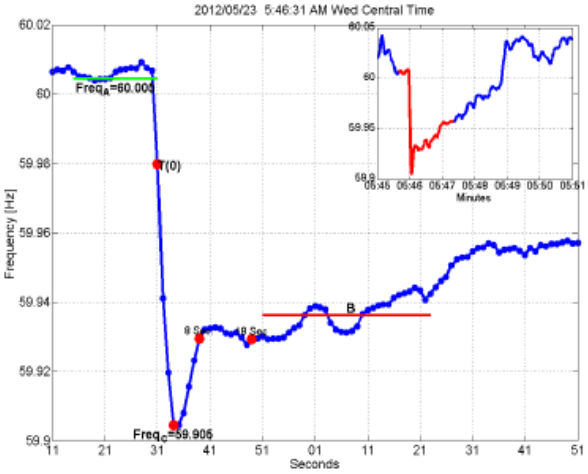
Table 1: Interconnection Frequency Excursion Threshold Values

b. The time from the start of the rapid change in frequency until the point at which Frequency has stabilized within a narrow range should be less than 18 seconds.

c. If any data point in the B Value average recovers to the A Value, the event will not be included.

4. Pre-disturbance frequency should be relatively steady and near 60.000 Hz for the A Value. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline. For example, given the choice of the two events below, the one on the right is preferred as the pre-disturbance frequency is stable and also closer to 60 Hz.





5. Excursions that include 2 or more events that do not stabilize within 18 seconds will not be considered.

6. Frequency excursion events occurring during periods when large interchange schedule ramping or load change is happening, and frequency excursion events occurring within 5 minutes of the top of the hour, will be excluded from consideration if other acceptable frequency excursion events from the same quarter are available.

7. The ERO will select the largest (A Value to Point C) 2 or 3 frequency excursion events occurring each month. If there are not 2 frequency excursion events satisfying the selection criteria in a month, then other frequency excursion events should be picked in the following sequence:

a. From the same event quarter of the year.

b. From an adjacent month.

c. From a similar load season in the year (shoulder vs. summer/winter)

d. The largest unused event.

As noted earlier, if a total of 20 events are not available in an evaluation year, then similar acceptable events from the next year's evaluation period will be included with the data set by the ERO for determining Frequency Response Obligation (FRO) compliance. The first year's small set of data will be reported and used for Bias Setting purposes, but compliance evaluation on the FRO will be done using a 24 month data set.

To assist Balancing Authority preparation for complying with this standard, the ERO will provide quarterly posting of candidate frequency excursion events for the current year FRM calculation. The ERO will post the final list of frequency excursion events used for standard compliance as specified in Attachment A of BAL-003-1. The following is a general description of the process that the ERO will use to ensure that BAs can evaluate events during the year in order to monitor their performance throughout the year.

Monthly

Candidate events will be initially screened by the "Frequency Event Detection Methodology" shown on the following link located on the NERC Resources Subcommittee area of the NERC website: http://www.nerc.com/docs/oc/rs/Frequency_Event_Detection_Methodology_and_Criteria_Oct_2011.pdf. Each month's list will be posted by the end of the following month on the NERC website, http://www.nerc.com/filez/rs.html and listed under "Candidate Frequency Events".

Quarterly

The monthly event lists will be reviewed quarterly with the quarters defined as:

- December through February
- March through May
- June through August
- September through November

Based on criteria established in the "*Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard",* events will be selected to populate the FRS Form 1 for each Interconnection. The Form 1's will be posted on the NERC website, in the Resources Subcommittee area under the title "Frequency Response Standard Resources". Updated Form 1's will be posted at the end of each quarter listed above after a review by the NERC RS' Frequency Working Group. While the events on this list are expected to be final, as outlined in the selection criteria, additional events may be considered, if the

number of events throughout the year do not create a list of at least 20 events. It is intended that this quarterly posting of updates to the FRS Form 1 would allow BAs to evaluate the events throughout the year, lessening the burden when the yearly posting is made.

Annually

The final FRS Form 1 for each Interconnection, which would contain the events from all four quarters listed above, will be posted as specified in Attachment A. Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO as specified in Attachment A using the final FRS Form 1. The ERO will check for errors and use the FRS Form 1 data to calculate CPS limits and FROs for the upcoming year.

Once the data listed above is fully reviewed, the ERO may adjust the implementation specified in Attachment A for changing the Frequency Bias Settings and CPS limits. This allows flexibility in when each BA implements its settings.

Process for Adjusting Interconnection Minimum Frequency Bias Setting

This procedure outlines the process the ERO is to use for modifying minimum Frequency Bias Settings to better meet reliability needs. The ERO will adjust the Frequency Bias Setting minimum in accordance with this procedure.

The ERO will post the minimum Frequency Bias Setting values on the ERO website along with other balancing standard limits.

Under BAL-003-1, the minimum Frequency Bias Settings will be moved toward the natural Frequency Response in each interconnection. In the first year, the minimum Frequency Bias Setting for each interconnection is shown in Table 2 below. Each Interconnection Minimum Frequency Bias Setting is based on the sum of the non-coincident peak loads for each BA from the currently available FERC 714 Report or equivalent. This non-coincident peak load sum is multiplied by the percentage shown in Table 1 to get the Interconnection Minimum Frequency Bias Setting. The Interconnection Minimum Frequency Bias Setting is allocated among the BAs on an interconnection using the same allocation method as is used for the allocation of the Frequency Response Obligation (FRO).

Interconnection	Interconnection Minimum Frequency Bias Setting (in MW/0.1Hz)
Eastern	0.9% of non-coincident peak load
Western	0.9% of non-coincident peak load
ERCOT*	N/A
HQ*	N/A

Table 2. Frequency Bias Setting Minimums

*The minimum Frequency Bias Setting requirement does not apply to a Balancing Authority that is the only Balancing Authority in its Interconnection. These Balancing Authorities are solely responsible for providing reliable frequency control of their Interconnection. These Balancing Authorities are responsible for converting frequency error into a megawatt error to provide reliable frequency control, and the imposition of a minimum bias setting greater than the magnitude the Frequency Response Obligation may have the potential to cause control system hunting, and instability in the extreme.

The ERO, in coordination with the regions of each interconnection, will annually review Frequency Bias Setting data submitted by BAs. If an Interconnection's total minimum Frequency Bias Setting exceeds (in absolute value) the Interconnection's total natural Frequency Response by more (in absolute value) than 0.2 percentage points of peak load (expressed in MW/0.1Hz), the minimum Frequency Bias Setting for BAs within that Interconnection may be reduced (in absolute value) based on the technical evaluation and consultation with the regions affected by 0.1 percentage point of peak load (expressed in MW/0.1Hz) to better match that Frequency Bias Setting and natural Frequency Response.

The ERO, in coordination with the regions of each Interconnection, will monitor the impact of the reduction of minimum frequency bias settings, if any, on frequency performance, control performance,

and system reliability. If unexpected and undesirable impacts such as, but not limited to, sluggish post-contingency restoration of frequency to schedule or control performance problems occur, then the prior reduction in the minimum frequency bias settings may be reversed, and/or the prospective reduction based on the criterion stated above may not be implemented.

Interconnection Frequency Response Obligation Methodology

This procedure outlines the process the ERO is to use for determining the Interconnection Frequency Response Obligation (IFRO).

The following are the formulae that comprise the calculation of the IFROs.

$$DF_{Base} = F_{Start} - UFLS$$

$$DF_{CC} = DF_{Base} - CC_{Adj}$$

$$DF_{CBR} = \frac{DF_{CC}}{CB_R}$$

$$MDF = DF_{CBR} - BC'_{Adj}$$

$$ARLPC = RLPC - CLR$$

$$IFRO = \frac{ARLPC}{MDF}$$

Where:

- DF_{Base} is the base delta frequency.
- F_{Start} is the starting frequency determined by the statistical analysis.
- UFLS is the highest UFLS trip setpoint for the interconnection.
- CC_{Adj} is the adjustment for the differences between 1-second and sub-second Point C observations for frequency events. A positive value indicates that the sub-second C data is lower than the 1-second data.
- DF_{CC} is the delta frequency adjusted for the differences between 1-second and sub-second Point C observations for frequency events.
- CB_R is the statistically determined ratio of the Point C to Value B.
- DF_{CBR} is the delta frequency adjusted for the ratio of the Point C to Value B.
- BC'_{ADJ} is the statistically determined adjustment for the event nadir being below the Value B (Eastern Interconnection only) during primary frequency response withdrawal.
- MDF is the maximum allowable delta frequency.
- RLPC is the resource loss protection criteria.
- CLR is the credit for load resources.
- ARLPC is the adjusted resource loss protection criteria adjusted for the credit for load resources.
- IFRO is the interconnection frequency response obligation.

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Frequency Response Standard Background Document

October, 2012

RELIABILITY | ACCOUNTABILITY




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Table of Contents

Introduction

This document provides background on the development, testing and implementation of BAL-003-1 - Frequency Response Standard (FRS).[1] The intent is to explain the rationale and considerations for the Requirements of this standard and their associated compliance information. The document also provides good practices and tips for Balancing Authorities ("BAs") with regard to Frequency Response.

In Order No. 693, the Federal Energy Regulatory Commission ("FERC" or the "Commission") directed additional changes to BAL-003.[2] This document explains how compliance with those directives is met by BAL-003-1.

The original Standards Authorization Request ("SAR"), finalized on June 30, 2007, assumed there was adequate Frequency Response in all the North American Interconnections. The goal of the SAR was to update the Standard to make the measurement process of frequency response more objective and to provide this objective data to Planners and Operators for improved modeling. The updated models will improve understanding of the trends in Frequency Response to determine if reliability limits are being approached. The Standard would also lay the process groundwork for a transition to a performance-based Standard if reliability limits are approached.

This document will be periodically updated by the FRS Drafting Team (FRSDT) until the Standard is approved. Once approved, this document will then be maintained and updated by the ERO and the NERC Resources Subcommittee to be used as a reference and training resource.

Background

This section discusses the different components of frequency control and the individual components of Primary Frequency Control also known as Frequency Response.

Frequency Control

Most system operators generally have a good understanding of frequency control and Bias Setting as outlined in the balancing standards and the references to them in the NERC Operating Manual. Frequency control can be divided into four overlapping windows of time as outlined below.

> **Primary Frequency Control (Frequency Response) –** Actions provided by the Interconnection to arrest and stabilize frequency in response to frequency deviations. Primary Control comes from automatic generator governor response (also known as speed

[1] Unless otherwise designated herein, all capitalized terms shall have the meaning set forth in the Glossary of Terms Used in NERC Reliability Standards, available here: http://www.nerc.com/files/Glossary_of_Terms.pdf.

[2] *Mandatory Reliability Standards for the Bulk-Power System*, Order No. 693, FERC Stats. & Regs. ¶ 31,242 at PP 368-375, *order on reh'g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007).

regulation), load response (typically from motors), and other devices that provide an immediate response based on local (device-level) control systems.

Secondary Frequency Control – Actions provided by an individual BA or its Reserve Sharing Group to correct the resource – load unbalance that created the original frequency deviation, which will restore both Scheduled Frequency and Primary Frequency Response. Secondary Control comes from either manual or automated dispatch from a centralized control system.

Tertiary Frequency Control – Actions provided by Balancing Authorities on a balanced basis that are coordinated so there is a net zero effect on Area Control Error (ACE). Examples of Tertiary Control include dispatching generation to serve native load; economic dispatch; dispatching generation to affect Interchange; and re-dispatching generation. Tertiary Control actions are intended to replace Secondary Control Response by reconfiguring reserves.

Time Control includes small offsets to scheduled frequency to keep long term average frequency at 60 Hz.

Primary Frequency Control – Frequency Response

Primary Frequency Control, also known generally as **Frequency Response**, is the first stage of overall frequency control and is the response of resources and load to a locally sensed change in frequency in order to arrest that change in frequency. Frequency Response is automatic, not driven by any centralized system, and begins within seconds rather than minutes. Different resources, loads, and systems provide Frequency Response with different response times, based on current system conditions such as total resource/load and their respective mix.

The proposed NERC Glossary of Terms defines **Frequency Response** as:

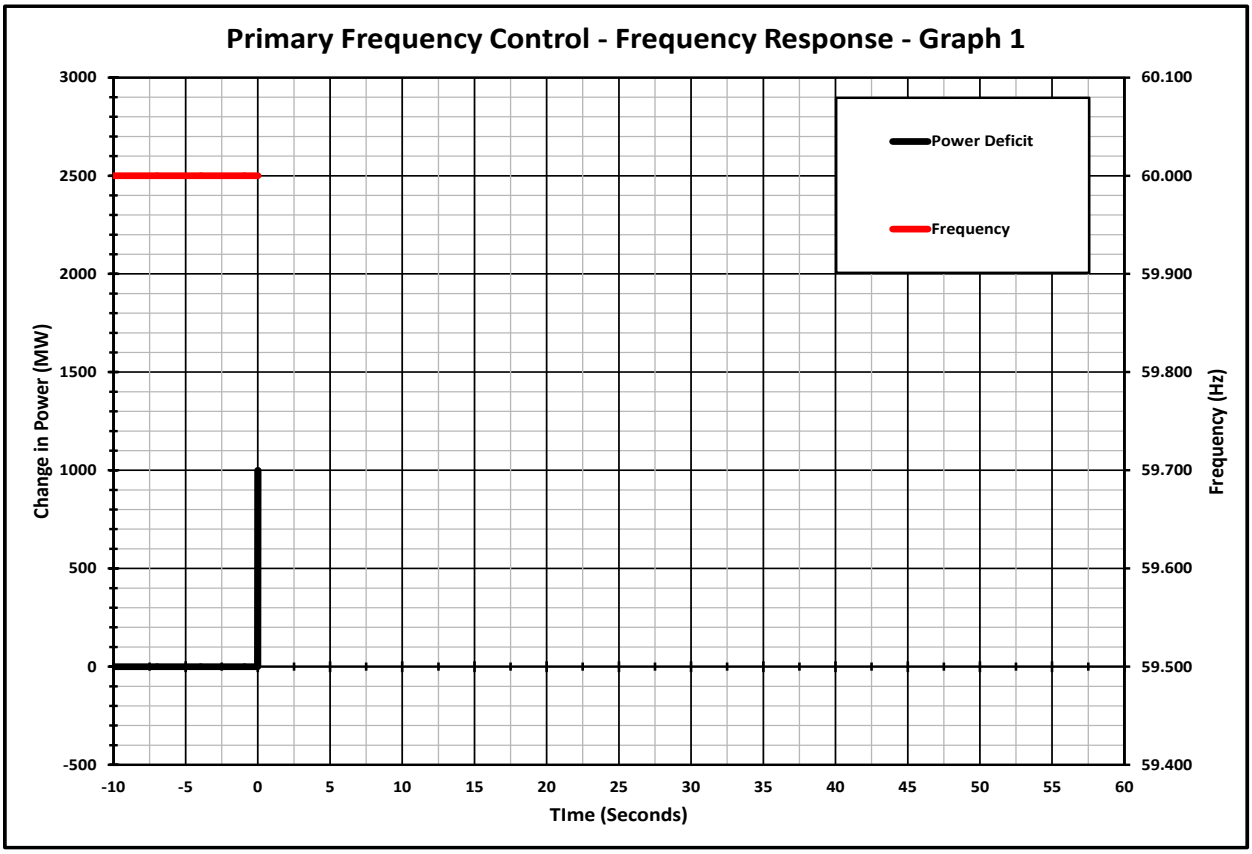
- (Equipment) The immediate and automatic reaction or response of power from a system or power from elements of the system to a change in locally sensed system frequency.
- (System) The sum of the change in demand, and the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 Hertz (MW/0.1 Hz).

As noted above, Frequency Response is the characteristic of load and generation within Balancing Authorities and Interconnections. It reacts or responds with changes in power to attempt changes in load-resource balance that result in changes to system frequency. Because the loss of a large generator is much more likely than a sudden loss of an equivalent amount of load, Frequency Response is typically discussed in the context of a loss of a large generator. Included within Frequency Response are many components of that response. Understanding Frequency Response and the FRS requires an understanding of each of these components and how they relate to each other.

Frequency Response Illustration

The following simple example is presented to illustrate the components of Frequency Response in graphical form. It includes a series of seven graphs that illustrate the various components of

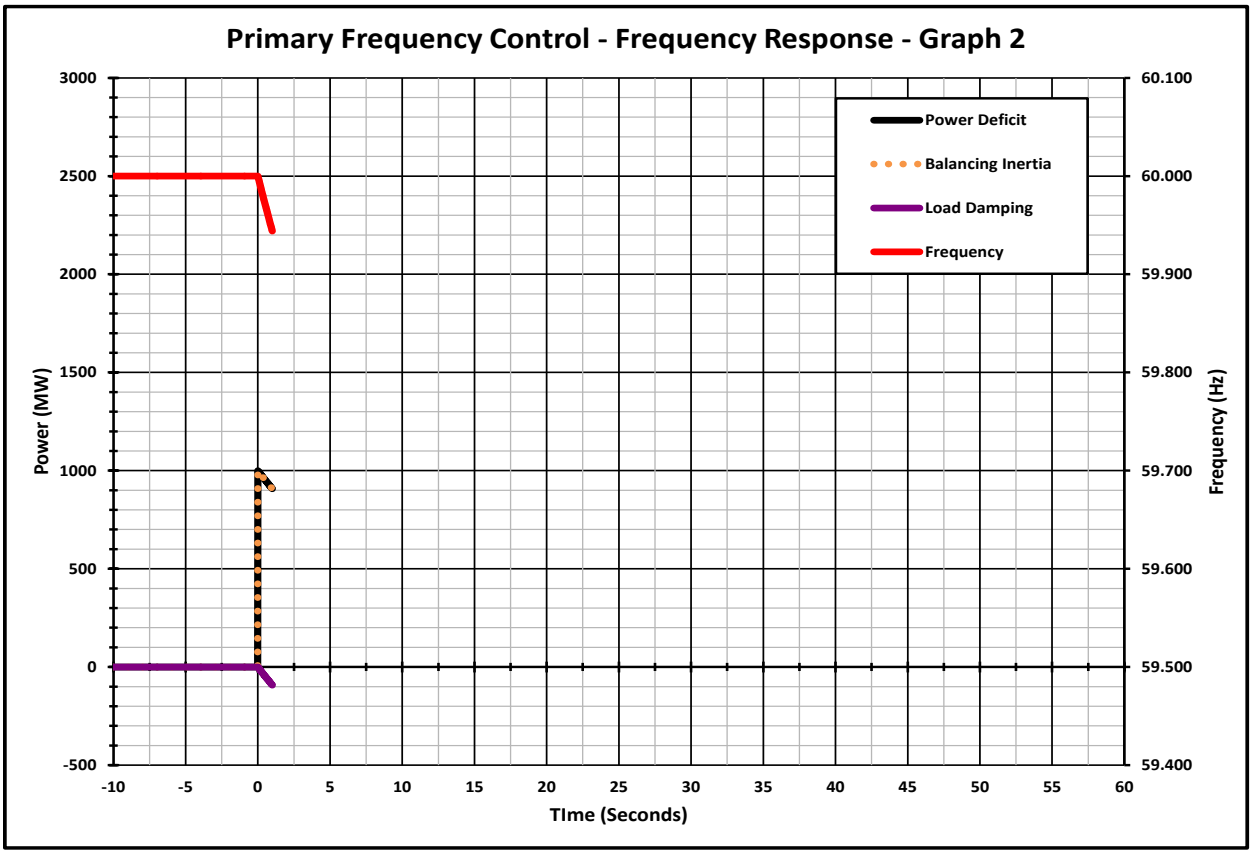
Frequency Response and a brief discussion of each describing how these components react to attempted changes in the load-resource balance and resulting changes in system frequency. The illustration is based on an assumed Disturbance event of the sudden loss of 1000 MW of generation. Although a large event is used to illustrate the response components, even small frequently occurring events will result in similar reactions or responses. The magnitude of the event only affects the shape of the curves on the graph; it does not obviate the need for Frequency Response.



The first graph, Primary Frequency Control – Frequency Response – Graph 1, presents a sudden loss of generation of 1000 MW. The components are presented relative to time as shown on the horizontal Time axis in seconds. This simplified example assumes a Disturbance event of the sudden loss of generation resulting from a breaker trip that instantaneously removes 1000 MW of generation from the interconnection. This sudden loss is illustrated by the power deficit line shown in black using the MW scale on the left. Interconnection frequency is illustrated by the frequency line shown in red using the Hertz scale on the right. Since the Scheduled Frequency is normally 60 Hz, it is assumed that this is the frequency when the Disturbance event occurs.

Even though the generation has tripped and power injected by the generator has been removed from the interconnection, the loads continue to use the same amount of power. The

"Law of Conservation of Energy"[3] requires that the 1000 MW must be supplied to the interconnection if energy balance is to be "conserved". This additional 1000 MW of power is produced by extracting kinetic energy that was stored in the rotating mass of all of the synchronized generators and motors on the interconnection when they were increased from zero to synchronous speed – essentially using this equipment as a giant flywheel. The extracted energy supplies the "balancing inertia"[4] power required to maintain the power and energy balance on the interconnection. This balancing inertia power is produced by the generators' spinning inertial mass' resistance to the slowdown in speed of the rotating equipment on the interconnection that both provides the stored kinetic energy and reduces the frequency of the interconnection. This is illustrated in the second graph, Primary Frequency Control – Frequency Response – Graph 2, by the orange dots representing the balancing inertia power that exactly overlay and offset the power deficit.



As the frequency decreases, synchronized motors slow, as does the work they are providing, resulting in a decrease in load called "load damping." This load damping is the reason that the power deficit initially declines. Synchronously operated motors will contribute to load damping. Variable speed drives that are decoupled from the interconnection frequency do not

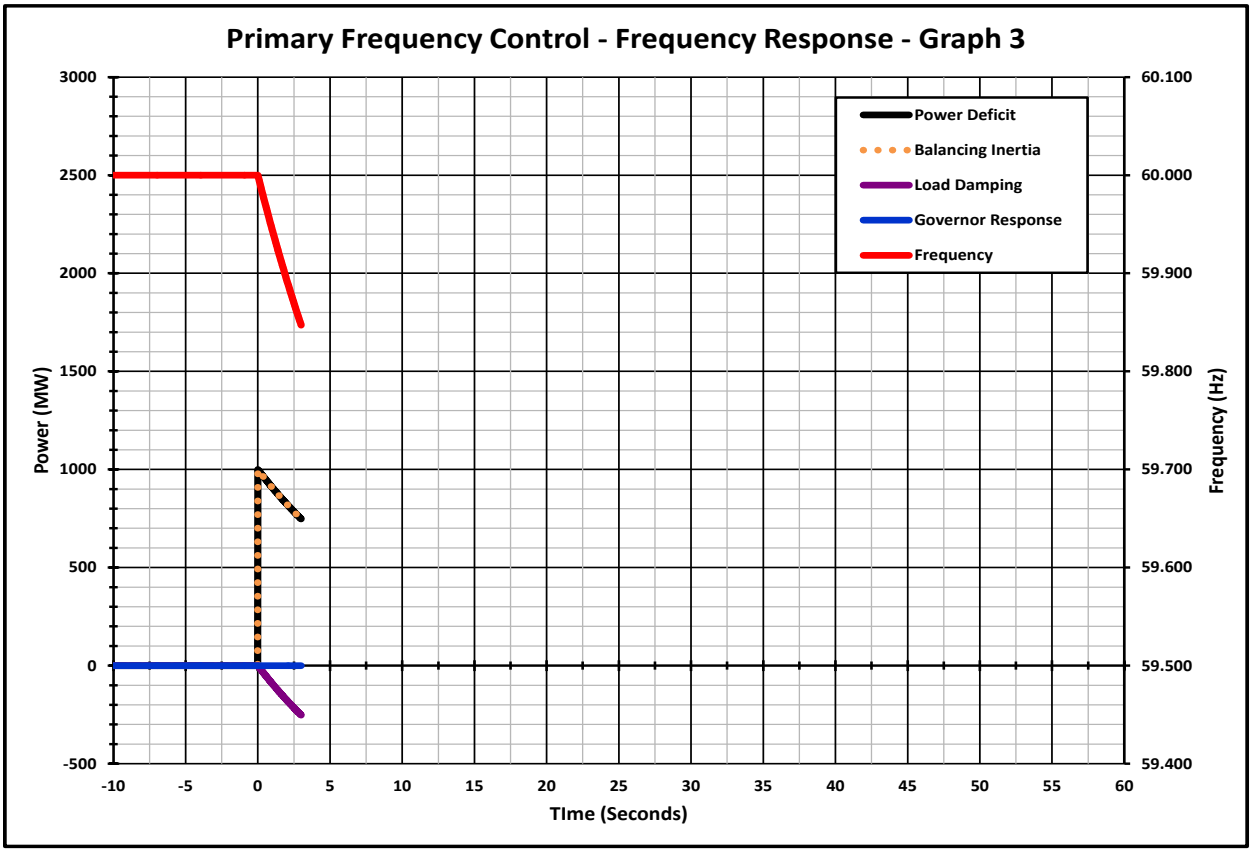
[3] The "Law of Conservation of Energy" is applied here in the form of power. If energy must be conserved, then power which is the first derivative of energy with respect to time, must also be conserved.

[4] The term "balancing Inertia" is coined here from the terms "inertial frequency response" and "balancing energy". Inertial frequency response is a common term used to describe the power supplied for this portion of the frequency response and balancing energy is a term used to describe the market energy supposedly purchased to restore energy balance.

contribute to load damping. In general, any load that does not change with interconnection frequency including resistive load will not contribute to load damping or Frequency Response.

It is important to note that the power deficit equals exactly the balancing inertia, indicating that there is no power or energy imbalance at any time during this process. What is normally considered as "balancing power or energy" is actually power or energy required to correct the frequency error from scheduled frequency. Any apparent power or energy imbalance is corrected instantaneously by the balancing inertia power and energy extracted from the interconnection. Thus the balancing function is really a frequency control function described as a balancing function because ACE is calculated in MWs instead of Hertz, frequency error.

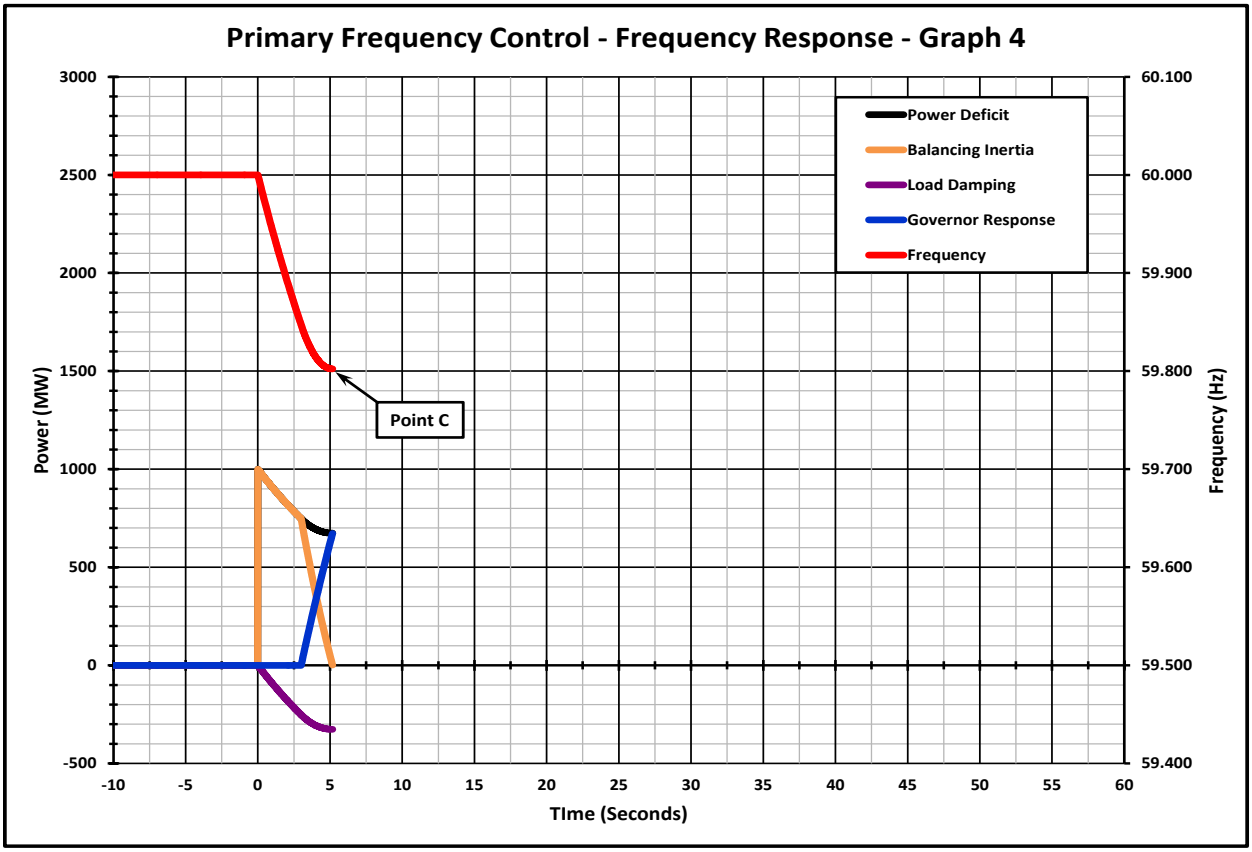
During the initial seconds of the Disturbance event, the governors have yet to respond to the frequency decline. This is illustrated with the Blue line on the third graph, Primary Frequency Control – Frequency Response – Graph 3, showing Governor Response. This time delay results from the time that it takes the controller to adjust the equipment and the time it takes the mass to flow from the source of the energy (main steam control valve for steam turbines, the combustor for gas turbines, or the gate valve for hydro turbines) to the turbine-generator blades where the power is converted to electrical energy.



Note that the frequency continues to decline due to the ongoing extraction by balancing inertia power of energy from the rotating turbine-generators and synchronous motors on the interconnection. The reduction in load also continues as the effect of load damping continues

to reduce the load while frequency declines. During this time delay (before the governor response begins) the balancing inertia limits the rate of change of frequency.

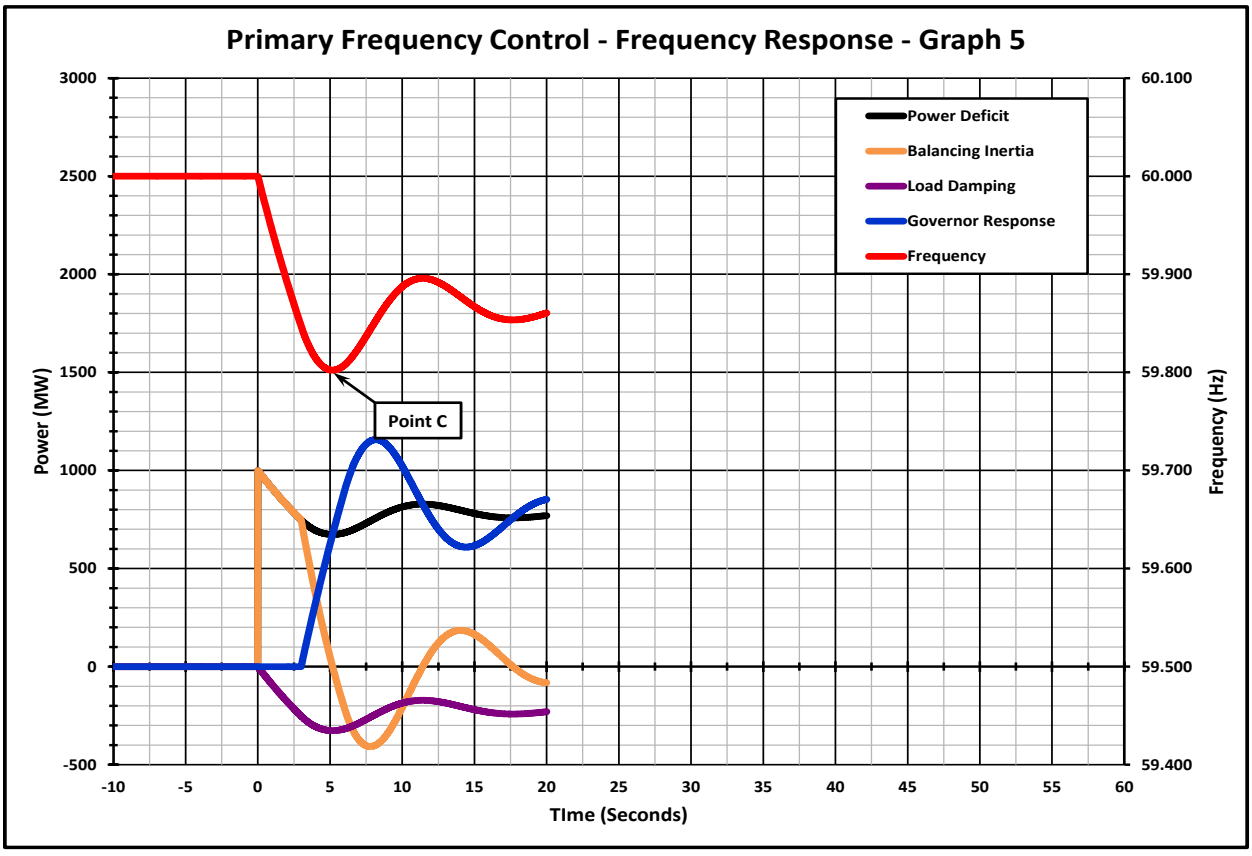
After a short time delay, the governor response begins to increase rapidly in response to the initial rapid decline in frequency, as illustrated on the fourth graph, Primary Frequency Control – Frequency Response – Graph 4. Governor response exactly offsets the power deficit at the point in time that the frequency decline is arrested. At this point in time, the balancing inertia has provided its contribution to reliability and its power contribution is reduced to zero as it is replaced by the governor response. If the time delay associated with the delivery of governor response is reduced, the amount of balancing inertia required to limit the change in frequency by the Disturbance event can also be reduced. This supports the conclusion that balancing inertia is required to manage the time delays associated with the delivery of Frequency Response. Not only is the rapid delivery of Frequency Response important, but the shortening of the time delay associated with its delivery is also important. Therefore, two important components of Frequency Response are 1) how long the time delay is before the initial delivery of response begins; and 2) how much of the response is delivered before the frequency change is arrested.



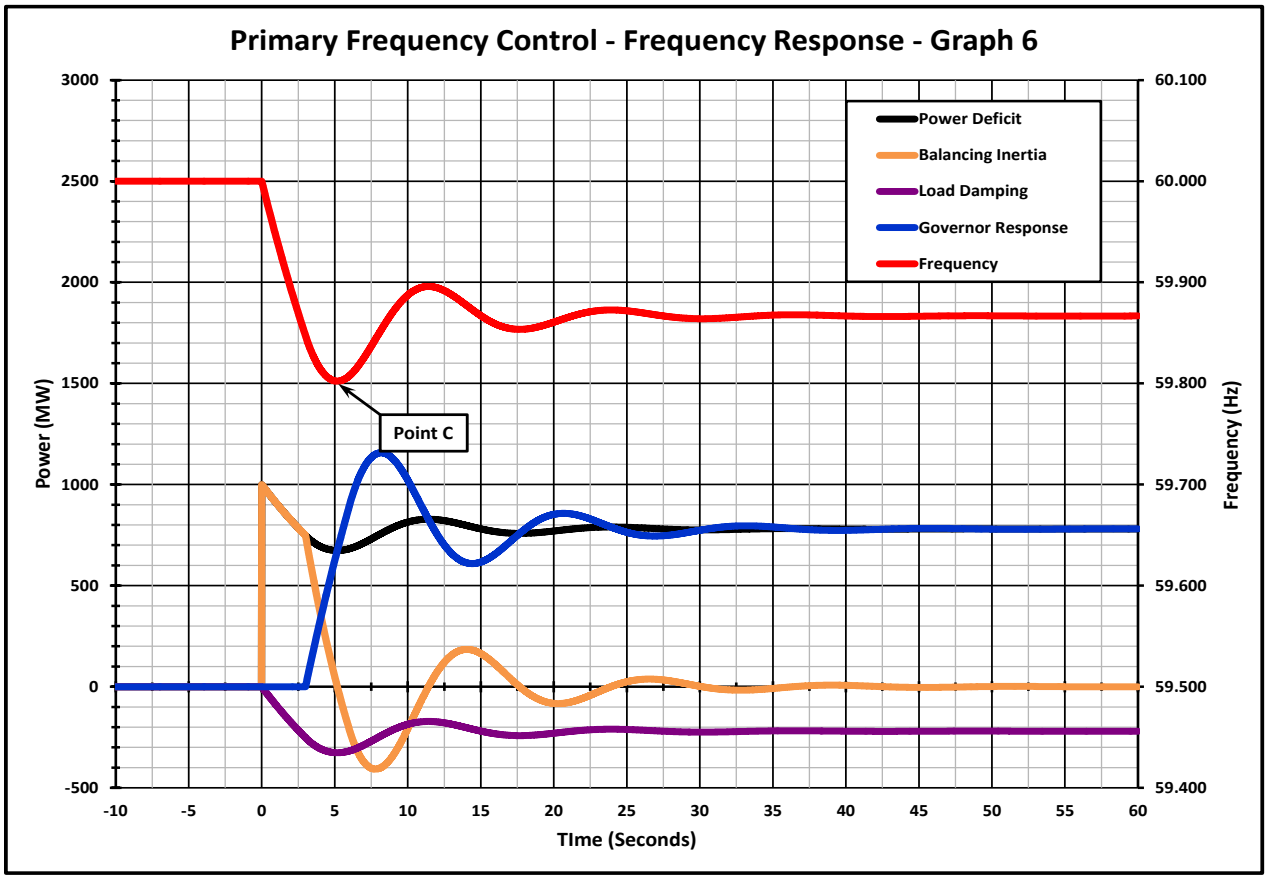
This point, at which the frequency is first arrested, is defined as "Point C" and Frequency Response calculated at this point is called the "**arrested frequency response**." The arrested frequency is normally the minimum (maximum for load loss events) frequency that will be

experienced during a Disturbance event. From a reliability perspective, this minimum frequency is the frequency that is of concern. Adequate reliability requires that frequency at the time frequency is arrested remain above the under-frequency relay settings so as not to trip these relays and the firm load interrupted by them. Frequency Response delivered after frequency is arrested at this minimum level provides less reliability value than Frequency Response delivered before Point C, but greater value than Secondary Frequency Control power and energy which is delivered minutes later.

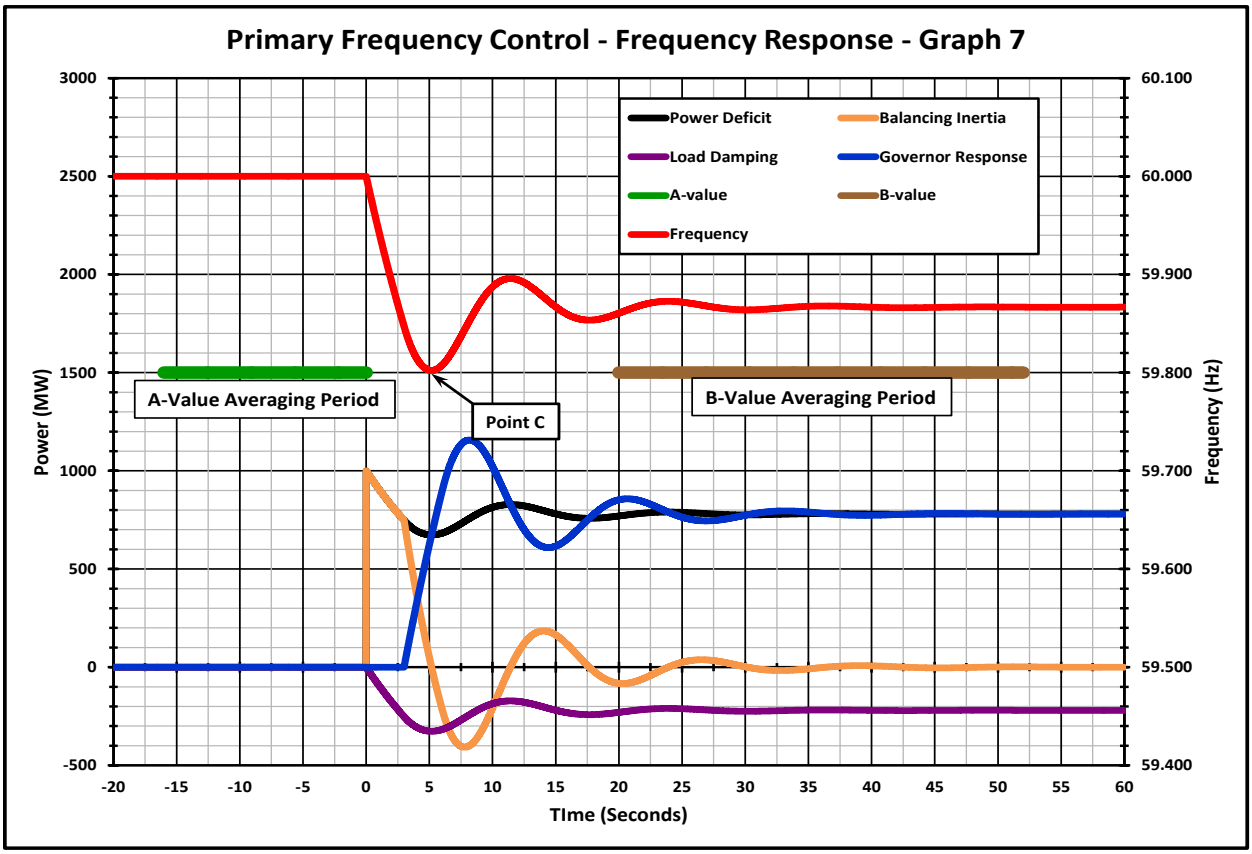
Once the frequency decline is arrested, the governors continue to respond because of the time delay associated with their Governor Response. This results in the frequency partially recovering from the minimum arrested value and results in an oscillating transient that follows the minimum frequency (arrested frequency) until power flows and frequency settle during the transient period that ends roughly 20 seconds after the Disturbance event. This post-disturbance transient period is included on the fifth illustrative graph, Primary Frequency Control – Frequency Response – Graph 5.



The total Disturbance event illustration is presented on the sixth graph, Primary Frequency Control – Frequency Response – Graph 6. Frequency and power contributions stabilize at the end of the transient period. Frequency Response calculated from data measured during this settled period is called the "Settled Frequency Response." The Settled Frequency Response is the best measure to use as an estimator for the "Frequency Bias Setting" discussed later.



The final Disturbance event illustration is presented on the seventh graph, Primary Frequency Control – Frequency Response – Graph 7. This graph shows the averaging periods used to estimate the pre-disturbance A-Value averaging period and the post-disturbance B-Value averaging period used to calculate the settled frequency response. A discussion of the measurement of Frequency Response immediately follows these graphs. That discussion includes consideration of the factors that affect the methods chosen to measure Frequency Response for implementation in a reliability standard.



Frequency Response Measurement (FRM)

The classic Frequency Response points A, C, and B, shown below in Fig. 1 Frequency Response Characteristic, are used for measurement as found in the Frequency Response Characteristic Survey Training Document within the NERC operating manual, found at http://www.nerc.com/files/opman_7-1-11.pdf. This traditional Frequency Response Measure has recently been more specifically termed "**settled frequency response**." This term has been used because it provides the best Frequency Response Measure to estimate the Frequency Bias Setting in Tie-line Bias Control based Automatic Generation Control Systems. However, the industry has recognized that there is considerable variability in measurement resulting from the selection of Point A and Point B in the traditional measure making the traditional measurement method unsuitable as the basis for an enforceable reliability standard in a real world setting of multiple Balancing Authority interconnections.

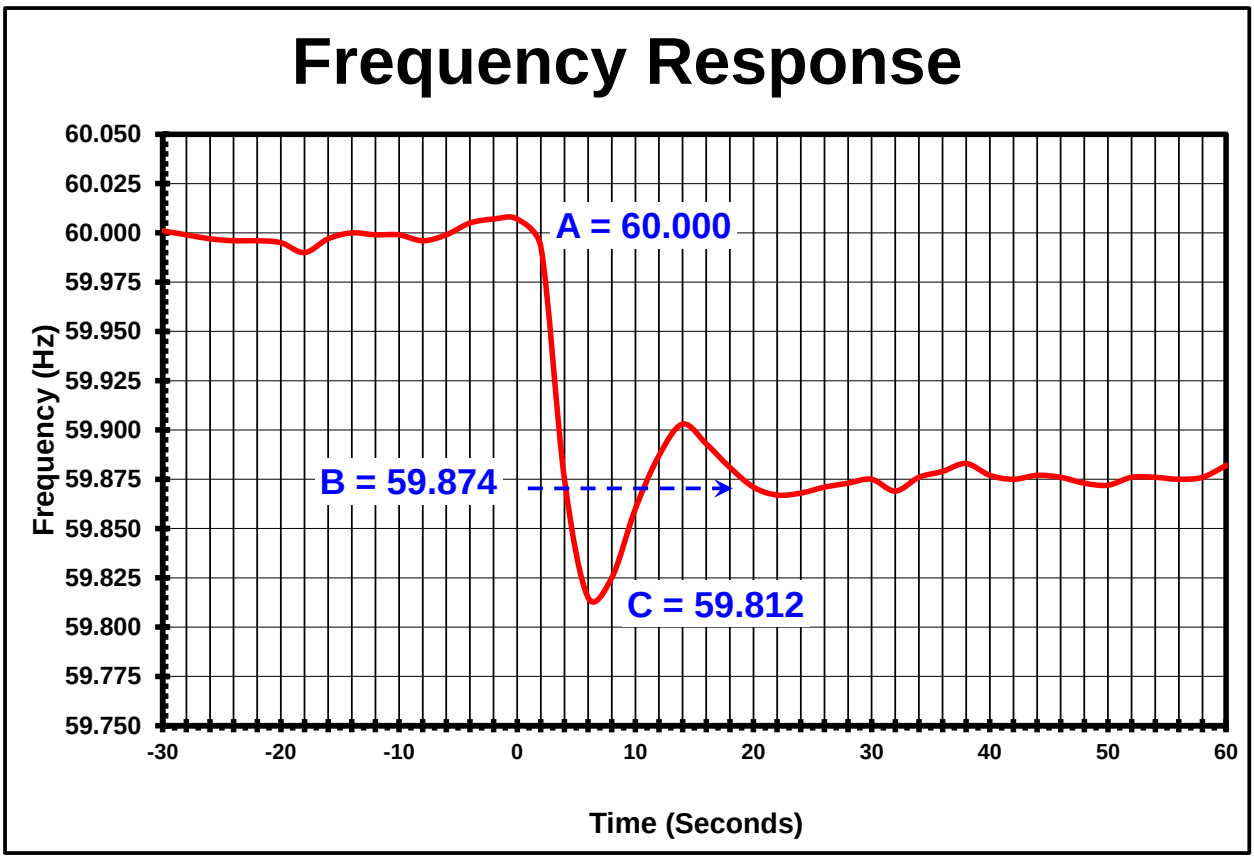


Figure 1. Frequency Response Characteristic

By contrast, measuring an Interconnection's settled frequency response is straightforward and fairly accurate. All that's needed to make the calculation is to know the size of a given contingency (MW), divide this value by the change in frequency and multiply the results by 10 since frequency response is expressed in MW/0.1Hz.

Measuring a BA's frequency response is more challenging. Prior to BAL-003-1, NERC's *Frequency Response Characteristic Survey Training Document* provided guidance to calculate Frequency Response. In short, it told the reader to identify the BA's interchange values "immediately before" and "immediately after" the Disturbance event and use the difference to calculate the MWs the BA deployed for the event. There are two challenges with this approach:

- Two people looking at the same data would come up with different values when assessing which exact points were immediately before and after the event.
- In practice, the actual response provided by the BA can change significantly in the window of time between point B and when secondary and tertiary control can assist in recovery.

Therefore, the measurement of settled frequency response has been standardized in a number of ways to limit the variability in measurement resulting from the poorly specified selection of Point A and Point B. It should be noted that t-0 has been defined as the first scan value that

shows a deviation in frequency of some significance, usually approaching about 10 mHz. The goal is such that the first scan prior to t-0 was unaffected by the deviation and appropriate for one of the averaging points.

- The A-value averaging period of approximately the previous 16 seconds prior to t-0 was selected to allow for an averaging of at least 2 scans for entities utilizing 6 second scan rates. (All time average period references in this document are for 2 second scan rates unless noted otherwise.)
- The B-value averaging period of approximately (t+20 to t+52 seconds) was selected to attempt to obtain the average of the data after primary frequency response was deployed and the transient completed(settled), but before significance influence of secondary control. Multiple periods were considered for averaging the B-value:
    - 12 to 24 sec
    - 18 to 30 sec
    - 20 to 40 sec
    - 18 to 52 sec
    - 20 to 52 sec

  It is necessary for all BAs from an interconnection to use the same averaging periods to provide consistent results. In addition, the SDT decided that until more experience is gained, it is also desirable for all interconnections to use the same averaging periods to allow comparison between interconnections.

The methods presented in this document only address the values required to calculate the frequency response associated with the frequency change between the initial frequency, A-Value, and the settling frequency, B-Value. No reasonable or consistent calculations can be made relating to the arresting frequency, C-Value, using Energy Management System (EMS) scan rate data as long as 6-seconds or tie-line flow values associated with the minimum value of the frequency response characteristic (C-value) as measured at the BA level.

Both the calculation of the frequency at Point A and the frequency at Point B began with the assumption that a 6-second scan rate was the source of the data. Once the averaging periods for a 6-second scan rate were selected, the averaging periods for the other scan rates were selected to provide as much consistency as possible between BAs with different scan rates.

The Frequency at Point A was initially defined as the average of the two scans immediately prior to the frequency event. All other averaging periods were selected to be as consistent as possible with this 12 second average scan from the 6-second scan rate method. In addition, the "**actual net interchange immediately before Disturbance**" is defined as the average of the same scans as used for the Point A frequency average.

The Frequency at Point B was then selected to be an average as long as the average of 6-second scan data as possible that would not begin until most of the hydro governor response had been delivered and would end before significant Automatic Generation Control (AGC) recovery response had been initiated as indicated by a consistent frequency restoration slope. The "**actual net interchange immediately after Disturbance**" is defined as the average of the same scans as used for the Point B frequency average.

B Averaging Period Selection:

Experience from the Electric Reliability Council of Texas ("ERCOT") and the field trail on other interconnections indicated that the 12 to 24 second and 18 to 30 second averaging periods were not suitable because they did not provide the consistency in results that the other averaging periods provided, and that the remaining measuring periods do not provide significantly different results from each other. The team believed that this was observed because the transients were not complete in all of the samples using these averaging periods.

The 18 to 52 second and 20 to 52 second averaging periods were compared to each other, with the 20 to 52 second period providing more consistent values, believed to result from the incomplete transient in some of the 18 to 52 second samples.

This left a choice between the 20 to 40 second and the 20 to 52 second averaging periods. The team recognized that there would be more AGC response in the 20 to 52 second period, but the team also recognized that the 20 to 52 second period would provide a better measure of squelched response from outer loop control action. The 20 to 52 second period was selected because it would indicate squelched response from outer-loop control and provide incentive to reduce response withdrawal. The final selections for the data averaging periods used in FRS Form 1 are shown in the table below.

Definitions of Frequency Values for Frequency Response Calculation

Scan Rate	T 0 Scan	A Value (average)	B Value (average)
6-Seconds	Identify first significant change in frequency as the T 0 scan	Average of T-1 through T-2 scans	Average of T+4 through T+8 scans
5-Seconds		Average of T-1 through T-2 scans	Average of T+5 through T+10 scans
4-Seconds		Average of T-1 through T-3 scans	Average of T+6 through T+12 scans
3-Seconds		Average of T-1 through T-5 scans	Average of T+7 through T+17 scans
2-Seconds		Average of T-1 through T-8 scans	Average of T+10 through T+26 scans

Consistent measurement of Primary Frequency Response is achievable for a selected number of events and can produce representative frequency response values, provided an appropriate sample size is used in the analysis. Available research investigating the minimum sample size to provide consistent measurements of Frequency Response has shown that a minimum sample size of 20 events should be adequate.

Measurement of Primary Frequency Response on an individual resource or load basis requires analysis of energy amounts that are often small and difficult to measure using current methods. In addition, the number of an interconnection's resources and loads providing their response could be problematic when compiling results for multiple events.

Measurement of Primary Frequency Response on an interconnection (System) basis is straight forward provided that an accurate frequency metering source is available and the magnitude of the resource/load imbalance is known in MWs.

Measurement on a Balancing Authority basis can be a challenge, since the determination of change in MWs is determined by the change in the individual BA's metered tie lines. Summation of tie lines is accomplished by summing the results of values obtained by the digital scanning of meters at intervals up to six seconds, resulting in a non-coincidental summing of values. Until the technology to GPS time stamp tie line values at the meter and the summing of those values for coincidental times is in use throughout the industry, it is necessary to use averaging of values described above to obtain consistent results.

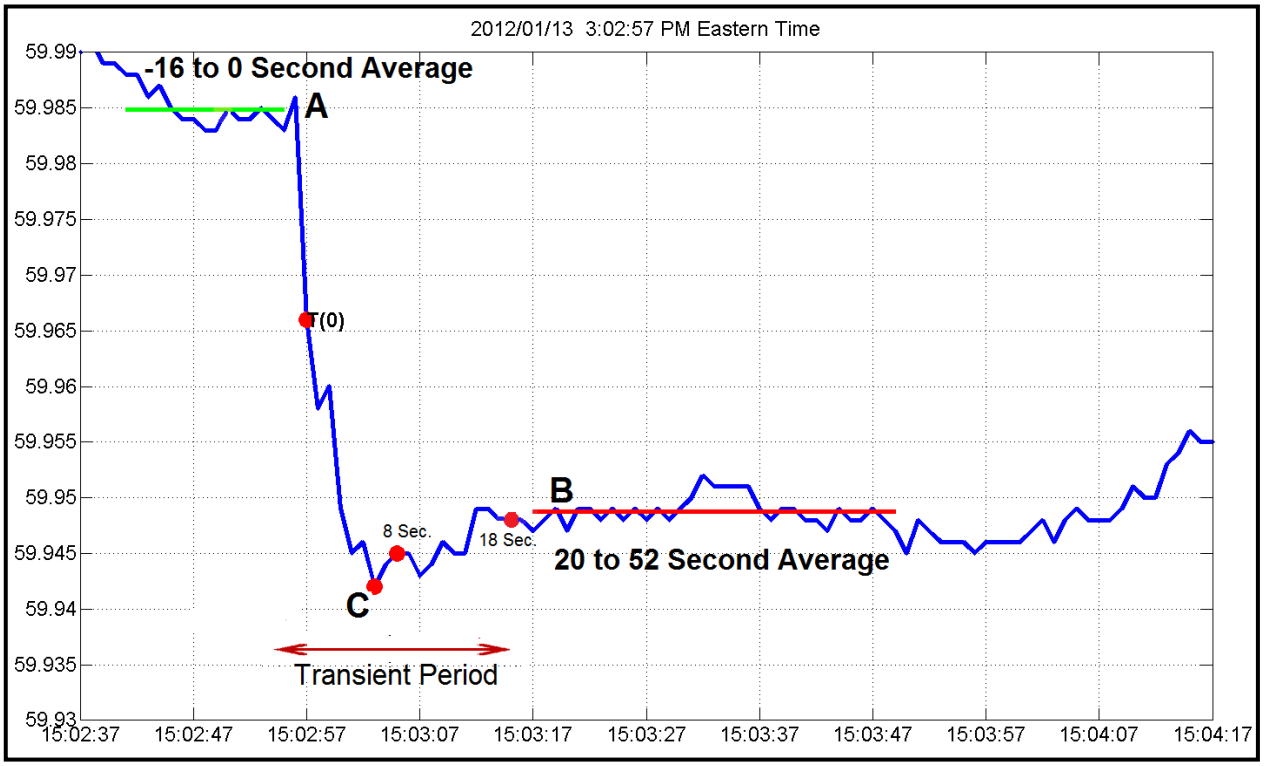


Figure 2. Frequency Response Measurement

The standardized measure is shown graphically in Fig. 2 Frequency Response Measurement with the averaging periods shown by the solid blue lines on the graph. Since FERC directed a performance obligation for BAL-003-1, it is important to be more objective in the measurement process. The standardized calculation is available on FRS Form 2 for EMS scan rates of 2, 3, 4, 5, and 6 seconds at http://www.nerc.com/filez/standards/Frequency_Response.html.

Arrested Frequency Response

There is another measure of Frequency Response that is of interest when developing a Frequency Response estimate that not only will be used for estimating the Frequency Bias Setting, but will also be used to assure reliability by operating in a manner that will bound interconnection frequency and prevent the operation of Under-frequency Relays. This Frequency Response Measure has recently been named "**arrested frequency response.**" This Frequency Response is significantly affected by the inertial Frequency Response, the governor Frequency Response and the time delays associated with the delivery of governor Frequency Response. It is calculated by using the change in frequency between the initial frequency, A,

and the maximum frequency change during the event, C, instead of using the change between A and B. Arrested Frequency Response is the correct response for determining the minimum Frequency Response related to under-frequency relay operation and the support of interconnection reliability. This is because it can be used to provide a direct estimate of the maximum frequency deviation an interconnection will experience for an initial frequency and a given size event in MW. Unfortunately, arrested frequency response cannot currently be measured using the existing EMS-based measurement infrastructure. This limitation exists because the scan rates currently used in industry EMSs are incapable of measuring the net actual interchange at the same instant that the maximum frequency deviation is reached. Fortunately, the ratio of arrested frequency response and settled frequency response tends to be stable on an interconnection. This allows the settled frequency response value to be used as a surrogate for the arrested frequency response and implement a reasonable measure upon which to base a standard. One consequence of using the settled frequency response as a surrogate for the arrested frequency response is the inclusion of a large reliability margin in Interconnection Frequency Response Obligation to allow for the difference between the settled frequency response as measured and the arrested frequency response that indicates reliability.

As measurement infrastructure improves one might expect the Frequency Response Obligation to transition to a measurement based directly on the arrested frequency response while the Frequency Bias Setting will continue to be based on the settled frequency response. However, at this time, the measurement devices and methods in use do not support the necessary level of accuracy to estimate arrested frequency response contribution for an individual Balancing Authority.

Frequency Response Definition and Examples

Limitations of the measurement infrastructure determine the measurement methods recommended in this standard. The measurement limitations provide opportunities to improve the Frequency Response as measured in the standard without contributing to an improvement in Frequency Response that contributes to reliability. These definitions and examples provide a basis for determining which contributions to Frequency Response contribute the most to improved reliability. They also provide the basis for determining on a case by case basis whether the individual contributors to the Frequency Response Measure are also contributing to reliability.

General Frequency Response Characteristics

In the simplest case Frequency Response includes any automatic response to changes in local frequency. If that response works to decrease that change in frequency, it is beneficial to reliability. If that response works to increase that change in frequency, it is detrimental to reliability. However, this definition does not address the relative value of one response as compared to other responses that may be provided in a specific case.

There are numerous characteristics associated with the Frequency Response that affect the reliability value and economic value of the response. These characteristics include:

1. **Inertial** – the response is inertial or approximates inertial response
   Inertial response provides power without delay that is proportional to the frequency and the change in frequency. Therefore, power provided by electronic control as

synthetic inertial response must be proportional to the frequency and change in frequency and be provided without a time delay.

2. **Immediate** – no unnecessary intentional time delays or reduction in the rate of response delivery
    a. time delay before the beginning of the response
    Turbines that convert heat or kinetic energy have time delays related to the time delay from the time that the control valves are moved to initiate the change in power and the time that the power is delivered to the generator. These times are usually associated with the time it takes a change in mass flow to travel from the control valve to the first blades of the turbine in the turbine generator.

    b. reduction in the rate of response delivery
    There are natural delays associated with the rate of response delivery that are related to the mass flow travel from the first turbine blades to the last turbine blades. In addition, some turbines have intentional delays designed into the control system to slow the rate of change in the delivery of the kinetic energy or fuel to the turbine to prevent the turbine or other equipment from being damaged, hydro turbines, or to prevent the turbine from tripping due to excessive rate of change, gas turbines.

3. **Proportional** – the amount of the total response is proportional to the frequency error
    a. No Deadband – the response is proportional across the entire frequency range
    b. Deadband – the response is only proportional outside of a defined deadband

4. **Bi-directional** – the response occurs to both increases and decreases in frequency

5. **Continuous** – there are no discontinuities in the delivery of the response (no step changes)

6. **Sustained** – the response is sustained until frequency is returned to schedule

Frequency Response Reliability Value

This section contains a more detailed discussion of the various characteristics of Frequency Response listed in the previous section. It also provides an indication of the relative value of these characteristics with respect to their contribution to reliability. Finally, it includes some examples of the described responses.

Inertial Response is provided from the stored energy in the rotating mass of the turbine-generators and synchronous motors on the interconnection. It limits the rate of change of frequency until sufficient Frequency Response can be supplied to arrest the change in frequency. Its reliability value increases as the time delay associated with the delivery of other Frequency Response on the interconnection increases. If those time delays are minimal, then the value of inertial response is low. If all time delays associated with the Frequency Response could be eliminated, then inertial response would have little value.

The reliability value of Inertial Response is the greatest on small interconnections because the size of the Disturbance events is larger relative to the inertia of the interconnection. Electronic

controls have been developed to provide synthetic inertial response from the stored energy in asynchronous generators to supplement the natural inertial response. Some Type III & IV Wind Turbines have this capability. In addition, electronically controlled SCRs have been developed that can store energy in the electrical system and release this stored energy to supply synthetic inertial response when required.

Immediate Response is provided by load damping and because the time delays associated with its delivery are very short (related to the speed of electrical signal in the electrical system); load damping requires very little inertial response to limit arrested frequency effectively. Synthetic immediate response can also be supplied from loads because in many cases, there is no mass flow time delay associated with the load process providing the power and energy reduction. Therefore, loads can provide an immediate response with a higher reliability value than generators with time delays required by the physics of the turbine-generator.

Governor response has time delays associated with its delivery. Governor response provided with shorter time delays has a higher reliability value because those shorter time delays require less inertial response to arrest frequency. Governor response is provided by the turbine-generators on the interconnection. Time delays associated with governor response vary depending on the type of turbine-generator providing the response.

The longest time delays are usually associated with high head hydro turbine-generators that require long times from the governor action until the additional mass flow through the turbine. These units may also have the longest delivery time associated with the full delivery of response because of the timing designed into the governor response.[5]

Intermediate time delays are usually associated with steam turbine-generators. The response begins when the steam control valves are adjusted and the steam mass flows from the valves to the first high pressure turbine blades. The delivery times associated with the full delivery of response may require the steam to flow through high, intermediate and low pressure turbines including reheat flows before full power is delivered. These times are shorter than those of the hydro turbine-generators in general, but not as fast as the times associated with gas turbines.[6]

Gas turbines typically have the shortest time delays, because control is provided by injecting more or less fuel into the turbine combustor and adjusting the air control dampers. These control changes can be initiated rapidly and the mass flow has the shortest path to the turbine blades. There may be timing limitations related to the rate of change in output of the gas turbine-generator to maintain flame stability in some cases slowing the rate of change.[7]

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[5] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-6 – 1-9.

[6] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-4 – 1-6.

[7] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-16 – 1-19.

Synthetic Governor Response can be supplied by certain loads and storage systems. The immediacy of the response is normally limited only by the electronic controls used to activate the desired response. Synthetic response, when it can be supplied immediately without significant time delay, has a higher reliability value because it requires less inertial response to achieve smaller arrested frequency deviations.

Proportional Response indicates that the response provided is proportional in magnitude to the frequency error. Response deadbands cause a non-proportional response and reduce the value of the response with respect to reliability. Contrary to general consensus, deadbands do not reduce the amount of Frequency Response that must be provided, they only transfer the responsibility for providing that Frequency Response from one source on the interconnection to another. For a given response, the response with the smaller deadband has the greater reliability value. Therefore, deadbands should be set to the smallest value that supports overall reliable operation including the reliable operation of the generator.

Electronic controls have also been developed to provide synthetic governor response. When these controls are applied to certain loads or stored energy systems, they can be programmed to provide synthetic governor response similar to the proportional response of a turbine-generator governor. Governor response in generators is limited to a small percentage of the output of the generating unit, while synthetic governor response could be applied to much larger percentages of loads or storage devices providing such response.

Load damping provides a proportional response.

Continuous Response is response that has no discontinuous (step) changes in the frequency versus response curve. Step changes (Non-continuous Response) in the Governor Response curve can lead to frequency instabilities at frequencies near the changes. The ERCOT Interconnection observed this and has since prohibited the use of governor response characteristics incorporating step responses.

Step responses also occur with the implementation of load interruption using under-frequency or over-frequency relays.

Bi-directional Response is response that occurs in both directions, when the frequency is increasing and when the frequency is decreasing. A uni-directional response is a response that only occurs once when frequency is decreasing or when frequency is increasing.

Inertial response, governor response and load damping are all bi-directional responses. Certain loads are capable of providing proportional bi-directional response while others are only capable of providing non-proportional bi-directional response.

The ERCOT Load Resource program is a uni-directional response program. Loads are only tripped when frequency declines below a given set-point. When frequency is restored above that set-point, the loads must be manually reconnected. As a consequence, the Frequency Response only occurs once with declining frequency and does not oppose the increase in frequency after the initial decline. If there should be a frequency oscillation, the uni-directional response will not contribute to the opposition of a second frequency decline across the set-

point during an oscillation event. Once a uni-directional response has occurred, it is unavailable for a second decline before reset.

Step or proportional responses implemented bi-directionally can lead to frequency instability when there is less continuous frequency response than the magnitude of the change in continuous response between the trip and reset frequencies in step, or the proportional response rate of change is greater than the underlying continuous response. A step bi-directional response will have the load reconnected as frequency recovers from the event thus opposing the increase in frequency during recovery, and also resetting the load response for the next frequency decline automatically. Bi-directional response obviously has a greater reliability value than uni-directional response.

Sustained Response is provided at its full value until frequency is restored to its scheduled value. On today's interconnections, few frequency responses are fully sustained until frequency has been restored to its scheduled value. On steam based turbine-generators, the steam pressure may drop after a time as the result of the additional steam flow from governor action. However, in general this has not been a problem because most responses are incomplete at the time that frequency has been initially arrested and the additional response has generally been sufficient to make up for more than the these unpreventable reductions in response. However, the intentional withdrawal of response before frequency has been restored to schedule can cause a decline in frequency beyond that which would be otherwise expected. This intentional withdrawal of response is highly detrimental to reliability. Therefore, it can be concluded in general that sustained response has a higher reliability value than un-sustained response.

On an interconnection, the withdrawal of response due to the loss of steam pressure on the steam units may be offset by the slower response of hydro turbine-generators. In these cases, the reliability of the combined response provides greater reliability value than the individual response of each type. The steam turbine-generators provide a fast response that may be reduced, while the hydro turbine-generators provide a slower response, contributing less to the arresting response, offsetting any reduction by the steam turbine-generators to assure a sustained response.

Sustained Response must also be considered for any resource that has a limited duration associated with its response. The amount of stored energy available from a resource may limit its ability to sustain response for a duration of time necessary to support reliability.

Frequency Response Cost Factors

In every system of exchange there are two sides; the supply side and the demand side. The supply side provides the services used by the demand side. In the case of Frequency Response, the supply side includes all providers of Frequency Response and the demand side includes all participants that create the need for Frequency Response.

Frequency Response Costs – Supply Side

There are a number of factors that affect the cost of providing Frequency Response from resources. Since there is a cost associated with those factors, some method of appropriate compensation could be made available to those resources providing Frequency Response.

Without compensation, providers of Frequency Response will be put in the position of incurring additional cost that can be avoided only by reducing or eliminating the response they provide. These costs are incurred independently of whether provided for in a formal Regional Transmission Organization/Independent System Operator (RTO/ISO) market or in a traditional BA subject to the FERC pro-forma tariffs.

It is the responsibility of the BA or the RTO/ISO to acquire the necessary amount of Frequency Response to support reliability in the most cost effective manner. This function is performed best when the suppliers are evaluated based on the value of the Frequency Response they provide and compensated appropriately for that Frequency Response. Suppliers provide Frequency Response when they are assured that they will receive fair compensation. Before considering how to perform this evaluation and compensation, the costs associated with providing Frequency Response should be understood and evaluated with respect to the level of reliability they offer.

Some cost factors that have been identified for providing Frequency Response include:

1. **Capacity Opportunity Cost** – the costs, including opportunity costs, associated with reserving capacity to provide Frequency Response. These costs are usually associated with the alternative use of the same capacity to provide energy or other ancillary services. There may also be capacity opportunity costs associated with the loss in average capacity by a load providing Frequency Response.
2. **Fuel Cost** – The cost of fuel used to provide the Frequency Response. The costs for fuel to provide Frequency Response can result in energy costs significantly different from the system marginal energy cost, both higher and lower. This is the case when Frequency Response is provided by resources that are not at the system marginal cost.
3. **Energy Efficiency Penalty Costs** – the costs associated with the loss in efficiency when the resource is operated in a mode that supports the delivery of Frequency Response. This cost is usually in the form of additional fuel use to provide the same amount of energy. An example is the difference between operating a steam turbine in valve control mode with an active governor and sliding pressure mode with valves wide open and no active governor control except for over-speed. This cost is incurred for all of the energy provided by the resource, not just the energy provided for Frequency Response. There may be additional energy costs associated with a load providing Frequency Response from loss in efficiency of their process when load is reduced.
4. **Capacity Efficiency Penalty Costs** – the costs associated with any reduction in capacity resulting from the loss of capacity associated with the loss in energy efficiency. When efficiency is lost, capacity may be lost at the same time because of limitations in the amount of input energy that can be provided to the resource.
5. **Maintenance Costs** – the operation of the resource in a manner necessary to provide Frequency Response may result in increases in the maintenance costs associated with the resource.
6. **Emissions Costs** – the additional costs incurred to manage any additional emissions that result when the resource is providing Frequency Response or stands ready to provide Frequency Response.

A good contract for the acquisition of Frequency Response from a resource will provide appropriate compensation to the resource all of the costs the resource incurs to provide Frequency Response. It will also provide a method to evaluate the least cost mix of resources necessary to provide the minimum required Frequency Response for maintaining reliability. Finally, it will provide the least complex method of evaluation considering the complexity and efficiency of the acquisition process.

Frequency Response Costs – Demand Side

Not only are there costs associated with acquiring Frequency Response from the supplying resources, there are costs associated with the amount of Frequency Response that must be acquired and influenced by those participants that create the need for Frequency Response. If the costs of acquiring Frequency Response from the supply resources can be assigned to those parties that create the need for Frequency Response, there is the promise that the amount of Frequency Response required to maintain reliability can be minimized. The considerations are the same as those that are driving the development of "real time pricing" and "dynamic pricing". If the costs are passed on to those contributing to the need for Frequency Response, incentives are created to reduce the need for Frequency Response making interconnection operations less expensive and more reliable. The problem is to balance both cost and complexity against reliability on both the supply side and the demand side.

Rationale by Requirement

Requirement 1

R1. Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or Balancing Authority that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation.

Background and Rationale

R1 is intended to meet the following primary objectives:

- Determine whether a Balancing Authority (BA) has sufficient Frequency Response for reliable operations.
- Provide the feeder information needed to calculate CPS limits and Frequency Bias Settings.

Primary Objective

With regard to the first objective, FRS Form 1 and the process in Attachment A provide the method for determining the Interconnections' necessary amount of Frequency Response and allocating it to the Balancing Authorities. The field trial for BAL-003-1 is testing an allocation methodology based on the amount of load and generation in the BA. This is to accommodate the wide spectrum of BAs from generation-only all the way to load-only.

Frequency Response Sharing Groups (FRSGs)

This standard proposes an entity called FRSG, which is defined as:

> *A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.*

This standard allows Balancing Authorities to cooperatively form FRSGs as a means to jointly meet the FRS. There is no obligation to form or be a part of FRSGs. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of FERC's Order No. 693 directives.

FRSG performance may be calculated one of two ways:

- Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or
- Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual event performance.

Frequency Response Obligation and Calculation

The basic Frequency Response Obligation is based on non-coincident peak load and generation data reported in FERC Form 714 (where applicable, see below for non-jurisdictional entities) for the previous full calendar year. The basic allocation formula used by NERC is:

Where:

- Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
- Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
- Annual Gen_{Int} is the sum of all Annual Gen_{BA} values reported in that interconnection.
- Annual $Load_{Int}$ is the sum of all Annual $Load_{BA}$ values reported in that interconnection.

Balancing Authorities that are not FERC jurisdictional should use the Form 714 Instructions to assemble and submit equivalent data. Until the BAL-003-1 process outlined in Attachment 1 is implemented, Balancing Authorities can approximate their FRO by multiplying their Interconnection's FRO by their share of Interconnection Bias. The data used for this calculation should be for the most recently filed Form 714. As an example, a report to NERC in January 2013 would use the Form 714 data filed in 2012, which utilized data from 2011.

Balancing Authorities that merge or that transfer load or generation need to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation for the Interconnection remains the same and so that CPS limits can be adjusted.

Attachment A proposes the following Interconnection event criteria as a basis to determine an Interconnection's Frequency Response Obligation:

- Largest category C loss-of-resource (N-2) event.
- Largest total generating plant with common voltage switchyard.
- Largest loss of generation in the interconnection in the last 10 years.

With regard to the second objective above (determining Frequency Bias Settings and CPS limits), Balancing Authorities have been asked to perform annual reviews of their Frequency Bias Settings by measuring their Frequency Response, dating back to Policy 1. This obligation was carried forward into BAL-003-01.b. While the associated training document provided useful information, it left many of the details to the judgment of the person doing the analysis. The FRS Form 1 and FRS Form 2 provide a consistent, objective process for calculating Frequency Response to develop an annual measure, the FRM.

The FRM will be computed from Single Event Frequency Response Data (SEFRD), defined as: "the data from an individual event from a Balancing Authority that is used to calculate its Frequency Response, expressed in MW/0.1Hz". The SEFRD for a typical Balancing Authority in an Interconnection with more than one Balancing Authority is basically the change of its net actual interchange on its tie lines with its adjacent Balancing Authorities divided by the change in interconnection frequency. (Some Balancing Authorities may choose to apply corrections to their net actual interchange values to account for factors such as nonconforming loads. FRS Form 1 shows the types of adjustments that are allowed.)

A standardized sampling interval of approximately 20 to 52 seconds will be used in the computation of SEFRD values. Microsoft Excel® spreadsheet interfaces for EMS scan rates of 2 through 6 seconds are provided to support the computation.

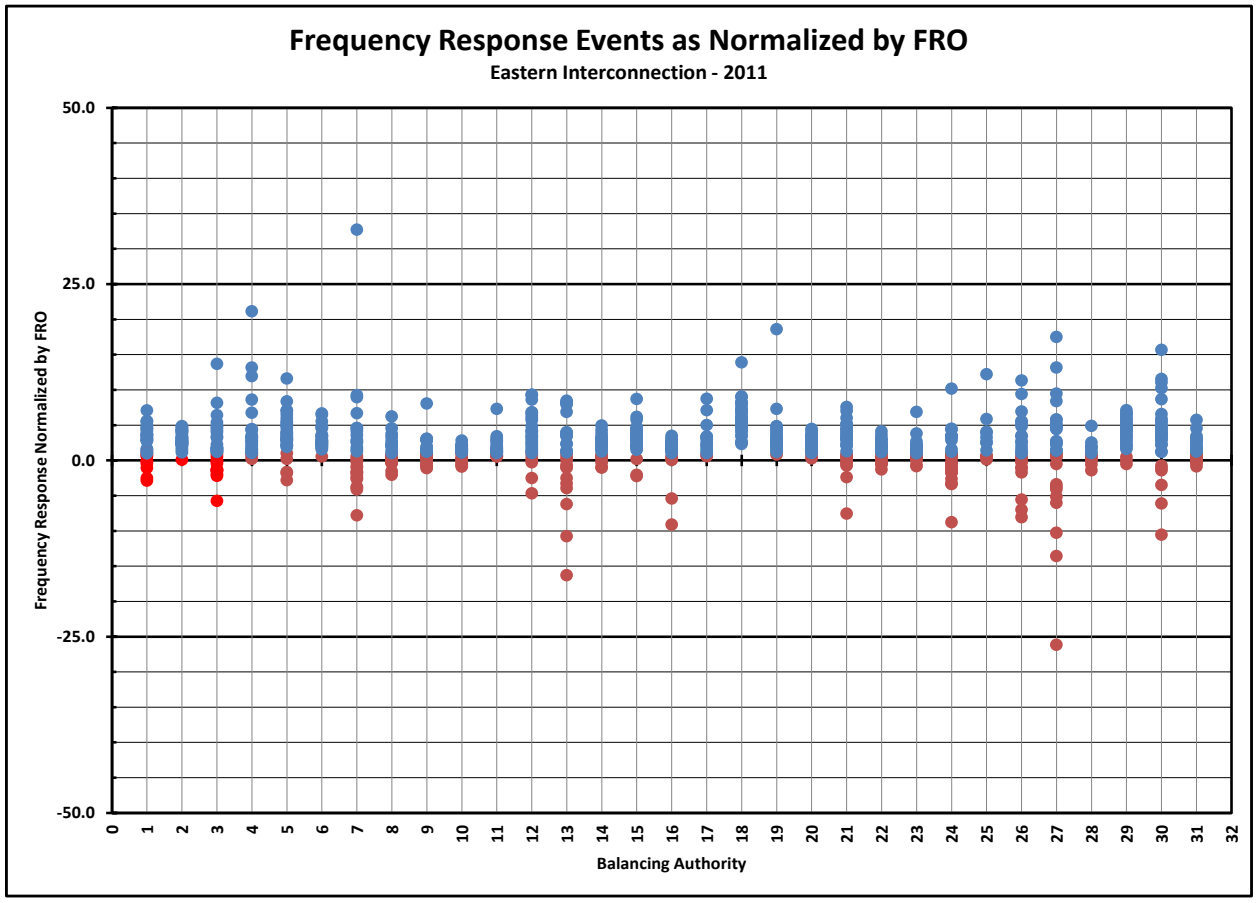
Single Event Frequency Response Data[8]

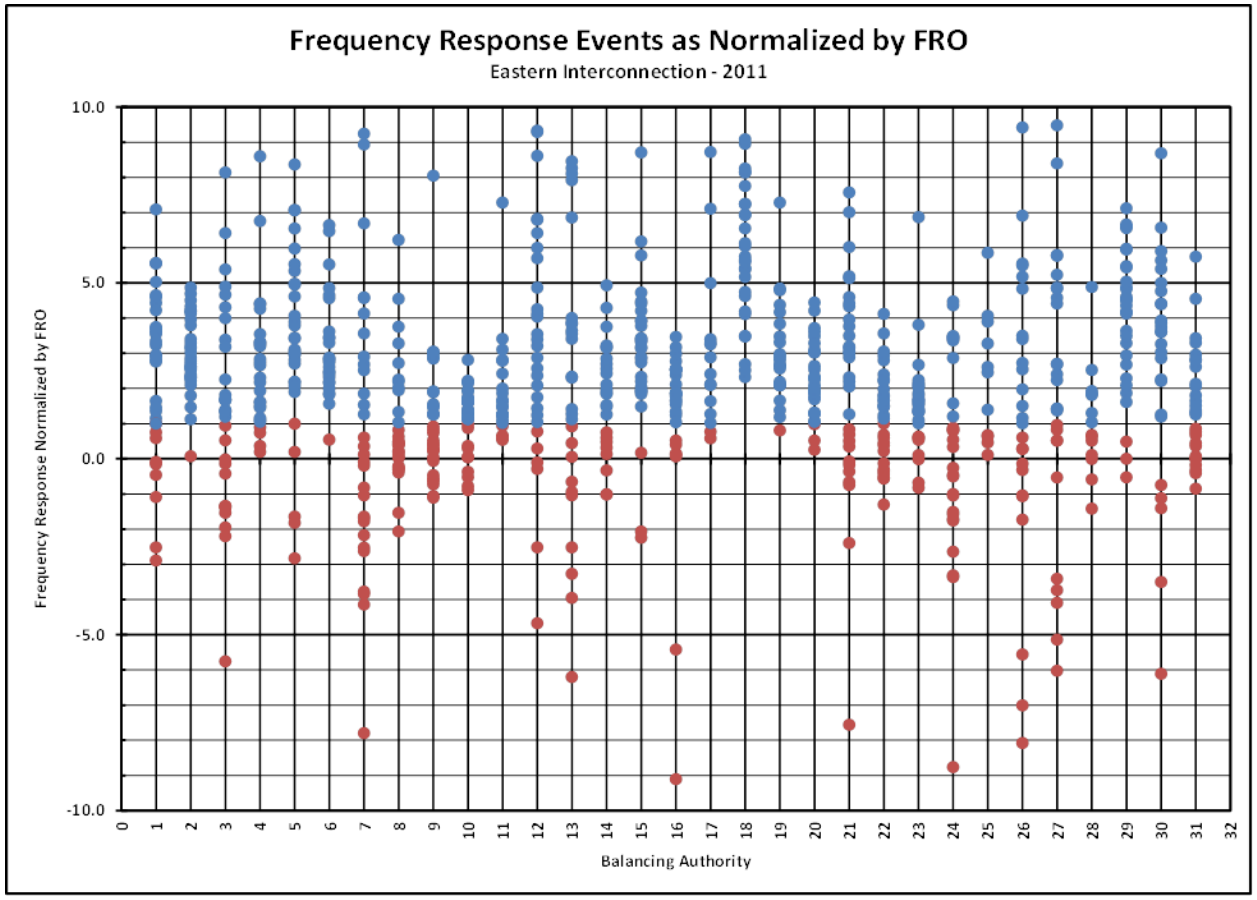
The use of a "single event measure" was considered early in the development of the FRS for compliance because a single event measure could be enforced for each event on the interconnection making compliance enforcement a simpler process. The variability of the measurement of Frequency Response for an individual BA for an individual Disturbance event was evaluated to determine its suitability for use as a compliance measure. The individual Disturbance events were normalized and plotted for each BA on the Eastern and Western Interconnections. This data was plotted with a dot representing each event. Events with a measured Frequency Response above the FRO were shown as blue dots and events with a measured Frequency Response below the FRO were shown as red dots. In order to show the full variability of the results the plots have been provide with two scales, a large scale to show all of the events and small scale to show the events closer to the FRO or a value of 1.0. This data is presented on four charts titled Frequency Response Events as Normalized by FRO.

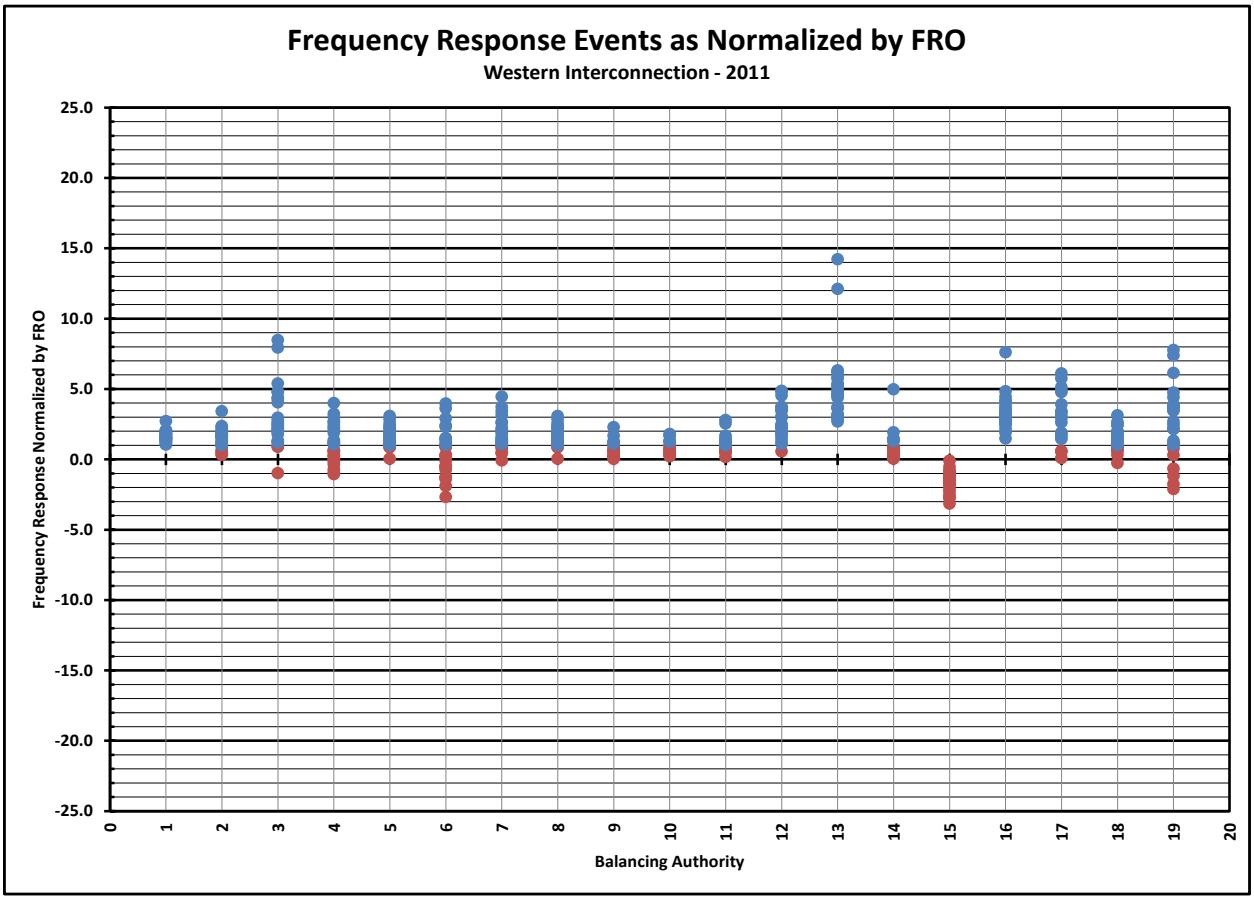
Analysis of this data indicates a single event based compliance measure is unsuitable for compliance evaluation when the data has the large degree of variability shown in these charts. Based on the field trial data provided, only 3 out of 19 BAs on the Western Interconnection would be compliant for all events with a standard based on a single event measure. Only 1 out of 31 BAs on the Eastern Interconnection would be compliant for all events with a standard based on a single event measure. The general consensus of the industry is that there is not a reliability issue with insufficient Frequency Response on any of the North American Interconnections at this time. Therefore, it is unreasonable to even consider a standard that would indicate over 90% of the BAs in North American to be non-compliant with respect to maintaining sufficient Frequency Response to maintain adequate reliability.

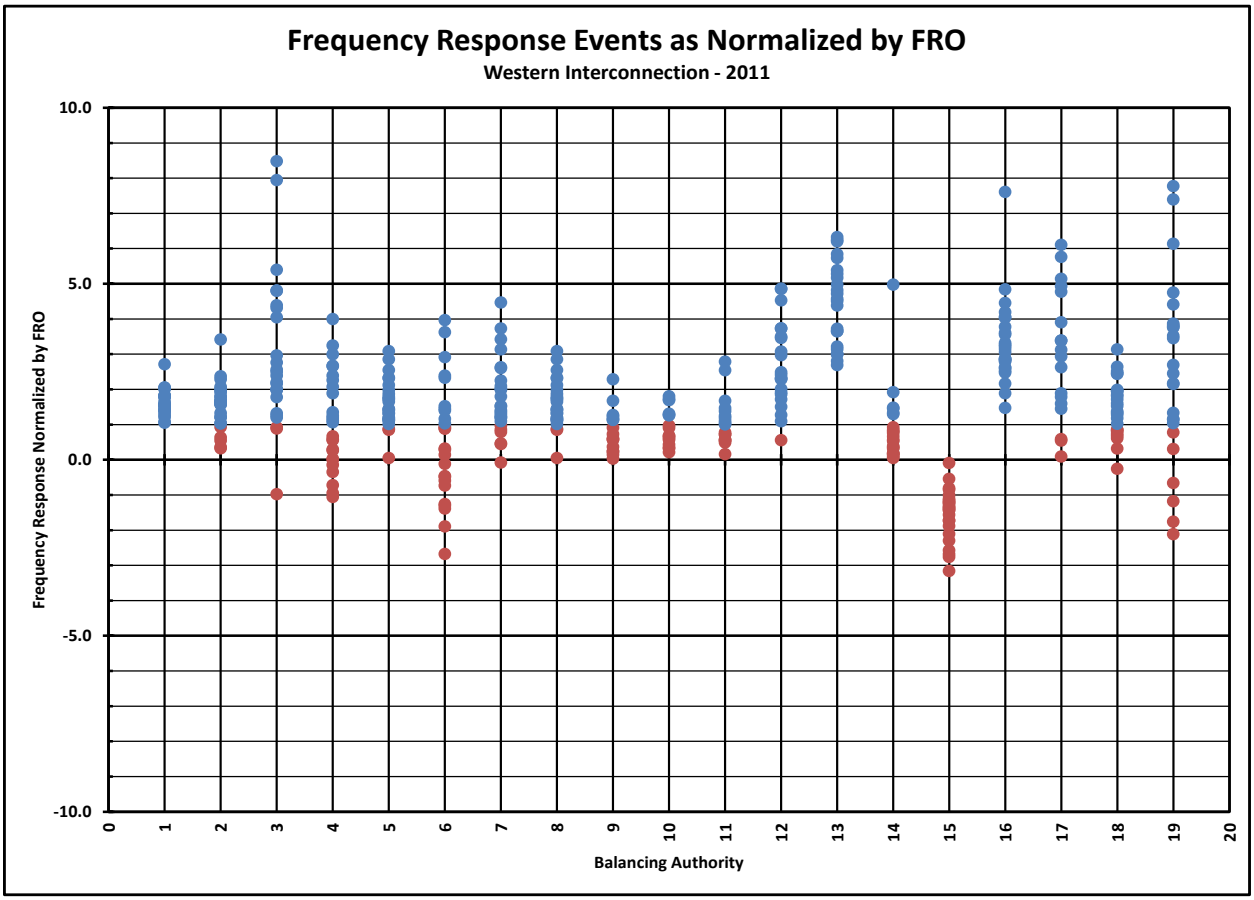
In an attempt to balance the workload of Balancing Authorities with the need for accuracy in the FRM, the standard will require at least 20 samples selected during the course of the year to compute the FRM. Research conducted by the FRSDT indicated that a Balancing Authority's FRM will converge to a reasonably stable value with at least 20 samples.

[8] Single Event Analysis based on results of Frequency Response Standard Field Trial Analysis, September 17, 2012.


Frequency Response Events as Normalized by FRO
Eastern Interconnection - 2011
Frequency Response Normalized by FRO
50.0
25.0
0.0
-25.0
-50.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Balancing Authority


Frequency Response Events as Normalized by FRO
Eastern Interconnection - 2011
Frequency Response Normalized by FRO
10.0
5.0
0.0
-5.0
-10.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Balancing Authority


Frequency Response Events as Normalized by FRO
Western Interconnection - 2011
Frequency Response Normalized by FRO
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Balancing Authority


Frequency Response Events as Normalized by FRO
Western Interconnection - 2011
Frequency Response Normalized by FRO
10.0
5.0
0.0
-5.0
-10.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Balancing Authority

Sample Size

In order to support field trial evaluations of sample size, sampling intervals, and aggregation techniques, the FRSDT will be retrieving scan rate data from the Balancing Authorities for each SEFRD. Additional frequency events may also be requested for research purposes, though they will not be included in the FRM computation.

FERC Order No. 693 directed the ERO (at P 375) to define the number of Frequency Response surveys that were conducted each year and to define a necessary amount of Frequency Response. R1 addresses both of these directives:

- There is a single annual survey of at least 20 events each year.
- The FRM calculated on FRS Form 1 is compared by the ERO against the FRO determined 12 months earlier (when the last FRS Form 1 was submitted) to verify the Balancing Authority provided its share of Interconnection Frequency Response.

Median as the Standard's Measure of Balancing Authority Performance

The FRSDT evaluated different approaches for "averaging" individual event observations to compute a technically sound estimate of Frequency Response Measure. The MW contribution for a single BA in a multi-BA Interconnection is small compared to the minute to minute changes in load, interchange and generation. For example, a 3000 MW BA in the east may only be called on to contribute 10MW for the loss of a 1000MW. The 10 MW of governor and load response may easily be masked as a coincident change in load.

In general, statisticians use the median as the best measure of central tendency when a population has outliers. Two independent reviews by the FRSDT has shown the Median to be less influenced by noise in the measurement process and the team has chosen the median as the initial metric for calculating the BAs' Frequency Response Measure.

The FRSDT performed extensive empirical studies and engaged in lively discussions in an attempt to determine the best aggregation technique for a sample set size of at least 20 events. Mean, median, and linear regression techniques were used on a trial basis with the data that was available during the early phases of the effort.

A key characteristic of the "aggregation challenge" is related to the use of actual net interchange data for measuring frequency response. The tie line flow measurements are varying continuously due to other operational phenomena occurring concurrently with the provision of frequency response. (*See* Appendix 1 for details.) All samples have "noise" in them, as most operational personnel who have computed the frequency response of their BA can attest. What has also become apparent to the FRSDT is that while the majority of the frequency response samples have similar levels of noise in them, a few of the samples may have much larger errors in them than the others that result in unrepresentative results. And with the sample set size of interest, it is common to have unrepresentative errors in these few samples to be very large and asymmetric. For example, one BA's subject matter expert observed recently that 4 out of 31 samples had a much larger error contribution than the other 27 samples, and that 3 out of 4 of the very high error samples grossly underestimated the frequency response. The median value demonstrated greater resiliency to this data quality problem than the mean with this data set. (The median has also demonstrated superiority to

linear regression in the presence of these described data quality problems in other analyses conducted by the FRSDT, but the linear regression showed better performance than the mean.)

The above can be demonstrated with a relatively simple example. Let's assume that a Balancing Authority's true frequency response has an average value of -200 MW/ .1 Hz. Let's also assume that this Balancing Authority installed "special" perfect metering on key loads and generators, so that we could know the true frequency response of each sample. And then we will compare them with that measured by typical tie line flow metering, with the kind of noise and error that occurs commonly and "not so commonly". Let's start with the following 4 samples having a common level of noise, with MW/ .1 Hz as the unit of measurement.

Perfect measurement	Noise	Samples from tie lines
-190	-30	-220
-210	-20	-230
-220	10	-210
-180	20	-160
-200	Mean	-205
-200	Median	-215

Now let's add a fifth sample, which is highly contaminated with noise and error that grossly underestimates frequency response.

Perfect measurement	Noise	Samples from tie lines
-190	-30	-220
-210	-20	-230
-220	10	-210
-180	20	-160
-200	250	+50
-200	Mean	-154
-200	Median	-210

It is clear from the above simplistic example that the mean drops by about 25% while the median is affected minimally by the single highly contaminated value.

Based on the analyses performed thus far, the FRSDT believes that the median's superior resiliency to this type of data quality problem makes it the best aggregation technique at this time. However, the FRSDT sees merit and promise in future research with sample filtering combined with a technique such as linear regression.

When compared with the mean, linear regression shows superior performance with respect to the elimination of noise because the measured data is weighted by the size of the frequency change associated with the event. Since the noise is independent from frequency change, the greater weighting on larger events provides a superior technique for reducing the effect of noise on the results.

However, linear regression does not provide a better method when dealing with a few samples with large magnitudes of noise and unrepresentative error. There are only two alternatives to improve over the use of median when dealing with these larger unrepresentative errors:

1. Increase the sample size, or
2. Actively eliminate outliers due to unrepresentative error.

Unfortunately, the first alternative, increasing the sample size is not available because significantly more sample events are not available within the measurement time period of one year. Linear regression techniques are being investigated that have an active outlier elimination algorithm that would eliminate data that lie outside ranges of the 96th percentile and 99th percentile, for example.

Still, the use of linear regression has value in the context of this standard. The NERC Resources Subcommittee will use linear regression to evaluate Interconnection frequency response, particularly to evaluate trends, seasonal impacts, time of day influences, etc. The Good Practices and Tools section of this document outlines how a BA can use linear regression to develop a predictive tool for its operators.

Additional discussion on this topic is contained in "Appendix 1 – Data Quality Concerns Related to the Use of Actual Net Interchange Value" of this document.

The NERC Frequency Response Initiative Report addressed the relative merits of using the median versus linear regression for aggregating single event frequency response samples into a frequency response measurement score for compliance evaluation. This report provided 11 evaluation criteria as a basis for recommending the use of linear regression instead of the median for the frequency response measurement aggregation technique. The FRSDT made its own assessment on the basis of these evaluation criteria on September 20, 2012, but concluded that the median would be the best aggregation technique to use initially when the relative importance of each criterion was considered. A brief summary of the FRSDT majority consensus on the basis of each evaluation criterion is provided below.

- Provides two dimensional measurement – The FRSDT agrees that the two dimensional concept is a useful way to perceive frequency response characteristics, and that it may be useful for potential future modeling activities. Better data quality would increase support for such future efforts, and the use of the median for initial compliance evaluations within BAL-003-1 should not hinder any such effort. The FRSDT perceived this as a mild advantage for linear regression.
- Represents nonlinear characteristics – With considerations similar to those applied to the previous criterion, the FRSDT perceived this as a mild advantage for linear regression.
- Provides a single best estimator – The FRSDT put gave minimal importance to the characteristic of the median averaging the middle values when used with an even number of samples.
- Is part of a linear system - With considerations similar to those applied to the first two criteria, the FRSDT perceived this as a mild advantage for linear regression (particularly in the modeling area.)
- Represents bimodal distributions – The FRSDT put minimal weight of this criterion, as a change in Balancing Authority footprint does not seem to be addressed adequately by any aggregation technique.
- Quality statistics available – The FRSDT perceived this as a mild advantage for linear regression in that the statistics would be coupled directly to the compliance evaluation. The FRSDT also included this criterion as part of the modeling advantages cited above.

The FRSDT supports collecting data and performing quality statistical analysis. If it is determined that the use of the median, as opposed to a mean or linear regression aggregation, is yielding undesirable consequences, the FRSDT recommends that other aggregation techniques be re-evaluated at that time.

- Reducing influence of noise - This is the dominant concern of the FRSDT, and it perceives the median to have a major advantage over linear regression in addressing noise in the change in actual net interchange calculation. The FRSDT bases this judgment on: prior FRSDT studies that have shown that the median produces more stable results; the data used in the NERC Frequency Response Initiative document exhibits large quantities of noise; prior efforts of FRSDT members in performing frequency response sampling for their own Balancing Authorities over many years; and similar observations of noise in the CERTS frequency Monitoring Application. The FRSDT has serious concerns that the influence of noise has a greater tendency to yield a "false positive" compliance violation with linear regression than with the median. Also, limited studies performed by the FRSDT indicates the possibility that the resultant frequency response measure would yield more measurement variation across years with linear regression versus the median while the actual Balancing Authority performance remains unchanged.
- Reducing the influence of outliers – This is related to the previous criterion. The FRSDT recognizes four main sources of noise: concurrent operating phenomena (described elsewhere in this document), transient tie line flows for nearby contingencies, data acquisition time skew in tie line data measurements, and time skew and data compression issues in archiving techniques and tools such as PI. Some outliers may be caused in part by true variation in the actual frequency response, and it is desirable to include those in the frequency response measure. The FRSDT supports efforts in the near future to distinguish between outliers caused by noise versus true frequency response, and progress in this area may make it feasible and desirable to replace the median with linear regression, or some other validated technique. The FRSDT does note that this is a substantial undertaking, and it would require substantial input from a sufficient number of experts to help distinguish noise from true frequency response.
- Easy to calculate – The FRSDT perceives this to be a minor to moderate advantage for the median. However, more complex (but reasonably so) techniques would receive more support if clear progress can be made in noise elimination.
- Familiar indicator – The FRSDT perceives this to be a minor to moderate advantage for the median. However, more complex (but reasonably so) techniques would receive more support if clear progress can be made as a result of noise elimination.
- Currently used as a measure in BAL-003 – The present standard refers to an average and does not provide specific guidance on the computation of that average, but the FRSDT puts minimal weight on this evaluation criterion.

In summary, the FRSDT perceives an approximate balance between the modeling advantage for linear regression and the simplicity advantage of the median. However, the clear determinant in endorsing the use of the median is the data quality issue related to concurrent operational phenomena, transient tie line flows, and data acquisition and archiving limitations.

FERC Order No. 693 also directed the Standard (at P 375) to identify methods for Balancing Authorities to obtain Frequency Response. Requirement R1 allows Balancing Authorities to participate in Frequency Response Sharing Groups (FRSGs) to provide or obtain Frequency Response. These may be the same FRSGs that cooperate for BAL-002-0 or may be FRSGs that form for the purposes of BAL-003-1.

If BAs participate as an FRSG for BAL-003-1, compliance is based on the sum of the participants' performance.

Two other ways that BAs could obtain Frequency Response are through Supplemental Service or Overlap Regulation Service:

- No special action is needed if a BA provides or receives supplemental regulation. If the regulation occurs via Pseudo Tie, the transfer occurs automatically as part of Net Actual Interchange (NIA) and in response to information transferred from recipient to provider.
- If a BA provides overlap regulation, its FRS Form 1 will include the Frequency Bias setting as well as peak load and generation of the combined Balancing Authority Areas. The FRM event data will be calculated on the sum of the provider's and recipient's performance.

In the Violation Severity Levels for Requirement R1, the impact of a BA not having enough frequency response depends on two factors:

- Does the Interconnection have sufficient response?
- How short is the BA in providing its FRO?

The VSL takes these factors into account. While the VSLs look different than some other standards, an explanation would be helpful.

VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plane as single-BA Interconnections.

Consider a small BA whose performance is 70% of its FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response, because this would treat multi-BA Interconnections more harshly than single BA Interconnections on a significant scale.

The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively.

Requirement 2

R2. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO.

Background and Rationale

Attachment A of the Standard discusses the process the ERO will follow to validate the BA's FRS Form 1 data and publish the official Frequency Bias Settings. Historically, it has taken multiple rounds of validation and outreach to confirm each BA's data due to transcription errors, misunderstanding of instructions, and other issues. While BAs historically submit Bias Setting data by January 1, it often takes one or more months to complete the process.

The target is to have BAs submit their data by January 10. The BAs are given 30 days to assemble their data since the BAs are dependent on the ERO to provide them with FRS Form 1, and there may be process delays in distributing the forms since they rely on identification of frequency events through November 30 of the preceding year.

Frequency Bias Settings generally change little from year to year. Given the fact that BAs can encounter staffing or EMS change issues coincident with the date the ERO sets for new Frequency Bias Setting implementation, the standard provides a 24 hour window on each side of the target date.

To recap the annual process:

1. The ERO posts the official list of frequency events to be used for this Standard in early December. The FRS Form 1 for each Interconnection will be posted shortly thereafter.

2. The Balancing Authority submits its revised annual Frequency Bias Setting value to NERC by January 10.

3. The ERO and the Resources Subcommittee validate Frequency Bias Setting values, perform error checking, and calculate, validate, and update CPS2 L10 values. This data collection and validation process can take as long as two months.

4. Once the L10 and Frequency Bias Setting values are validated, The ERO posts the values for the upcoming year and also informs the Balancing Authorities of the date on which to implement revised Frequency Bias Setting values. Implementation typically would be on or about March 1st of each year.

BAL-003-0.1b standard requires a minimum Frequency Bias Setting equal in absolute value to one percent of the Balancing Authority's estimated yearly peak demand (or maximum generation level if native load is not served). For most Balancing Authorities this calculated amount of Frequency Bias is significantly greater in absolute value than their actual Frequency Response characteristic (which represents an over-bias condition) resulting in over-control

since a larger magnitude response is realized. This is especially true in the Eastern Interconnection where this condition requires excessive secondary frequency control response which degrades overall system performance and increases operating cost as compared to requiring an appropriate balance of primary and secondary frequency control response.

Balancing Authorities were given a minimum Frequency Bias Setting obligation because there had never been a mandatory Frequency Response Obligation. This historic "one percent of peak per 0.1Hz" obligation, dating back to NERC's predecessor, NAPSIC, was intended to ensure all BAs provide some support to Interconnection frequency.

The ideal system control state exists when the Frequency Bias Setting of the Balancing Authority exactly matches the actual Frequency Response characteristic of the Balancing Authority. If this is not achievable, over-bias is significantly better from a control perspective than under-bias with the caveat that Frequency Bias is set relatively close in magnitude to the Balancing Authority actual Frequency Response characteristic. Setting the Frequency Bias to better approximate the Balancing Authority natural Frequency Response characteristic will improve the quality and accuracy of ACE control, CPS & DCS and general AGC System control response. This is the technical basis for recommending an adjustment to the long standing "1% of peak/0.1Hz" Frequency Bias Setting. The Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard is intended to bring the Balancing Authorities' Frequency Bias Setting closer to their natural Frequency Response. Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard balances the following objectives:

- Bring the Frequency Bias Setting and Frequency Response closer together.
- Allow time to analyze impact on other Standards (CPS, BAAL and to a lesser extent DCS) by adjustments in the minimum Frequency Bias Setting, by accommodating only minor adjustments.
- Do not allow the Frequency Bias Setting minimum to drop below natural Frequency Response, because under-biasing could affect an Interconnection adversely.

Additional flexibility has been added to the Frequency Bias Setting based on the actual Frequency Response (FRM) by allowing the Frequency Bias Setting to have a value in the range from 100% of FRM to 125% of FRM. This change has been included for the following reasons:

- When the new standardized measurement method is applied to BAs with a Frequency Response close to the interconnection minimum response, the requirement to use FRM is as likely to result in a Frequency Bias Setting below the actual response as it is to result in a response above the actual response. From a reliability perspective, it is

always better to have a Frequency Bias Setting slightly above the actual Frequency Response.

- As with single BA interconnections, the tuning of the control system may require that the BA implement a Frequency Response Setting slightly greater in absolute terms than its actual Frequency Response to get the best performance.

- The new standardized measurement method for determining FRM in some cases results in a measured Frequency Response significantly lower than the previous methods used by some BAs. It is desirable to not require significant change in the Frequency Bias Setting for these BAs that experience a reduction in their measured Frequency Response.

Requirement 3

R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is:

- *Less than zero at all times, and*
- *Equal to or more negative than its Frequency Response Obligation when the Frequency varies from 60 Hz by more that +/- 0.036 Hz.*

Background and Rationale

In multi-Balancing Authority interconnections, the Frequency Bias Setting should be coordinated among all BAs on the interconnection. When there is a minimum Frequency Bias Setting requirement, it should apply for all BAs. However, BAs using a variable Frequency Bias Setting may have non-linearity in their actual response for a number of reasons including the dead-bands implemented on their generator governors. The measurement to ensure that these BAs are conforming to the interconnection minimum is adjusted to remove the dead-band range from the calculated average Frequency Bias Setting actually used. For BAs using variable bias, FRS Form 1 has a data entry location for the previous year's average monthly Bias. The Balancing Authority and the ERO can compare this value to the previous year's Frequency Bias Setting minimum to ensure R3 has been met.

On single BA interconnections, there is no need to coordinate the Frequency Bias Setting with other BAs. This eliminates the need to maintain a minimum Frequency Bias Setting for any reason other than meeting the reliability requirement as specified by the Frequency Response Obligation.

Requirement 4

R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either:

- *The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or*
- *The Frequency Bias Setting as shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.*

Background and Rationale

This requirement reflects the operating principles first established by NERC Policy 1 and is similar to Requirement R6 of the approved BAL-003-0.1b standard. Overlap Regulation Service is a method of providing regulation service in which the Balancing Authority providing the regulation service incorporates another Balancing Authority's actual interchange, frequency response, and schedules into the providing Balancing Authority's AGC/ACE equation.

As noted earlier, a BA that is providing Overlap Regulation will report the sum of the Bias Settings in its FRS Form 1. Balancing Authorities receiving Overlap Regulation Service have an ACE and Frequency Bias Setting equal to zero (0).

How this Standard Meets the FERC Order 693 Directives

FERC Directive

The following is the relevant paragraph of Order No. 693.

> *Accordingly, the Commission approves Reliability Standard BAL-003-0 as mandatory and enforceable. In addition, the Commission directs the ERO to develop a modification to BAL-003-0 through the Reliability Standards development process that: (1) includes Levels of Non-Compliance; (2) determines the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other requirements of the Reliability Standard are being met, and to modify Measure M1 based on that determination and (3) defines the necessary amount of Frequency Response needed for Reliable Operation for each balancing authority with methods of obtaining and measuring that the frequency response is achieved.*

1. Levels of Non-Compliance

VRFs and VSLs are an equally effective way of assigning compliance elements to the standard.

2. Determine the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other Requirements of the Reliability Standard are met

BAL-003 V0 R2 (the basis of Order No. 693) deals with the calculation of Frequency Bias Setting such that it reflects natural Frequency Response.

The drafting team has determined that a sample size on the order of at least 20 events is necessary to have a high confidence in the estimate of a BA's Frequency Response. Selection of the frequency excursion events used for analysis will be done via a method outlined in Attachment A to the Standard.

On average, these events will represent the largest 2-3 "clean" frequency excursions occurring each month.

Since Frequency Bias Setting is an annual obligation, the survey of the at least 20 frequency excursion events will occur once each year.

3. Define the necessary amount of Frequency Response needed for Reliable Operation for each Balancing Authority with methods of obtaining and measuring that the frequency response is achieved

Necessary Amount of Frequency Response

The drafting team has proposed the following approach to defining the necessary amount of frequency response. In general, the goal is to avoid triggering the first step of under-frequency load shedding (UFLS) in the given Interconnection for reasonable contingencies expected. The

methodology for determining each Interconnection's and Balancing Authority's obligation is outlined in Attachment A to the Standard.

It should be noted the standard cannot guarantee there will never be a triggering of UFLS as the magnitude of "point C" differs throughout an interconnection during a disturbance and there are local areas that see much wider swings in frequency.

The contingency protection criterion is the largest reasonably expected contingency in the Interconnection. This can be based on the largest observed credible contingency in the previous 10 years or the largest Category C event for the Interconnection.

Attachment A to the standard presents the base obligation by Interconnection and adds a Reliability Margin. The Reliability Margin included addresses the difference between Points B and C and accounts for variables.

For multiple BA interconnections, the Frequency Response Obligation is allocated to BAs based on size. This allocation will be based on the following calculation:

Methods of Obtaining Frequency Response

The drafting team believes the following are valid methods of obtaining Frequency Response:

- Regulation services.
- Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration.
- Through a tariff (e.g. Frequency Response and regulation service).
- From generators through an interconnection agreement.
- Contract with an internal resource or loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response).

Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation.

Measuring that the Frequency Response is Achieved

FRS Form 1 and the underlying data retained by the BA will be used for measuring whether Frequency Response was provided. FRS Form 1 will provide the guidance on how to account for and measure Frequency Response.

Going Beyond the Directive

Based on the combined operating experience of the SDT, the drafting team consensus is that each Interconnection has sufficient Frequency Response. If margins decline, there may be a need for additional standards or tools. The drafting team and the Resources Subcommittee are working with the ERO on its Frequency Response Initiative to develop processes and good practices so the Interconnections are prepared. These good practices and tools are described in the following section.

The drafting team is also evaluating a risk-based approach for basing the Interconnection Frequency Response Obligation on an historic probability density of frequency error, and for allocating the obligation on the basis of the Balancing Authority's average annual ACE share of frequency error. This allocation method uses the inverse of the rationale for allocating the CPS1 epsilon requirement by Bias share.

Good Practices and Tools

Background

This section outlines tips and tools to help Balancing Authorities meet the Frequency Response Standard or to operate more reliably. If you have suggested additions, please send them to balancing@nerc.com.

Identifying and Estimating Frequency Responsive Reserves

Knowing the quantity and depth of frequency responsive reserves in real time is a possible next step to being better prepared for the next event. The challenge in achieving this is having the knowledge of the capabilities of all sources of frequency response. Presently the primary source of Frequency Response remains with the generation resources in our fleets.

Understanding how each of these sources performs to changes in system frequency and knowing their limitations would improve the BA's ability to measure frequency responsive reserves. Presently there are only guidelines, criteria and protocols in some regions of the industry that identify specific settings and performance expectations of Primary Frequency Response of resources.

One method of gaining a better understanding of performance is to measure performance during actual events that occur on the system. Measuring performance during actual events would only provide feedback for performance during that specific event and would not provide insight into depth of response or other limitations.

Repeated measurements will increase confidence in expected performance. NERC modeling standards are in process to be revised that will improve the BA's insight into predicting available frequency responsive reserves. However, knowing how resources are operated, what modes of operation provide sustained Primary Frequency Response and knowing the operating range of this response would give the BA the knowledge to accurately predict frequency response and the amount of frequency responsive reserves available in real time.

Some benefits have been realized by communicating to generation resources (GO) the importance of operating in modes that allow Primary Frequency Response to be sustained by the control systems of the resource. Other improvements in implementation of Primary Frequency Response have been achieved through improved settings on turbine governors through the elimination of "step" frequency response with the simultaneous reduction in governor dead-band settings.

Improvements in the full AGC control loop of the generating resource, which accounts for the expected Primary Frequency Response, have improved the delivery of quality Primary Frequency Response while minimizing secondary control actions of generators. Some of these actions can provide quick improvement in delivery of Primary Frequency Response.

Once Primary Frequency Response sources are known, the BA could calculate available reserves that are frequency responsive. Planning for these reserves during normal and emergency operations could be developed and added to the normal planning process.

Using FRS Form 1 Data

The information collected for this standard can be supplemented by a few data points to provide the Balancing Authority useful tools and information. The BA could do a regression analysis of its frequency response against the following values:

- Load (value A).
- Interchange (Value A).
- Total generation.
- Spinning reserve.

While the last two values above are not part of Form 1, they should be readily available. Small BAs might even include headroom on its larger generators as part of the regression.

The regression would provide a formula the BA could program in its EMS to present the operator a real time estimate of the BA's Frequency Response.

Statistical outliers in the regression would point to cases meriting further inspection to find causes of low Frequency Response or opportunities for improvement.

Tools

Single generating resource performance evaluation tools for steam turbine, combustion turbine (simple cycle or combined cycle) and for intermittent resources are available at the following link. http://texasre.org/standards_rules/standardsdev/rsc/sar003/Pages/Default.aspx.

These tools and the regional standard associated with them are in their final stages of development in the Texas region.

These tools will be posted on the NERC website.

References

NERC *Frequency Response Characteristic Survey Training Document* (Found in the NERC Operating Manual)

NERC Resources Subcommittee Position Paper on Frequency Response

NERC TIS Report *Interconnection Criteria for Frequency Response Requirements (for the Determination Interconnection Frequency Response Obligations (IFRO)*

Frequency Response Standard Field Trial Analysis, September 17, 2012

Appendix 1 - Data Quality Concerns Related To The Use Of The Actual Net Interchange Value

Actual net interchange for a typical Balancing Authority (BA) is the summation of its tie lines to other BAs. In some cases, there are pseudo-ties in it which reflect the effective removal or addition of load and/or generation from another BA, or it could include supplemental regulation as well. But in the typical scenario, actual net interchange values that are extracted from EMS data archiving can be influenced by data latency times in the data acquisition process, and also any timestamp skewing in the archival process.

Of greater concern, however, are the inevitable variations of other operating phenomena occurring concurrently with a frequency event. The impacts of these phenomena are superimposed on actual net interchange values along with the frequency response that we wish to measure through the use of the actual net interchange value.

To explore this issue further, let's begin with the idealized condition:

- frequency is fairly stable at some value near or a little below 60 Hz
- ACE of the non-contingent BA of interest is 0 and has been 0 for an extended period, and AGC control signals have not been issued recently
- Actual net interchange is "on schedule", and there are no schedule changes in the immediate future
- BA load is flat
- All generators not providing AGC are at their targets
- Variable generation such as wind and solar are not varying
- Operators have not directed any manual movements of generation recently

And when the contingency occurs in this idealized state, the change in actual net interchange will be measuring only the decline in load due to lesser frequency and generator governor response, and, none of the contaminating influences. While the ACE may become negative due to the actual frequency response being less than that called for by the frequency bias setting within the BA's AGC system, this contaminating influence on measuring frequency response will not appear in the actual net interchange value if the measurement interval ends before the generation on AGC responds.

Now let's explore the sensitivity of the resultant frequency response sampling to the relaxation of these idealized circumstances.

1. The "60 Hz load" increases moderately due to time of day concurrent with the frequency event. If the frequency event happens before AGC or operator-directed manual load adjustments occur, then the actual net interchange will be reduced by the moderate increase in load and the frequency response will be underestimated. But if the frequency event happens while AGC response and/or manual adjustments occur, then the actual net interchange will be increased by the AGC response (and/or manual adjustments) and the frequency response will be overestimated.

2. The “60 Hz load” decreases moderately due to time of day concurrent with the frequency event. If the frequency event happens before AGC or operator-directed manual load adjustments occur, then the actual net interchange will be increased by the moderate reduction in load and the frequency response will be overestimated. But if the frequency event happens while AGC response and/or manual adjustments occur, then the actual net interchange will be decreased by the AGC response (and/or manual adjustments) and the frequency response will be underestimated.
3. In anticipation of increasing load during the next hour, the operator increases manual generation before the load actually appears. If the frequency event happens while the generation “leading” the load is increasing, then the actual net interchange will be increased by the increase in manual generation and the frequency response will be overestimated. But if the frequency event occurs when the result of AGC signals sent to offset the operator’s leading actions take effect, then the actual net interchange will be decreased and the frequency response is underestimated.
4. In anticipation of decreasing load during the next hour, the operator decreases manual generation before the load actually declines. If the frequency event happens while the generation “leading” the load downward is decreasing, then the actual net interchange will be decreased by the reduction in manual generation and the frequency response will be underestimated. But if the frequency event occurs when the result of AGC signals sent to offset the operator’s leading actions take effect, then the actual net interchange will be increased and the frequency response is overestimated.
5. A schedule change to export more energy is made at 5 minutes before the top of the hour. The BA’s “60 Hz load” is not changing. The schedule change is small enough that the operator is relying on upward movement of generators on AGC to provide the additional energy to be exported. The time at which the AGC generators actually begin to provide the additional energy is dependent on how much time passes before the AGC algorithm gets out of its deadbands, the individual generator control errors get large enough for sending out the control signal, and maybe 20 seconds to 3 minutes for the response to be effected. The key point here is that it is not clear when the effects of a schedule change, as manifested in a change in generation and then ultimately a change in actual net interchange, will occur.
6. With the expected penetration of wind in the near future, unanticipated changes in their output will tend to affect actual net interchange and add noise to the frequency response observation process.

To a greater or lesser extent, 1 through 4 above are happening continuously for the most part with most BAs in the Eastern and Western Interconnections. The frequency response is buried within the typical hour to hour operational cacophony superimposed on actual net interchange values. The choice of metrics will be important to artfully extract frequency response from the noise and other unrepresentative error.

Standard BAL-003-0.1b — Frequency Response and Bias

A. Introduction

1. **Title:** **Frequency Response and Bias**

2. **Number:** BAL-003-0.1b

3. **Purpose:** This standard provides a consistent method for calculating the Frequency Bias component of ACE.

4. **Applicability:**

   4.1. Balancing Authorities.

5. **Effective Date:** Immediately after approval of applicable regulatory authorities.

B. Requirements

R1. Each Balancing Authority shall review its Frequency Bias Settings by January 1 of each year and recalculate its setting to reflect any change in the Frequency Response of the Balancing Authority Area.

R1.1. The Balancing Authority may change its Frequency Bias Setting, and the method used to determine the setting, whenever any of the factors used to determine the current bias value change.

R1.2. Each Balancing Authority shall report its Frequency Bias Setting, and method for determining that setting, to the NERC Operating Committee.

R2. Each Balancing Authority shall establish and maintain a Frequency Bias Setting that is as close as practical to, or greater than, the Balancing Authority's Frequency Response. Frequency Bias may be calculated several ways:

R2.1. The Balancing Authority may use a fixed Frequency Bias value which is based on a fixed, straight-line function of Tie Line deviation versus Frequency Deviation. The Balancing Authority shall determine the fixed value by observing and averaging the Frequency Response for several Disturbances during on-peak hours.

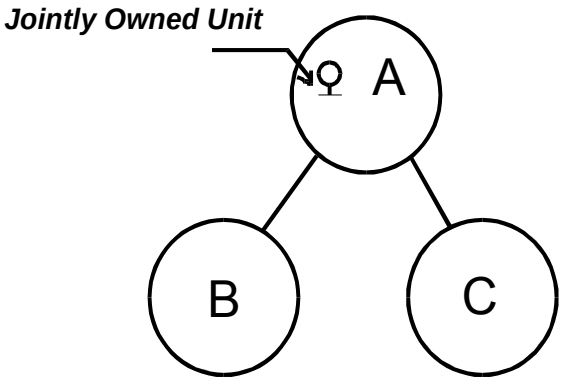
R2.2. The Balancing Authority may use a variable (linear or non-linear) bias value, which is based on a variable function of Tie Line deviation to Frequency Deviation. The Balancing Authority shall determine the variable frequency bias value by analyzing Frequency Response as it varies with factors such as load, generation, governor characteristics, and frequency.

R3. Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless such operation is adverse to system or Interconnection reliability.

R4. Balancing Authorities that use Dynamic Scheduling or Pseudo-ties for jointly owned units shall reflect their respective share of the unit governor droop response in their respective Frequency Bias Setting.

R4.1. Fixed schedules for Jointly Owned Units mandate that Balancing Authority (A) that contains the Jointly Owned Unit must incorporate the respective share of the unit governor droop response for any Balancing Authorities that have fixed schedules (B and C). See the diagram below.

R4.2. The Balancing Authorities that have a fixed schedule (B and C) but do not contain the Jointly Owned Unit shall not include their share of the governor droop response in their Frequency Bias Setting.



R5. Balancing Authorities that serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of the Balancing Authority's estimated yearly peak demand per 0.1 Hz change.

R5.1. Balancing Authorities that do not serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of its estimated maximum generation level in the coming year per 0.1 Hz change.

R6. A Balancing Authority that is performing Overlap Regulation Service shall increase its Frequency Bias Setting to match the frequency response of the entire area being controlled. A Balancing Authority shall not change its Frequency Bias Setting when performing Supplemental Regulation Service.

C. Measures

M1. Each Balancing Authority shall perform Frequency Response surveys when called for by the Operating Committee to determine the Balancing Authority's response to Interconnection Frequency Deviations.

D. Compliance

Not Specified.

E. Regional Differences

None identified.

F. Associated Documents

1. Appendix 1 — Interpretation of Requirement R3 (October 23, 2007).

2. Appendix 2 — Interpretation of Requirements R2, R2.2, R5, and R5.1 (February 12, 2008).

Version History

Version	Date	Action	Change Tracking
0	April 1, 2005	Effective Date	New
0	August 8, 2005	Removed "Proposed" from Effective Date	Errata
0	March 16, 2007	FERC Approval — Order 693	New

0a	December 19, 2007	Added Appendix 1 — Interpretation of R3 approved by BOT on October 23, 2007	Addition
0a	July 21, 2008	FERC Approval of Interpretation of R3	Addition
0b	February 12, 2008	Added Appendix 2 — Interpretation of R2, R2.2, R5, and R5.1 approved by BOT on February 12, 2008	Addition
0.1b	January 16, 2008	Section F: added "1."; changed hyphen to "en dash." Changed font style for "Appendix 1" to Arial; updated version number to "0.1b"	Errata
0.1b	October 29, 2008	BOT approved errata changes	Errata
0.1a	May 13, 2009	FERC Approved errata changes – version changed to 0.1a (Interpretation of R2, R2.2, R5, and R5.1 not yet approved)	Errata
0.1b	May 21, 2009	FERC Approved Interpretation of R2, R2.2, R5, and R5.1	Addition

Appendix 1

Interpretation of Requirement 3

Request: *Does the WECC Automatic Time Error Control Procedure (WATEC) violate Requirement 3 of BAL-003-0?*

Interpretation:

Requirement 3 of BAL-003-0 — Frequency Response and Bias deals with Balancing Authorities using Tie-Line Frequency Bias as the normal mode of automatic generation control.

> **BAL-003-0**
> **R3.** Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless such operation is adverse to system or Interconnection reliability.

- Tie-Line Frequency Bias is one of the three foundational control modes available in a Balancing Authority's energy management system. (The other two are flat-tie and flat-frequency.) Many Balancing Authorities layer other control objectives on top of their basic control mode, such as automatic inadvertent payback, CPS optimization, time control (in single BA Interconnections).
- As long as Tie-Line Frequency Bias is the underlying control mode and CPS1 is measured and reported on the associated ACE equation, there is no violation of BAL-003-0 Requirement 3:

$$ACE = (NI_A - NI_S) - 10B\,(F_A - F_S) - I_{ME}$$

Appendix 2

Interpretation of Requirements R2, R2.2, R5, R5.1

Request: *ERCOT specifically requests clarification that a Balancing Authority is entitled to use a variable bias value as authorized by Requirement R2.2, even though Requirement 5 seems not to account for the possibility of variable bias settings.*

Interpretation:

The consensus of the Resources Subcommittee is that BAL-003-0 — Frequency Response and Bias — Requirement R2 does not conflict with BAL-003-0 Requirement R5.

BAL-003-0 — Frequency Response and Bias Requirement 2 requires a Balancing Authority to analyze its response to frequency excursions as a first step in determining its frequency bias setting. The Balancing Authority may then choose a fixed bias (constant through the year) per Requirement 2.1, or a variable bias (varies with load, specific generators, etc.) per Requirement 2.2.

BAL-003-0

R2. Each Balancing Authority shall establish and maintain a Frequency Bias Setting that is as close as practical to, or greater than, the Balancing Authority's Frequency Response. Frequency Bias may be calculated several ways:

- **R2.1.** The Balancing Authority may use a fixed Frequency Bias value which is based on a fixed, straight-line function of Tie Line deviation versus Frequency Deviation. The Balancing Authority shall determine the fixed value by observing and averaging the Frequency Response for several Disturbances during on-peak hours.
- **R2.2.** The Balancing Authority may use a variable (linear or non-linear) bias value, which is based on a variable function of Tie Line deviation to Frequency Deviation. The Balancing Authority shall determine the variable frequency bias value by analyzing Frequency Response as it varies with factors such as load, generation, governor characteristics, and frequency.

BAL-003-0 — Frequency Response and Bias Requirement 5 sets a minimum contribution for all Balancing Authorities toward stabilizing interconnection frequency. The 1% bias setting establishes a minimum level of automatic generation control action to help stabilize frequency following a disturbance. By setting a floor on bias, Requirement 5 also helps ensure a consistent measure of control performance among all Balancing Authorities within a multi-Balancing Authority interconnection. However, ERCOT is a single Balancing Authority interconnection. The bias settings ERCOT uses do produce, on average, the best level of automatic generation control action to meet control performance metrics. The bias value in a single Balancing Authority interconnection does not impact the measure of control performance.

BAL-003-0

R5. Balancing Authorities that serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of the Balancing Authority's estimated yearly peak demand per 0.1 Hz change.

- **R5.1.** Balancing Authorities that do not serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of its estimated maximum generation level in the coming year per 0.1 Hz change.

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Unofficial Comment Form

Project 2007-12 Frequency Response

Please **DO NOT** use this form to submit comments. Please use the electronic form to submit comments on the BAL-003-1 Frequency Response and Bias Setting. The electronic comment form must be completed by 8 p.m. ET **November 5, 2012.**

http://www.nerc.com/filez/standards/Frequency_Response.html

If you have questions please contact Darrel Richardson at darrel.richardson@nerc.net or by telephone at (609) 613-1848.

Background Information

This posting is soliciting formal comment.

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be analyzed, and the reasons for the decline in Frequency Response can be identified. The standard would set a minimum Frequency Response obligation for each Balancing Authority, provide a uniform calculation of Frequency Response and Frequency Bias Settings that transition to values closer to natural Frequency Response, and encourage coordinated AGC operation.

The Drafting Team made significant modifications to the proposed standard BAL-003-1 and associated documents based on industry comments from the second posting and initial ballot. These modifications include:

- Modifying the definition for Frequency Response Measure
- Removing reference to Reserve Sharing Groups and replacing with Frequency Response Sharing Group
- Creation of definition for Frequency Response Sharing Group
- Modifying Requirement R2
- Creating a new Requirement R3 for entities using variable Frequency Bias
- Removing requirement for operating in Tie Line Bias mode
- Removing Requirement R5 and combining into revised Requirement R2 and new Requirement R3
- Modifying Attachment A to provide additional clarity

- Creating a Procedure to provide instructions for the ERO to follow in supporting the standard
- Re-writing the Background Document to incorporate additional language for justification of requirements and provide additional clarity

You do not have to answer all questions. Enter all comments in simple text format.

1. The SDT has made minor modifications to the proposed definition for Frequency Response Measure based on industry comments. Do you agree that these modifications provide sufficient clarity? If not, please explain in the comment area.

   ☐ Yes
   ☐ No

   Comments:

2. The SDT has created a definition for Frequency Response Sharing Group. The definition is as follows:

   A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members.

   Do you agree with this definition? If not, please explain in the comment area.

   ☐ Yes
   ☐ No

   Comments:

3. The SDT has added Requirement R3 for entities using variable Frequency Bias.

   R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is:

   3.1 Less than zero at all times, and

   3.3 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/-0.036 Hz.

   Do you agree with the proposed requirement? If not, please explain in the comment area.

   ☐ Yes
   ☐ No

   Comments:

4. Based on Industry comments the SDT has modified ”Attachment A- Supporting Document” to provide additional clarity. Do you agree with the modifications? If not, what modifications do you disagree with?

   ☐ Yes
   ☐ No

   Comments:

5. The SDT has moved a portion of the material located in Attachment A and all of the material located in ”Attachment B- Process for Adjusting Bias Setting Floor” into a new document “Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard”. The SDT created this document to assign tasks to the ERO and provide instructions for the ERO to follow when carrying them out under the BAL-003-1 standard. Do you agree that the ERO should perform these tasks and that this document provides sufficient detail for the ERO to do it under the BAL-003-1 standard? If not, what needs to be added to the document?”.

   ☐ Yes
   ☐ No

   Comments:

6. The SDT is now using the method detailed in the Frequency Response Initiative Report dated September 30, 2012 to calculate the Interconnection Frequency Response Obligation. Do you agree that this method provides for the proper amount of Frequency Response? If not, what specifically needs to be changed?

   ☐ Yes
   ☐ No

   Comments:

7. Based on Industry comments received the SDT made significant clarifying modifications to the Background Document. Do you agree that this document provides sufficient information to justify the rationale used by the SDT in developing the draft standard and provides the industry with sufficient understanding of the issues being addressed by the standard?

   ☐ Yes
   ☐ No

   Comments:

8. If you are not in support of this draft standard, what modifications do you believe need to be made in order for you to support the standard? Please list the issues and your proposed solution to the issue.

   ☐ Yes
   ☐ No

   Comments:

9. Please provide any other comments (that you have not already provided in response to the questions above) that you have on the draft standard BAL-003-1.

   Comments:

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Project 2007-12 Frequency Response BAL-003-1
Mapping Document

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
R1. Each Balancing Authority shall review its Frequency Bias Settings by January 1 of each year and recalculate its setting to reflect any change in the Frequency Response of the Balancing Authority Area. R1.1. The Balancing Authority may change its Frequency Bias Setting, and the method used to determine the setting, whenever any of the factors used to determine the current bias value change. R1.2. Each Balancing Authority shall report its Frequency Bias Setting, and method	This Requirement has been moved into BAL-003-1 Attachment A & FRS Form 1 as described in the Proposed Language Section	Attachment A Balancing Authorities that merge or that transfer load or generation are encouraged to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation to the Interconnection remains the same and so that CPS limits can be adjusted. Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
for determining that setting, to the NERC Operating Committee.		submit their FRS Form 1. AND FRS Form 1 Note : Balancing Authorities with variable Frequency Bias Settings shall calculate monthly average Frequency Bias Settings. The previous year's monthly averages will be reported annually on FRS Form 1.
R2. Each Balancing Authority shall establish and maintain a Frequency Bias Setting that is as close as practical to, or greater than, the Balancing Authority's Frequency Response. Frequency Bias may be calculated several ways: **R2.1.** The Balancing Authority may use a fixed Frequency Bias value which is based on a fixed, straight-line function of Tie Line deviation versus Frequency Deviation. The	This Requirement is included in BAL-003-1 as described in the Proposed Language Section.	**R2.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO. **R3.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias setting that is:

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
Balancing Authority shall determine the fixed value by observing and averaging the Frequency Response for several Disturbances during on-peak hours. **R2.2.** The Balancing Authority may use a variable (linear or non-linear) bias value, which is based on a variable function of Tie Line deviation to Frequency Deviation. The Balancing Authority shall determine the variable frequency bias value by analyzing Frequency Response as it varies with factors such as load, generation, governor characteristics, and frequency.		3.1 Less than zero at all times, and 3.2 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz. AND Attachment A Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit their FRS Form 1. AND FRS Form 1

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
		Note : Balancing Authorities with variable Frequency Bias Settings shall calculate monthly average Frequency Bias Settings. The previous year's monthly averages will be reported annually on FRS Form 1. AND A portion of this Requirement is being phased out in accordance with the process detailed in the Procedure. This phase out is intended to bring the Frequency Bias Setting closer or equal to the natural Frequency Response.
R3. Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless such operation is adverse to system or Interconnection reliability.	This Requirement has been removed from the BAL-003-1 standard.	This Requirement has been removed from proposed standard BAL-003-I. It is duplicative of BAL-005-0.1b Requirements R6 and R7. BAL-005-0.1b R6. The Balancing Authority's AGC shall compare total Net Actual Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority's ACE. Single Balancing Authorities operating asynchronously may employ alternative ACE calculations such as (but not limited to) flat frequency control. If a Balancing Authority is unable to calculate ACE for more than 30 minutes it shall notify its

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
		Reliability Coordinator. R7. The Balancing Authority shall operate AGC continuously unless such operation adversely impacts the reliability of the Interconnection. If AGC has become inoperative, the Balancing Authority shall use manual control to adjust generation to maintain the Net Scheduled Interchange.
R4. Balancing Authorities that use Dynamic Scheduling or Pseudo-ties for jointly owned units shall reflect their respective share of the unit governor droop response in their respective Frequency Bias Setting. R4.1. Fixed schedules for Jointly Owned Units mandate that Balancing Authority (A) that contains the Jointly Owned Unit must incorporate the respective share of the unit governor droop response for any Balancing Authorities that have fixed	This Requirement has been removed from the BAL-003-1 standard.	This Requirement addresses how to calculate Frequency Bias Settings. This is no longer needed since the Frequency Bias Settings are calculated in FRS Form 1 using Frequency Response associated with the "official" list of events and a couple of "floor or ceiling" limits (% of peak load/gen and FRO). The entire calculation is built into the FRS Form 1 workbook.

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
schedules (B and C). R4.2. The Balancing Authorities that have a fixed schedule (B and C) but do not contain the Jointly Owned Unit shall not include their share of the governor droop response in their Frequency Bias Setting.		
R5. Balancing Authorities that serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of the Balancing Authority's estimated yearly peak demand per 0.1 Hz change. **R5.1.** Balancing Authorities that do not serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of its estimated maximum generation level in the coming year per 0.1 Hz change.	This Requirement has been combined into Requirements R2 and R3 of BAL-003-1.	**R2.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO. **R3.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias setting that is: 3.1 Less than zero at all times, and 3.2 Equal to or more negative than its Frequency

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
		Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz.
R6. A Balancing Authority that is performing Overlap Regulation Service shall increase its Frequency Bias Setting to match the frequency response of the entire area being controlled. A Balancing Authority shall not change its Frequency Bias Setting when performing Supplemental Regulation Service.	This Requirement has been moved into BAL-003-1 Requirement R4.	**R4.** Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either: • The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or • The Frequency Bias Setting as shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Project 2007-12 Frequency Response BAL-003-1
Mapping Document

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
R1. Each Balancing Authority shall review its Frequency Bias Settings by January 1 of each year and recalculate its setting to reflect any change in the Frequency Response of the Balancing Authority Area. R1.1. The Balancing Authority may change its Frequency Bias Setting, and the method used to determine the setting, whenever any of the factors used to determine the current bias value change. R1.2. Each Balancing Authority shall report its Frequency Bias Setting, and method for determining that setting, to the NERC Operating Committee.	This Requirement has been moved into BAL-003-1 Attachment A & FRS Form 1 as described in the Proposed Language Section	Attachment A Balancing Authorities that merge or that transfer load or generation are encouraged to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation to the Interconnection remains the same and so that CPS limits can be adjusted. Each Balancing Authority ~~shall~~ reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO ~~on FRS Form 1 by January 10~~ each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below~~December 10~~, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit their FRS Form 1. AND

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
		FRS Form 1 Note : Balancing Authorities with variable Frequency Bias Settings shall calculate monthly average Frequency Bias Settings. The previous year's monthly averages will be reported annually on FRS Form 1.
R2. Each Balancing Authority shall establish and maintain a Frequency Bias Setting that is as close as practical to, or greater than, the Balancing Authority's Frequency Response. Frequency Bias may be calculated several ways: **R2.1.** The Balancing Authority may use a fixed Frequency Bias value which is based on a fixed, straight-line function of Tie Line deviation versus Frequency Deviation. The Balancing Authority shall determine the fixed value by observing and averaging the Frequency Response for several Disturbances during on-peak hours. **R2.2.** The Balancing Authority may use a variable (linear or non-linear) bias value, which is based on a variable function of Tie Line deviation to Frequency Deviation.	This Requirement is included in BAL-003-1 as described in the Proposed Language Section.	**R2.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO. **R3.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias setting that is: 3.1 Less than zero at all times, and 3.2 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz. ~~R2. Each Balancing Authority not participating in Overlap Regulation Service shall implement the Frequency Bias Setting (fixed or variable) validated by the ERO, into its Area Control Error (ACE) calculation beginning on the date specified by the ERO to ensure effectively~~

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
The Balancing Authority shall determine the variable frequency bias value by analyzing Frequency Response as it varies with factors such as load, generation, governor characteristics, and frequency.		~~coordinated Tie Line Bias control.~~ AND Attachment A Each Balancing Authority ~~shall~~ reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO ~~on FRS Form 1 by January 10~~ each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below~~December 10~~, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit their FRS Form 1. AND FRS Form 1 Note : Balancing Authorities with variable Frequency Bias Settings shall calculate monthly average Frequency Bias Settings. The previous year's monthly averages will be reported annually on FRS Form 1. AND

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
		A portion of this Requirement is being phased out in accordance with the process detailed in the Procedure~~Attachment B~~. This phase out is intended to bring the Frequency Bias Setting closer or equal to the natural Frequency Response.
R3. Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless such operation is adverse to system or Interconnection reliability.	This Requirement has been removed from~~into~~ the BAL-003-1 standard ~~Requirement R3~~.	~~R3. Each Balancing Authority not receiving Overlap Regulation Service shall operate its Automatic Generation Control (AGC) in Tie Line Bias mode to ensure effectively coordinated control, unless such operation would have an Adverse Reliability Impact on the Balancing Authority's Area.~~ This Requirement has been removed from proposed standard BAL-003-I. It is duplicative of BAL-005-0.1b Requirements R6 and R7. BAL-005-0.1b R6. The Balancing Authority's AGC shall compare total Net Actual Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority's ACE. Single Balancing Authorities operating asynchronously may employ alternative ACE calculations such as (but not limited to) flat frequency control. If a Balancing Authority is unable to calculate ACE for more than 30 minutes it shall notify its Reliability Coordinator. R7. The Balancing Authority shall operate AGC continuously unless such operation adversely impacts the reliability of the Interconnection. If AGC has become inoperative, the Balancing Authority shall use manual control to adjust generation to maintain the Net Scheduled Interchange.

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
R4. Balancing Authorities that use Dynamic Scheduling or Pseudo-ties for jointly owned units shall reflect their respective share of the unit governor droop response in their respective Frequency Bias Setting. R4.1. Fixed schedules for Jointly Owned Units mandate that Balancing Authority (A) that contains the Jointly Owned Unit must incorporate the respective share of the unit governor droop response for any Balancing Authorities that have fixed schedules (B and C). R4.2. The Balancing Authorities that have a fixed schedule (B and C) but do not contain the Jointly Owned Unit shall not include their share of the governor droop response in their Frequency Bias Setting.	This Requirement has been removed from the BAL-003-1 standard.	This Requirement addresses how to calculate Frequency Bias Settings. This is no longer needed since the Frequency Bias Settings are calculated in FRS Form 1 using Frequency Response associated with the "official" list of events and a couple of "floor or ceiling" limits (% of peak load/gen and FRO). The entire calculation is built into the FRS Form 1 workbook.
R5. Balancing Authorities that serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of the Balancing Authority's estimated yearly peak demand per 0.1 Hz change. **R5.1.** Balancing Authorities that do not serve native load shall	This Requirement has been combined into Requirements R2 and R3	**R2.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
have a monthly average Frequency Bias Setting that is at least 1% of its estimated maximum generation level in the coming year per 0.1 Hz change.	ofmoved into BAL-003-1 Requirement R5.	period specified by the ERO. **R3.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias setting that is: 3.1 Less than zero at all times, and 3.2 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz. R5. In order to ensure adequate control response each Balancing Authority shall use a monthly average Frequency Bias Setting whose absolute value is at least equal to one of the following: • The minimum percentage of the Balancing Authority Area's estimated yearly Peak Demand within its metered boundary per 0.1 Hz change as specified by the ERO in accordance with Attachment B. • The minimum percentage of the Balancing Authority Area's estimated yearly peak generation for a generation-only Balancing Authority, per 0.1 Hz change as specified by the ERO in accordance with Attachment B.
R6. A Balancing Authority that is performing Overlap Regulation Service	This Requirement	**R4.** Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
shall increase its Frequency Bias Setting to match the frequency response of the entire area being controlled. A Balancing Authority shall not change its Frequency Bias Setting when performing Supplemental Regulation Service.	has been moved into BAL-003-1 Requirement R4.	its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either: • The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or • The Frequency Bias Setting as shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas. ~~R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation to be equivalent to the sum of the Frequency Bias Settings of the participating Balancing Authorities as validated by the ERO or calculate the Frequency Bias Setting based on the entire area being combined and thereby represent the Frequency Response for the combined area being controlled.~~

Violation Risk Factor and Violation Severity Level Assignments

Project 2007-12 – Frequency Response

This document provides the drafting team's justification for assigning draft standard Requirement violation risk factors (VRFs) and violation severity levels (VSLs) for:

- BAL-003-1 — Frequency Response and Frequency Bias Setting

Each primary Requirement is assigned a VRF and a set of one or more VSLs. These elements support the determination of an initial value range for the Base Penalty Amount regarding violation of requirements in FERC-approved Reliability Standards, as defined in the ERO Sanction Guidelines.

Justification for Assignment of Violation Risk Factors

The Frequency Response Standard Drafting Team applied the following NERC criteria when proposing VRFs for the requirements under this project:

High Risk Requirement

A requirement that, if violated, could directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures; or, a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures, or could hinder restoration to a normal condition.

Medium Risk Requirement

A requirement that, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system. However, violation of a medium risk requirement is unlikely to lead to bulk electric system instability, separation, or cascading failures; or, a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly and adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. However, violation of a medium risk requirement is unlikely, under emergency, abnormal, or restoration conditions anticipated by the preparations, to lead to bulk electric system instability, separation, or cascading failures, nor to hinder restoration to a normal condition.

Lower Risk Requirement

A requirement that is administrative in nature and a requirement that, if violated, would not be expected to adversely affect the electrical state or capability of the bulk electric system, or the

ability to effectively monitor and control the bulk electric system; or, a requirement that is administrative in nature and a requirement in a planning time frame that, if violated, would not, under the emergency, abnormal, or restorative conditions anticipated by the preparations, be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. A planning requirement that is administrative in nature.

The SDT also considered consistency with the FERC Violation Risk Factor Guidelines for setting VRFs[1]:

Guideline (1) — Consistency with the Conclusions of the Final Blackout Report
The Commission seeks to ensure that Violation Risk Factors assigned to Requirements of Reliability Standards in these identified areas appropriately reflect their historical critical impact on the reliability of the Bulk-Power System.

In the VSL Order, FERC listed critical areas (from the Final Blackout Report) where violations could severely affect the reliability of the Bulk-Power System:[2]

- Emergency operations
- Vegetation management
- Operator personnel training
- Protection systems and their coordination
- Operating tools and backup facilities
- Reactive power and voltage control
- System modeling and data exchange
- Communication protocol and facilities
- Requirements to determine equipment ratings
- Synchronized data recorders
- Clearer criteria for operationally critical facilities
- Appropriate use of transmission loading relief

Guideline (2) — Consistency within a Reliability Standard
The Commission expects a rational connection between the sub-Requirement Violation Risk Factor assignments and the main Requirement Violation Risk Factor assignment.

Guideline (3) — Consistency among Reliability Standards
The Commission expects the assignment of Violation Risk Factors corresponding to Requirements that address similar reliability goals in different Reliability Standards would be treated comparably.

[1] North American Electric Reliability Corp., 119 FERC 61,145, order on reh'g and compliance filing, 120 FERC 61,145 (2007) ("VRF Rehearing Order").
[2] Id. at footnote 15.

Guideline (4) — Consistency with NERC's Definition of the Violation Risk Factor Level
Guideline (4) was developed to evaluate whether the assignment of a particular Violation Risk Factor level conforms to NERC's definition of that risk level.

Guideline (5) — Treatment of Requirements that Co-mingle More Than One Obligation
Where a single Requirement co-mingles a higher risk reliability objective and a lesser risk reliability objective, the VRF assignment for such Requirements must not be watered down to reflect the lower risk level associated with the less important objective of the Reliability Standard.

Justification for Assignment of Violation Severity Levels:

In developing the VSLs for the standards under this project, the SDT anticipated the evidence that would be reviewed during an audit, and developed its VSLs based on the noncompliance an auditor may find during a typical audit. The SDT based its assignment of VSLs on the following NERC criteria:

Lower	Moderate	High	Severe
Missing a minor element (or a small percentage) of the required performance The performance or product measured has significant value as it almost meets the full intent of the requirement.	Missing at least one significant element (or a moderate percentage) of the required performance. The performance or product measured still has significant value in meeting the intent of the requirement.	Missing more than one significant element (or is missing a high percentage) of the required performance or is missing a single vital component. The performance or product has limited value in meeting the intent of the requirement.	Missing most or all of the significant elements (or a significant percentage) of the required performance. The performance measured does not meet the intent of the requirement or the product delivered cannot be used in meeting the intent of the requirement.

FERC VSL guidelines are presented below, followed by an analysis of whether the VSLs proposed for each requirement in this standard meet the FERC Guidelines for assessing VSLs:

Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance

Compare the VSLs to any prior levels of non-compliance and avoid significant changes that may encourage a lower level of compliance than was required when levels of non-compliance were used.

Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties

A violation of a “binary” type requirement must be a “Severe” VSL.

Do not use ambiguous terms such as “minor” and “significant” to describe noncompliant performance.

Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement

VSLs should not expand on what is required in the requirement.

Guideline 4: Violation Severity Level Assignment Should Be Based on a Single Violation, Not on a Cumulative Number of Violations

Unless otherwise stated in the requirement, each instance of non-compliance with a requirement is a separate violation. Section 4 of the Sanction Guidelines states that assessing penalties per violation per day basis is the “default” for penalty calculations.

VRF and VSL Justification

BAL-003-1 VRF and VSL Justifications		
R1	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for the contingency. This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring calculated FRM to be equal to or more negative than FRO. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This requirement is similar in concept to the current enforceable BAL-003-0.1b standard Requirement R2 which specifies a Medium VRF.
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for the contingency. This is consistent with the NERC definition.
	FERC VRF G5	This requirement does not co-mingle reliability objectives.

	Discussion	
	Proposed Lower VSL	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO
	Proposed Moderate VSL	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO
	Proposed High VSL	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO
	Proposed Severe VSL	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the calculated FRM being less negative than FRO.
	FERC VSL G1 Discussion	This is not applicable since there was not a Requirement mandating a certain level of Frequency Response prior to this standard.
	FERC VSL G2 Discussion	Proposed VSL's is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on the amount the calculated FRM is less negative than FRO.
	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider results of the calculation required. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

R2	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities to implement the Frequency Bias Setting validated by the ERO. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Lower VRF however BAL-003-1 Requirements R1, R3, and R4 specify a Medium VRF and the SDT believes it is appropriate for this Requirement to also possess a Medium VRF given the nature of the revision to BAL-003-0.1b.
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition.
	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.

	Proposed Lower VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting failed to implement the validated Frequency Bias Setting value into its ACE calculation within the implementation period specified but did so within 5 calendar days from the implementation period specified by the ERO.
	Proposed Moderate VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 5 calendar days but less than or equal to 15 calendar days from the implementation period specified by the ERO.
	Proposed High VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 15 calendar days but less than or equal to 25 calendar days from the implementation period specified by the ERO.
	Proposed Severe VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting did not implement the validated Frequency Bias Setting value into its ACE calculation in more than 25 calendar days from the implementation period specified by the ERO.
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating increments for tardiness implementing the validated Frequency Bias Setting into the ACE calculation.
	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Lower VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL's is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on how late the validated Frequency Bias Setting is implemented.
	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider performance of required action. Proposed VSL's are consistent with the requirement.
	FERC VSL G4	Proposed VSL's are based on a single violation and not a cumulative

	Discussion	violation methodology.

R3	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting in its ACE equation and would provide support for a contingency. This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities to implement a Frequency Bias Setting validated by the ERO. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Lower VRF however BAL-003-1 Requirements R1, R2, and R4 specify a Medium VRF and the SDT believes it is appropriate for this Requirement to also possess a Medium VRF given the nature of the revision to BAL-003-0.1b.
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for a contingency. This is consistent with the NERC definition.
	FERC VRF G5	This requirement does not co-mingle reliability objectives.

	Discussion	
	Proposed Lower VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 1% but by at most 10%.
	Proposed Moderate VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 10% but by at most 20%.
	Proposed High VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 20% but by at most 30%.
	Proposed Severe VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response obligation by more than 30%..
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the calculated average Frequency Bias Setting being less negative than its minimum as defined in Attachment B.
	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Medium VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based on the calculated average Frequency Bias Setting being less negative than its minimum as defined in Attachment B.

	FERC VSL G3 Discussion	Proposed VSL does not expand on what is required. The VSLs assigned only consider compliance with the Frequency Bias Setting calculation and implementation required. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

R4	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition. In addition, this Requirement VRF is consistent with the BAL-003-0 Requirement which has been approved by FERC.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities providing Overlap Regulation Services to correctly increase its Frequency Bias Setting. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R6 which specifies a Medium VRF
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the

		previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition. In addition, this Requirement VRF is consistent with the BAL-003-0 Requirement which has been approved by FERC.
	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.
	Proposed Lower VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error less than 10% of the validated or calculated value.
	Proposed Moderate VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error more than 10% but less than or equal to 20% of the validated or calculated value
	Proposed High VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error more than 20% but less than or equal to 30% of the validated or calculated value.
	Proposed Severe VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with setting error more than 30% of the validated or calculated value. OR The Balancing Authority failed to change the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting being below the minimum percentage specified by the ERO. The VSL also includes a binary requirement for failing to change the Frequency Bias Setting value when providing Overlap Regulation Services.
	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R6 which specifies a Medium VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL's has both a percentage of noncompliance performance and binary element. The binary element is designated severe. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on the amount the calculated monthly average Frequency Bias Setting is below the minimum percentage specified

		by the ERO or if the entity fails to change the Frequency Bias Setting value when providing Overlap Regulation Services.
	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider results of the calculation required and if the Frequency Bias Setting is correctly set when providing Overlap Regulation Services. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

Violation Risk Factor and Violation Severity Level Assignments

Project 2007-12 – Frequency Response

This document provides the drafting team's justification for assigning draft standard Requirement violation risk factors (VRFs) and violation severity levels (VSLs) for:

- BAL-003-1 — Frequency Response and Frequency Bias Setting

Each primary Requirement is assigned a VRF and a set of one or more VSLs. These elements support the determination of an initial value range for the Base Penalty Amount regarding violation of requirements in FERC-approved Reliability Standards, as defined in the ERO Sanction Guidelines.

Justification for Assignment of Violation Risk Factors

The Frequency Response Standard Drafting Team applied the following NERC criteria when proposing VRFs for the requirements under this project:

High Risk Requirement

A requirement that, if violated, could directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures; or, a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures, or could hinder restoration to a normal condition.

Medium Risk Requirement

A requirement that, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system. However, violation of a medium risk requirement is unlikely to lead to bulk electric system instability, separation, or cascading failures; or, a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly and adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. However, violation of a medium risk requirement is unlikely, under emergency, abnormal, or restoration conditions anticipated by the preparations, to lead to bulk electric system instability, separation, or cascading failures, nor to hinder restoration to a normal condition.

Lower Risk Requirement

A requirement that is administrative in nature and a requirement that, if violated, would not be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system; or, a requirement that is administrative in nature and a requirement in a planning time frame

that, if violated, would not, under the emergency, abnormal, or restorative conditions anticipated by the preparations, be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. A planning requirement that is administrative in nature.

The SDT also considered consistency with the FERC Violation Risk Factor Guidelines for setting VRFs[1]:

Guideline (1) — Consistency with the Conclusions of the Final Blackout Report
The Commission seeks to ensure that Violation Risk Factors assigned to Requirements of Reliability Standards in these identified areas appropriately reflect their historical critical impact on the reliability of the Bulk-Power System.

In the VSL Order, FERC listed critical areas (from the Final Blackout Report) where violations could severely affect the reliability of the Bulk-Power System:[2]

- Emergency operations
- Vegetation management
- Operator personnel training
- Protection systems and their coordination
- Operating tools and backup facilities
- Reactive power and voltage control
- System modeling and data exchange
- Communication protocol and facilities
- Requirements to determine equipment ratings
- Synchronized data recorders
- Clearer criteria for operationally critical facilities
- Appropriate use of transmission loading relief

Guideline (2) — Consistency within a Reliability Standard
The Commission expects a rational connection between the sub-Requirement Violation Risk Factor assignments and the main Requirement Violation Risk Factor assignment.

Guideline (3) — Consistency among Reliability Standards
The Commission expects the assignment of Violation Risk Factors corresponding to Requirements that address similar reliability goals in different Reliability Standards would be treated comparably.

Guideline (4) — Consistency with NERC's Definition of the Violation Risk Factor Level
Guideline (4) was developed to evaluate whether the assignment of a particular Violation Risk Factor level conforms to NERC's definition of that risk level.

[1] North American Electric Reliability Corp., 119 FERC 61,145, order on reh'g and compliance filing, 120 FERC 61,145 (2007) ("VRF Rehearing Order").
[2] Id. at footnote 15.

Guideline (5) — Treatment of Requirements that Co-mingle More Than One Obligation

Where a single Requirement co-mingles a higher risk reliability objective and a lesser risk reliability objective, the VRF assignment for such Requirements must not be watered down to reflect the lower risk level associated with the less important objective of the Reliability Standard.

Justification for Assignment of Violation Severity Levels:

In developing the VSLs for the standards under this project, the SDT anticipated the evidence that would be reviewed during an audit, and developed its VSLs based on the noncompliance an auditor may find during a typical audit. The SDT based its assignment of VSLs on the following NERC criteria:

Lower	Moderate	High	Severe
Missing a minor element (or a small percentage) of the required performance The performance or product measured has significant value as it almost meets the full intent of the requirement.	Missing at least one significant element (or a moderate percentage) of the required performance. The performance or product measured still has significant value in meeting the intent of the requirement.	Missing more than one significant element (or is missing a high percentage) of the required performance or is missing a single vital component. The performance or product has limited value in meeting the intent of the requirement.	Missing most or all of the significant elements (or a significant percentage) of the required performance. The performance measured does not meet the intent of the requirement or the product delivered cannot be used in meeting the intent of the requirement.

FERC VSL guidelines are presented below, followed by an analysis of whether the VSLs proposed for each requirement in this standard meet the FERC Guidelines for assessing VSLs:

Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance

Compare the VSLs to any prior levels of non-compliance and avoid significant changes that may encourage a lower level of compliance than was required when levels of non-compliance were used.

Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties

A violation of a “binary” type requirement must be a “Severe” VSL.

Do not use ambiguous terms such as “minor” and “significant” to describe noncompliant performance.

Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement

VSLs should not expand on what is required in the requirement.

Guideline 4: Violation Severity Level Assignment Should Be Based on a Single Violation, Not on a Cumulative Number of Violations

Unless otherwise stated in the requirement, each instance of non-compliance with a requirement is a separate violation. Section 4 of the Sanction Guidelines states that assessing penalties per violation per day basis is the "default" for penalty calculations.

VRF and VSL Justification

BAL-003-1 VRF and VSL Justifications		
R1	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for the contingency. This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring calculated FRM to be equal to or more negative than FRO. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This requirement is similar in concept to the current enforceable BAL-003-0.1b standard Requirement R2 which specifies a Medium VRF.
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for the contingency. This is consistent with the NERC definition.
	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.
	Proposed Lower VSL	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the

		Interconnection's FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO~~The Interconnection met its FRO and the Balancing Authority's, or Reserve Sharing Groups, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its~~
	Proposed Moderate VSL	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO~~The Interconnection met its FRO and the Balancing Authority's, or Reserve Sharing Groups, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO~~
	Proposed High VSL	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO~~The Interconnection did not meet its FRO and the Balancing Authority's, or Reserve Sharing Groups, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO~~
	Proposed Severe VSL	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO~~The Interconnection did not meet its FRO and the Balancing Authority's, or Reserve Sharing Groups, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO~~
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the calculated FRM being less negative than FRO.
	FERC VSL G1 Discussion	This is not applicable since there was not a Requirement mandating a certain level of Frequency Response prior to this standard.
	FERC VSL G2 Discussion	Proposed VSL's is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on the amount the calculated FRM is less negative than FRO.

	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider results of the calculation required. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

R2	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities to implement the Frequency Bias Setting validated by the ERO. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Lower VRF however BAL-003-1~~0.1b~~ Requirements R1~~2~~, R3, and R4~~5, and R6~~ specify a Medium VRF and the SDT believes it is appropriate for this Requirement to also possess a Medium VRF given the nature of the revision to BAL-003-0.1b.
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition.

	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.
	Proposed Lower VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting failed to implement the validated Frequency Bias Setting value into its ACE calculation within the implementation period specified but did so within 5 calendar days from the implementation period specified by the ERO.~~The Balancing Authority failed to implement the validated Frequency Bias Setting value in to its ACE calculation on the date specified but did so within 5 calendar days following the date specified by the ERO.~~
	Proposed Moderate VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 5 calendar days but less than or equal to 15 calendar days from the implementation period specified by the ERO.~~The Balancing Authority implemented the validated Frequency Bias Setting value in to its ACE calculation in more than 5 calendar days but less than or equal to 15 calendar days following the date specified by the ERO.~~
	Proposed High VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 15 calendar days but less than or equal to 25 calendar days from the implementation period specified by the ERO.~~The Balancing Authority implemented the validated Frequency Bias Setting value in to its ACE calculation in more than 15 calendar days following the date specified by the ERO, but the new Bias Setting was within 10% of the previous year's Bias Setting~~
	Proposed Severe VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting did not implement the validated Frequency Bias Setting value into its ACE calculation in more than 25 calendar days from the implementation period specified by the ERO. ~~The Balancing Authority implemented the validated Frequency Bias Setting value in to its ACE calculation in more than 15 calendar days following the date specified by the ERO and the Bias Setting was more than 10% different from the previous year.~~
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating increments for tardiness implementing the validated Frequency Bias Setting into the ACE calculation..

	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Lower VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL's is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on how late the validated Frequency Bias Setting is implemented.
	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider performance of required action. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

R3	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting in its ACE equation and would provide support for a contingency~~who was not operating its AGC in Tie Line Bias would typically be the only Balancing Authority that is operating in this manner and the rest of the Balancing Authorities would pick up the slack~~. ~~In addition, this Requirement VRF is the same as the BAL-003-0 standard VRF and was approved by FERC.~~ This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities to implement a Frequency Bias Setting validated by the ERO~~operate AGC in Tie Line Bias mode~~. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which

		specifies a Lower VRF however BAL-003-1 Requirements R1, R2, and R4 specify a Medium VRF and the SDT believes it is appropriate for this Requirement to also possess a Medium VRF given the nature of the revision to BAL-003-0.1b.~~R3 which specifies a Medium VRF~~
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for a contingency~~who was not operating its AGC in Tie Line Bias would typically be the only Balancing Authority that is operating in this manner and the rest of the Balancing Authorities would pick up the slack. In addition, this Requirement VRF is the same as the BAL-003-0 standard VRF and was approved by FERC~~. This is consistent with the NERC definition.
	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.
	Proposed Lower VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 1% but by at most 10%.~~The Balancing Authority could not provide the type of evidence as outlined in Measure M3 that Tie Line Bias is the normal mode of AGC.~~
	Proposed Moderate VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 10% but by at most 20%.~~N/A~~
	Proposed High VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligtation by more than 20% but by at most 30%.~~A spot check during an audit found the Balancing Authority's AGC out of Tie Line Bias mode without documentation supporting the need to operate in a different AGC mode.~~

	Proposed Severe VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response obligation by more than 30%..~~A system event occurred and it was found that a contributing factor was that the Balancing Authority failed to operate AGC in Tie Line Bias mode.~~
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the calculated average Frequency Bias Setting being less negative than its minimum as defined in Attachment B.~~The NERC VSL guidelines are satisfied by incorporating a binary requirement for failing to operating AGC in Tie Line Bias mode when an Adverse Reliability Impact did not exist.~~
	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1~~3~~ which specifies a Medium VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based ~~only~~ on the calculated average Frequency Bias Setting being less negative than its minimum as defined in Attachment B.~~if AGC is not operating in Tie Line Bias mode unless there is an Adverse Reliability Impact~~.
	FERC VSL G3 Discussion	Proposed VSL does not expand on what is required. The VSLs assigned only consider compliance with the Frequency Bias Setting calculation and implementation~~AGC control mode status~~ required. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

R4	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition. In addition, this Requirement VRF is consistent with the BAL-003-0 Requirement which has been approved by FERC.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities providing Overlap Regulation Services to correctly increase its Frequency Bias Setting. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1.

		Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R6 which specifies a Medium VRF
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition. In addition, this Requirement VRF is consistent with the BAL-003-0 Requirement which has been approved by FERC.
	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.
	Proposed Lower VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error less than 10~~5~~% of the validated or calculated~~correct~~ value.
	Proposed Moderate VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error more than 10~~5~~% but less than or equal to 20~~15~~% of the validated or calculated~~correct~~ value
	Proposed High VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error more than 20~~15~~% but less than or equal to 30~~25~~% of the validated or calculated~~correct~~ value.

	Proposed Severe VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with setting error more than 30~~25~~% of the validated or calculated~~correct~~ value. OR The Balancing Authority failed to change the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting being below the minimum percentage specified by the ERO. The VSL also includes a binary requirement for failing to change the Frequency Bias Setting value when providing Overlap Regulation Services.
	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R6 which specifies a Medium VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL's has both a percentage of noncompliance performance and binary element. The binary element is designated severe. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on the amount the calculated monthly average Frequency Bias Setting is below the minimum percentage specified by the ERO or if the entity fails to change the Frequency Bias Setting value when providing Overlap Regulation Services.
	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider results of the calculation required and if the Frequency Bias Setting is correctly set when providing Overlap Regulation Services. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

~~R5~~	~~Proposed VRF~~	~~Medium~~
	~~NERC VRF Discussion~~	~~This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition. In addition, this Requirement VRF is consistent with the BAL-003-0 Requirement which has been approved by FERC.~~
	~~FERC VRF G1 Discussion~~	~~This Requirement is more administrative in nature requiring entities to determine if the monthly absolute value Frequency Bias Setting~~

		meets specified criteria. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R5 which specifies a Medium VRF
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition. In addition, this Requirement VRF is consistent with the BAL-003-0 Requirement which has been approved by FERC.
	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.
	Proposed Lower VSL	The absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting is 5% or less below the minimum specified by the ERO.
	Proposed Moderate VSL	The absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting is more than 5% but less than or equal to 15% below the minimum specified by the ERO.
	Proposed High VSL	The absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting is more than 15% but less than or equal to 25% below the minimum specified by the ERO.
	Proposed Severe VSL	The absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting is more than 25% below the minimum specified by the ERO.
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the calculated monthly average

		~~Frequency Bias Setting absolute value being below the minimum specified by the ERO.~~
	~~FERC VSL G1 Discussion~~	~~This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R5 which specifies a Medium VRF. Proposed VSL's meet or exceed the current threshold of compliance.~~
	~~FERC VSL G2 Discussion~~	~~Proposed VSL's is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on the amount the calculated monthly average Frequency Bias Setting absolute value is below the minimum specified by the ERO.~~
	~~FERC VSL G3 Discussion~~	~~Proposed VSL's do not expand on what is required. The VSL's assigned only consider results of the calculation required. Proposed VSL's are consistent with the requirement.~~
	~~FERC VSL G4 Discussion~~	~~Proposed VSL's are based on a single violation and not a cumulative violation methodology.~~

Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

Balancing Authority MyBA

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information NAI	Value "A" Information Adjustment	Value "B" Information NAI	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Value "A" Information Load	Value "B" Information Load	Reason(s)
1	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
2	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
8	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
9	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
10	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

1901	Bias Calculation Form 1 for Year
Eastern	Interconnection
MyBA	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-964	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
#DIV/0!	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
	1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.
Calculate Regression	
	BA Bias Type and Bias Setting
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
621018	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-20.87	Balancing Authority desired Bias Setting: May be set to a value between 100% to 125% of its FRM if this value is more negative than the minimum Bias based on Peak Demand. If not more negative, then the Bias must be the minimum Bias based on Peak Demand. If variable Bias is used, enter "Variable".
#DIV/0!	**1901 Frequency Bias Setting - (minimum of 100% to 125% of FRM, or 0.9% of Historical Peak Demand if not Variable)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Select Reason(s) for adjustment

Instructions

Step 1 Enter data in all green cells on this "Data Entry" worksheet.

Step 2 For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

Step 3 PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

MyBA_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.8976	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.9068	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
N		NL & PH & ID & CBA
Y		NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq	10 X BA DelFreq	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics	
	For Bias	For R1			For Bias	
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0	0	#N/A
0	0	595	#DIV/0!	0	1	0
0	0	595	#DIV/0!	0	#NUM!	12
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0		
0	0	595	#DIV/0!	0	For R1	
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0	0	#N/A
0	0	595	#DIV/0!	0	1	0
0	0	595	#DIV/0!	0	#NUM!	11
0	0	595	#DIV/0!	0	0	0

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

Event Number	Balancing Authority	MyBA	JOU Dynamic Schedules		Non conforming Load		Pumped Hydro		Not Used		Transferred Frequency Response		Contingent BA Adjustment		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
   Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
   (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: MyBA

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**
**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecialValues the data copied from FRS Form 2 for each event.

Value A Data BA Performance

Value B 20 to 52 second Average Period Evaluation

Average P.U. Performance #DIV/0! #DIV/0! #DIV/0!

Event Number	Date/Time (Central Prevailing)	Del/Freq	Date	A Point Time	FPointA Hz	A Value Hz	t/01 Time	C Value Hz	Value A Data: Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Value B: Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points: Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
1	1/0/1900 0:00	0.000																																								
2	1/0/1900 0:00	0.000																																								
3	1/0/1900 0:00	0.000																																								
4	1/0/1900 0:00	0.000																																								
5	1/0/1900 0:00	0.000																																								
6	1/0/1900 0:00	0.000																																								
7	1/0/1900 0:00	0.000																																								
8	1/0/1900 0:00	0.000																																								
9	1/0/1900 0:00	0.000																																								
10	1/0/1900 0:00	0.000																																								
11	1/0/1900 0:00	0.000																																								
12	1/0/1900 0:00	0.000																																								
13	1/0/1900 0:00	0.000																																								
14	1/0/1900 0:00	0.000																																								
15	1/0/1900 0:00	0.000																																								
16	1/0/1900 0:00	0.000																																								
17	1/0/1900 0:00	0.000																																								
18	1/0/1900 0:00	0.000																																								
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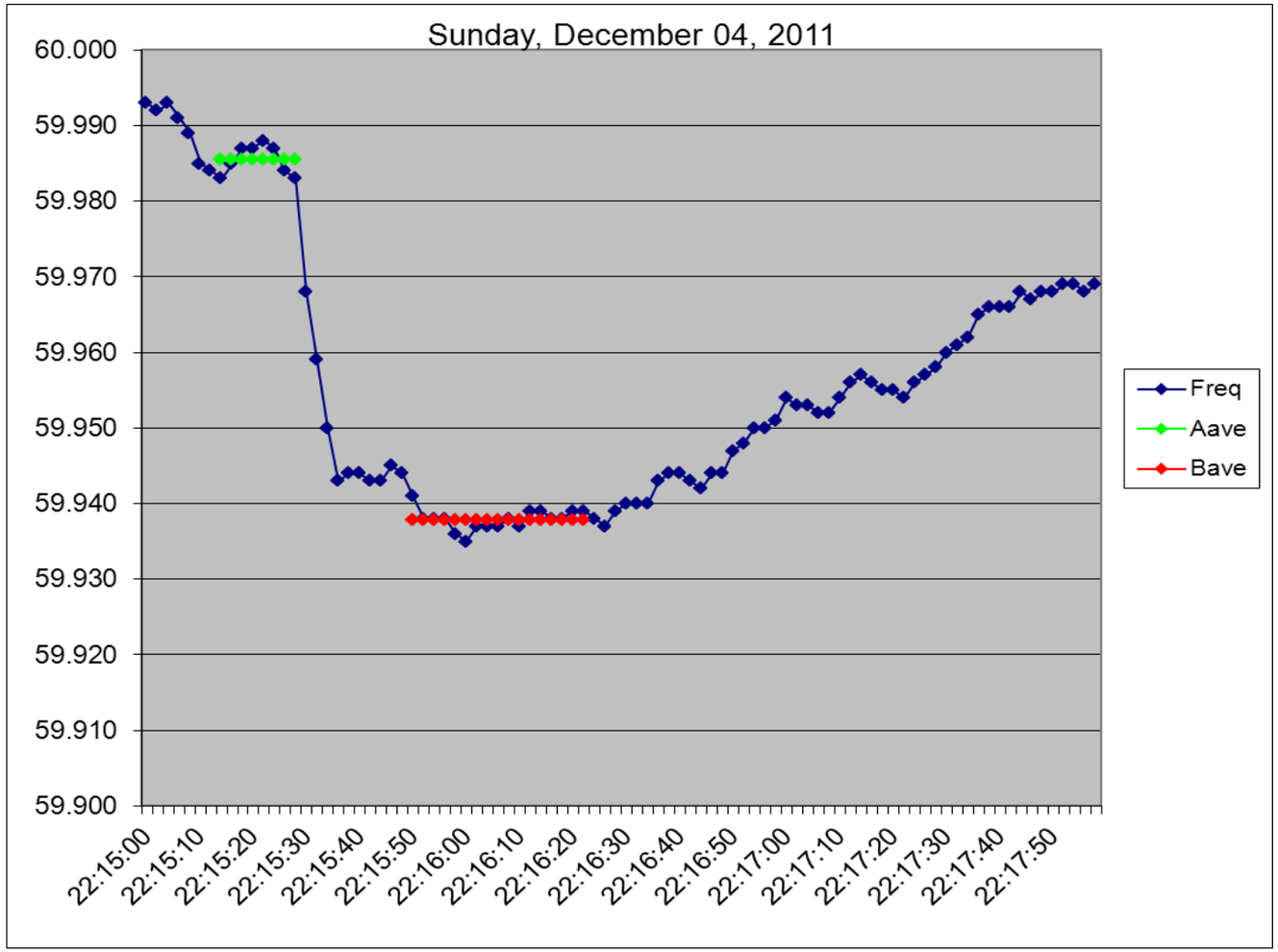
25	1/0/1900 0:00	0.000																																								
26	1/0/1900 0:00	0.000																																								
27	1/0/1900 0:00	0.000																																								
28	1/0/1900 0:00	0.000																																								
29	1/0/1900 0:00	0.000																																								
30	1/0/1900 0:00	0.000																																								
31	1/0/1900 0:00	0.000																																								
32	1/0/1900 0:00	0.000																																								
33	1/0/1900 0:00	0.000																																								
34	1/0/1900 0:00	0.000																																								
35	1/0/1900 0:00	0.000																																								
36	1/0/1900 0:00	0.000																																								
37	1/0/1900 0:00	0.000																																								
38	1/0/1900 0:00	0.000																																								
39	1/0/1900 0:00	0.000																																								
40	1/0/1900 0:00	0.000																																								
41	1/0/1900 0:00	0.000																																								
42	1/0/1900 0:00	0.000																																								

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours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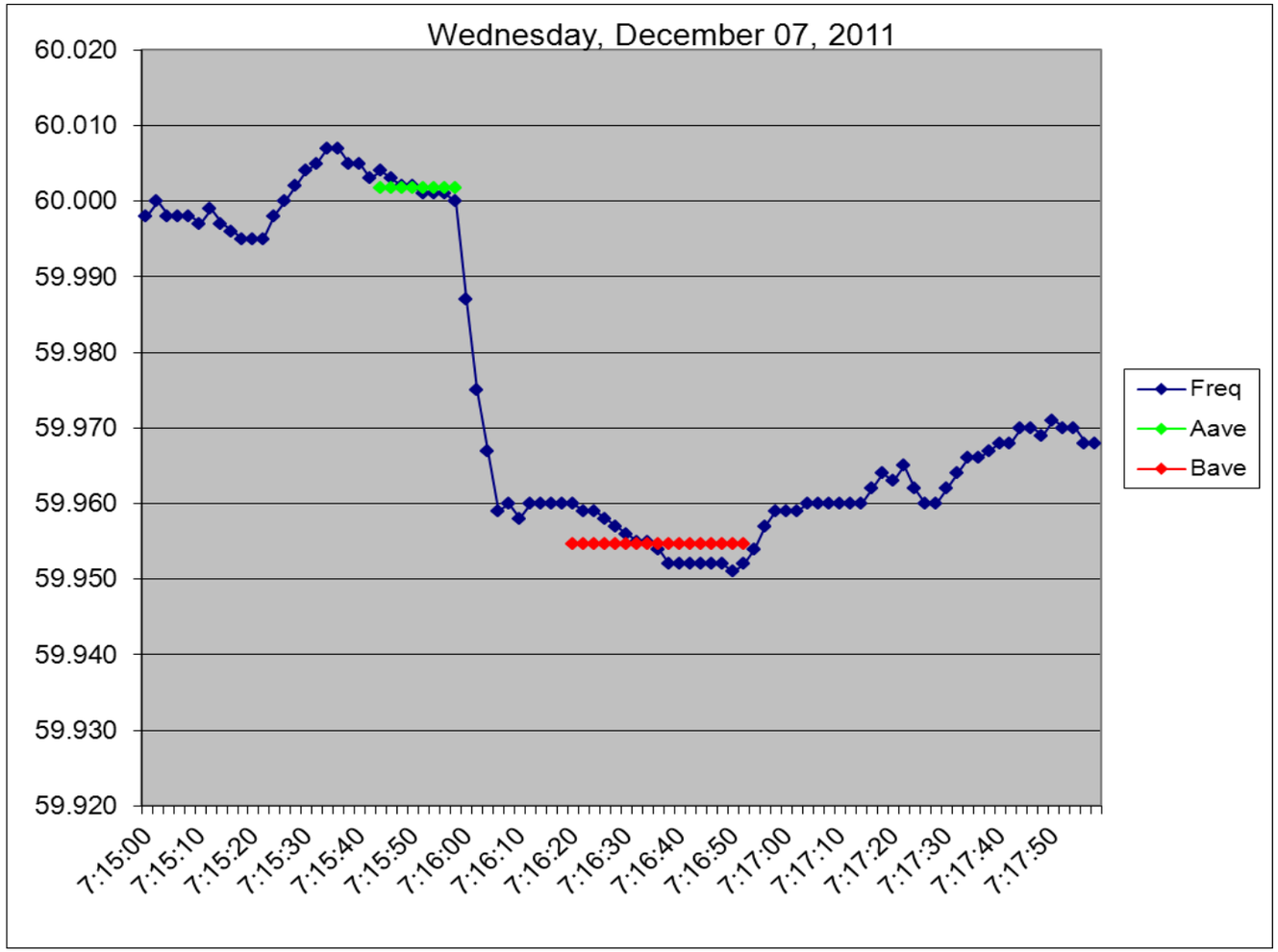
59.990
59.980
59.970
59.960
59.950
59.940
59.930
59.920
59.910
59.900
22:15:00
22:15:10
22:15:20
22:15:30
22:15:40
22:15:50
22:16:00
22:16:10
22:16:20
22:16:30
22:16:40
22:16:50
22:17:00
22:17:10
22:17:20
22:17:30
22:17:40
22:17:50
Freq
Aave
Bave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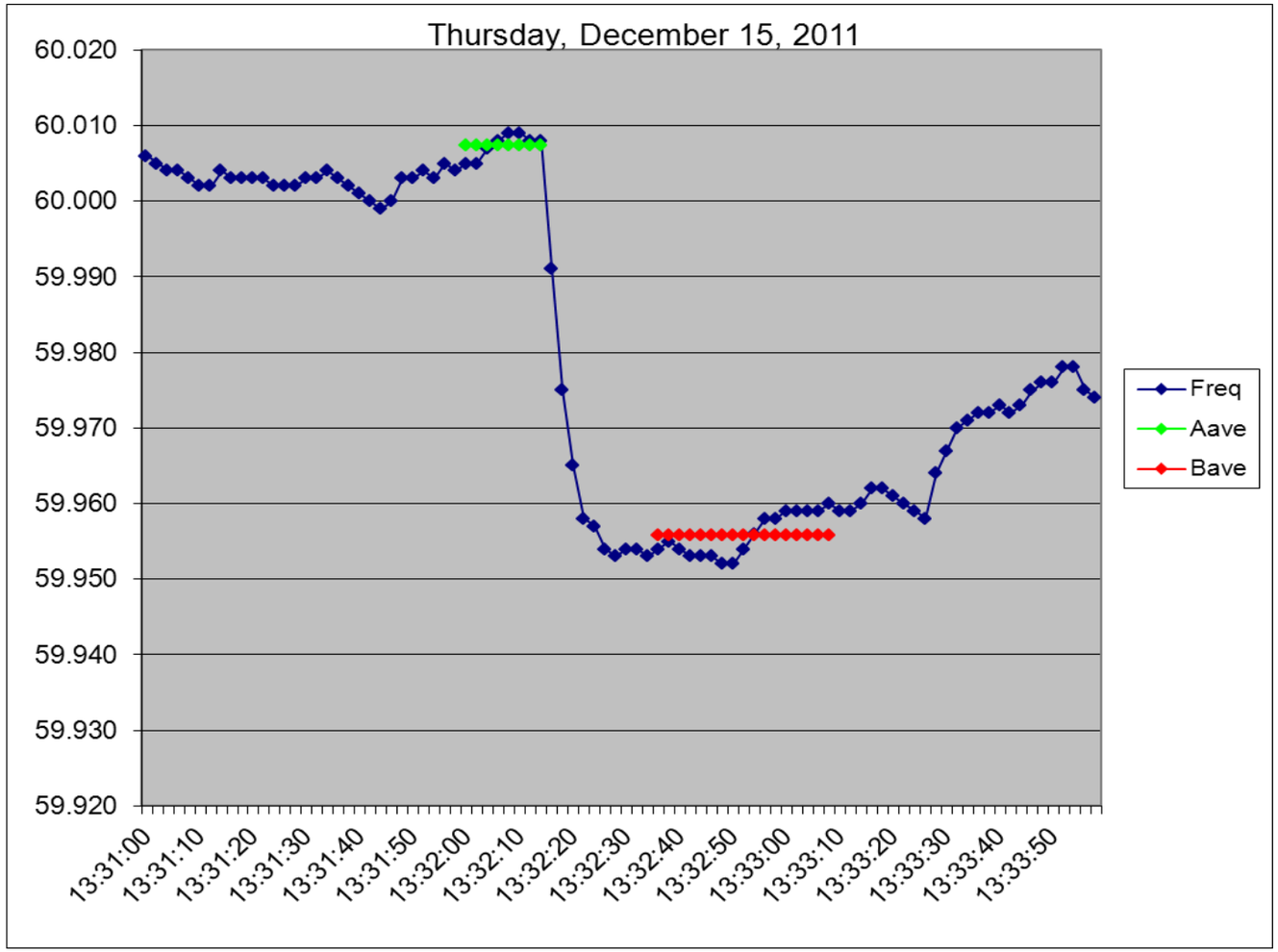
59.960
59.950
59.940
59.930
59.920
7:15:00
7:15:10
7:15:20
7:15:30
7:15:40
7:15:50
7:16:00
7:16:10
7:16:20
7:16:30
7:16:40
7:16:50
7:17:00
7:17:10
7:17:20
7:17:30
7:17:40
7:17:50
Freq
Aave
Bave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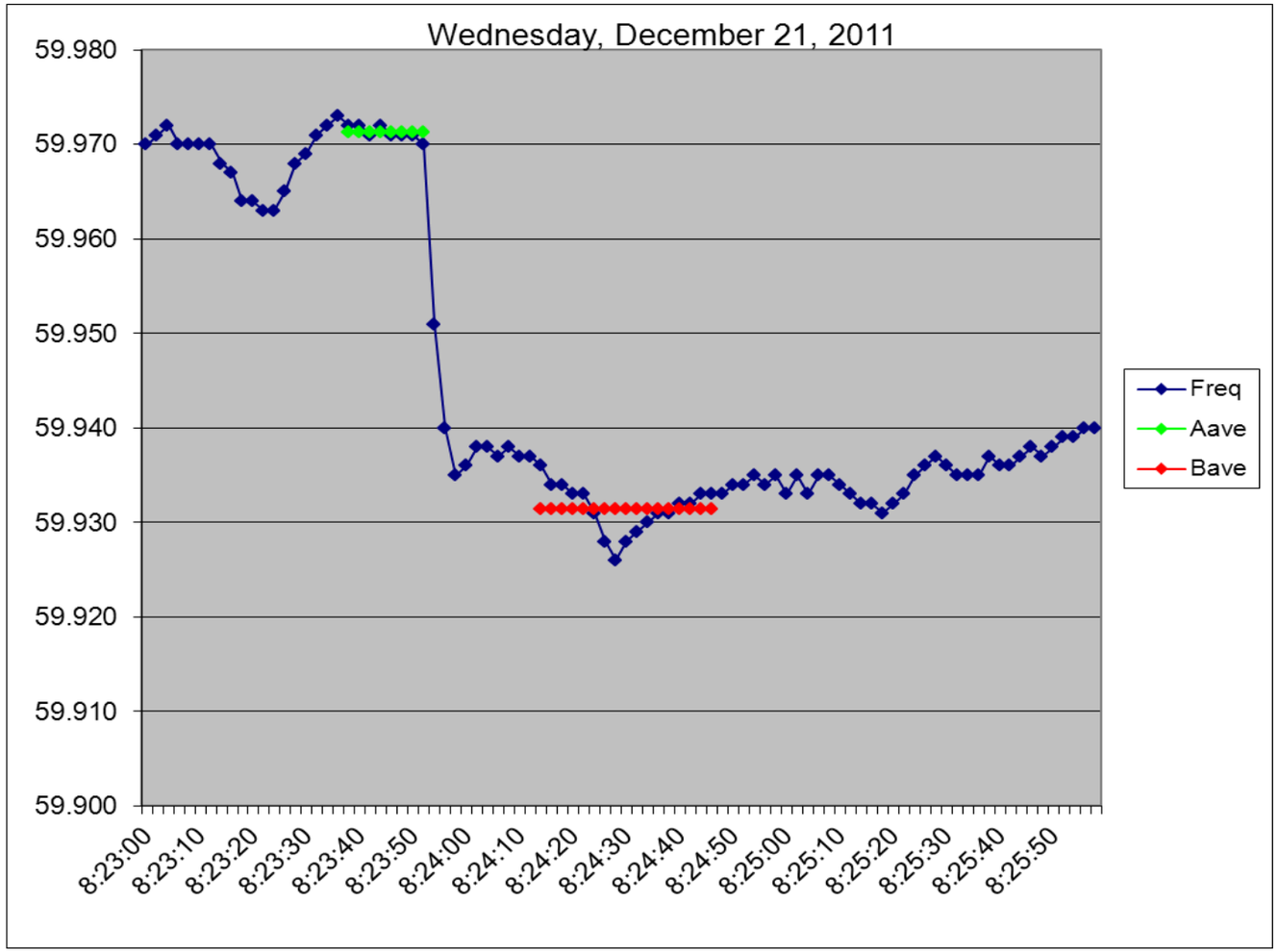
59.970
59.960
59.950
59.940
59.930
59.920
13:31:00
13:31:10
13:31:20
13:31:30
13:31:40
13:31:50
13:32:00
13:32:10
13:32:20
13:32:30
13:32:40
13:32:50
13:33:00
13:33:10
13:33:20
13:33:30
13:33:40
13:33:50
Freq
Aave
Bave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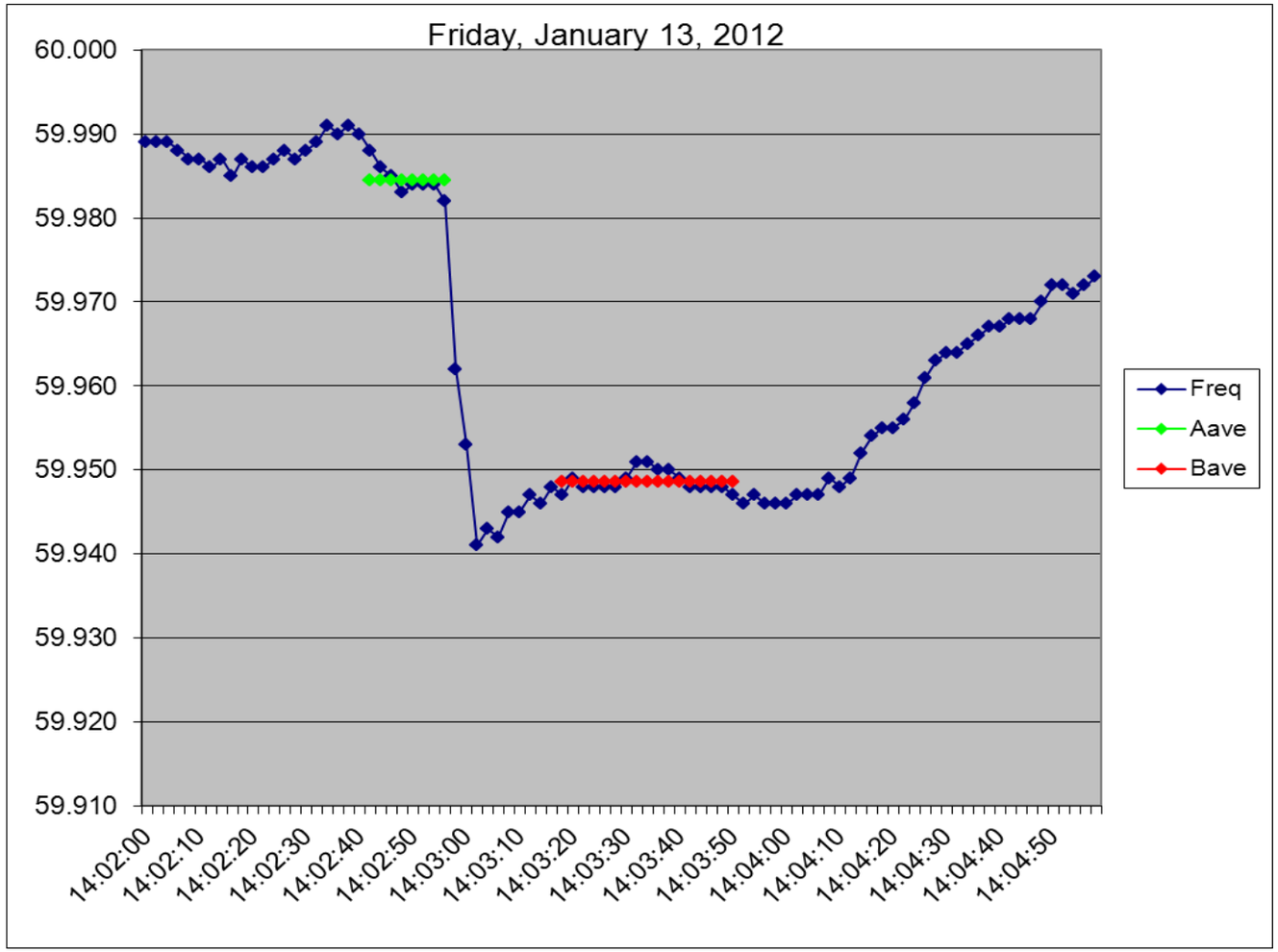
59.970
59.960
59.950
59.940
59.930
59.920
59.910
59.900
8:23:00
8:23:10
8:23:20
8:23:30
8:23:40
8:23:50
8:24:00
8:24:10
8:24:20
8:24:30
8:24:40
8:24:50
8:25:00
8:25:10
8:25:20
8:25:30
8:25:40
8:25:50
Freq
Aave
Bave


Friday, January 13, 2012
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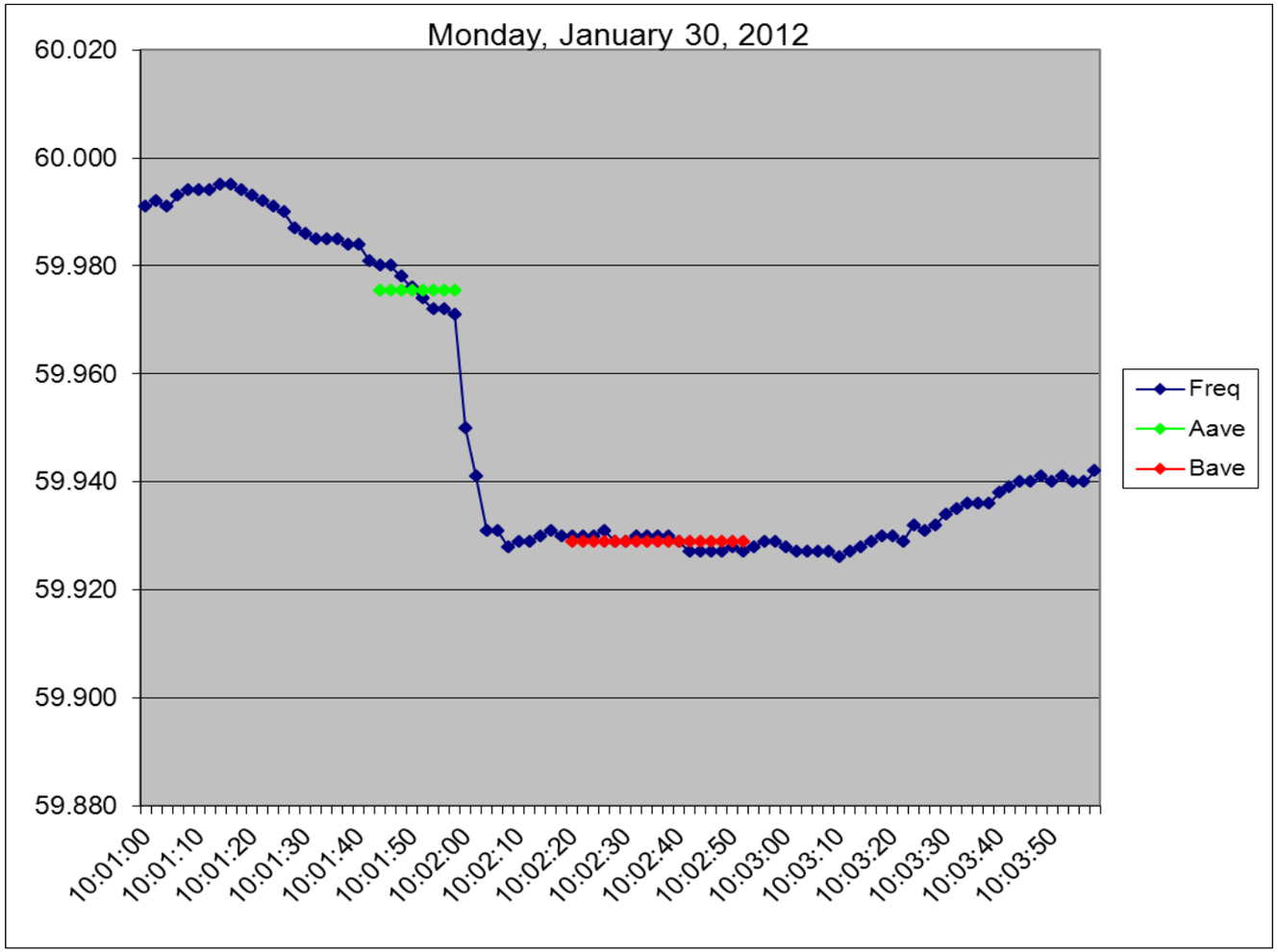
59.990
59.980
59.970
59.960
59.950
59.940
59.930
59.920
59.910
14:02:00
14:02:10
14:02:20
14:02:30
14:02:40
14:02:50
14:03:00
14:03:10
14:03:20
14:03:30
14:03:40
14:03:50
14:04:00
14:04:10
14:04:20
14:04:30
14:04:40
14:04:50
Freq
Aave
Bave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60.000
59.980
59.960
59.940
59.920
59.900
59.880
10:01:00
10:01:10
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10:01:30
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10:01:50
10:02:00
10:02:10
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10:02:40
10:02:50
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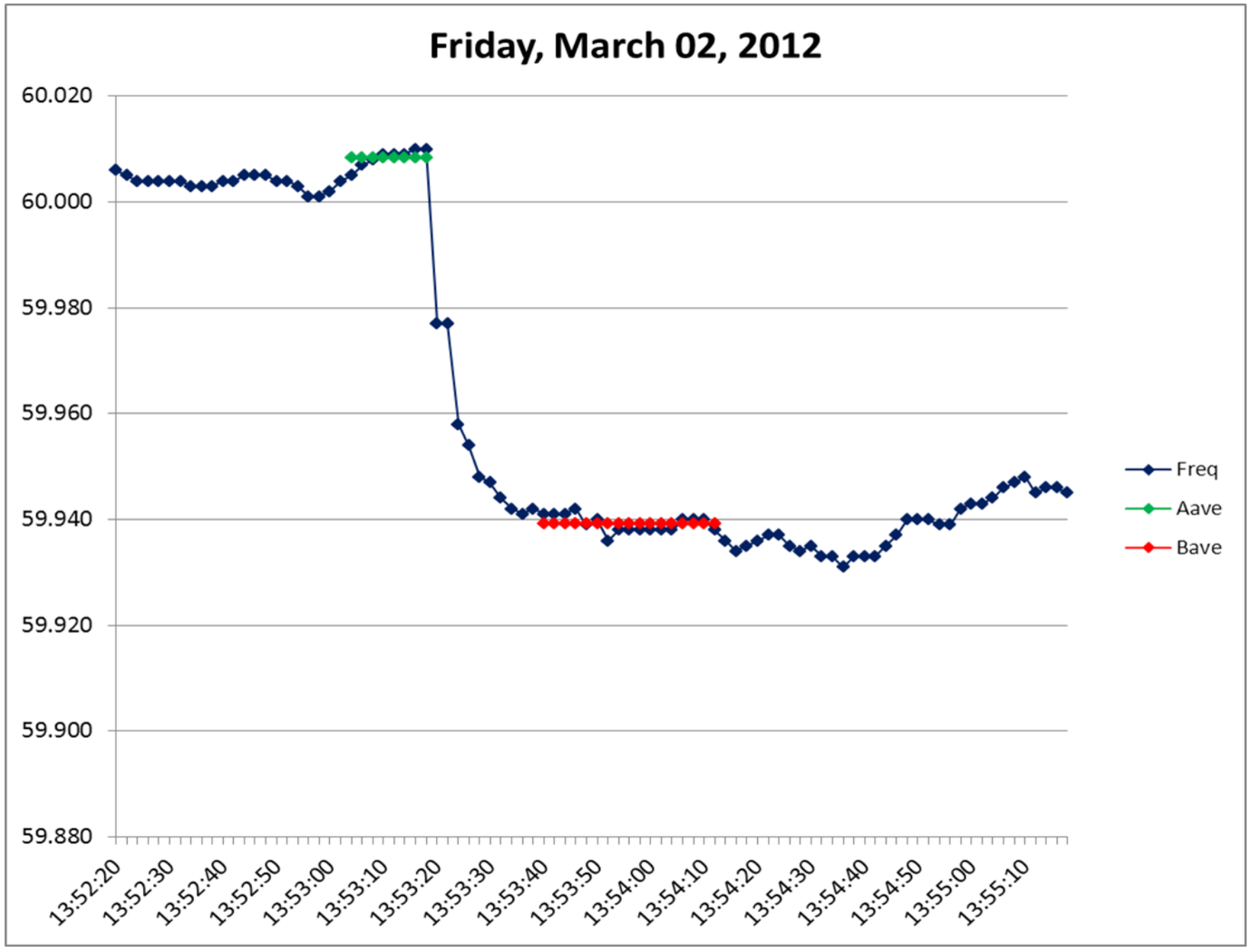
10:03:10
10:03:20
10:03:30
10:03:40
10:03:50
Freq
Aave
Bave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59.980
59.960
59.940
59.920
59.900
59.880
13:52:20
13:52:30
13:52:40
13:52:50
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13:53:20
13:53:30
13:53:40
13:53:50
13:54:00
13:54:10
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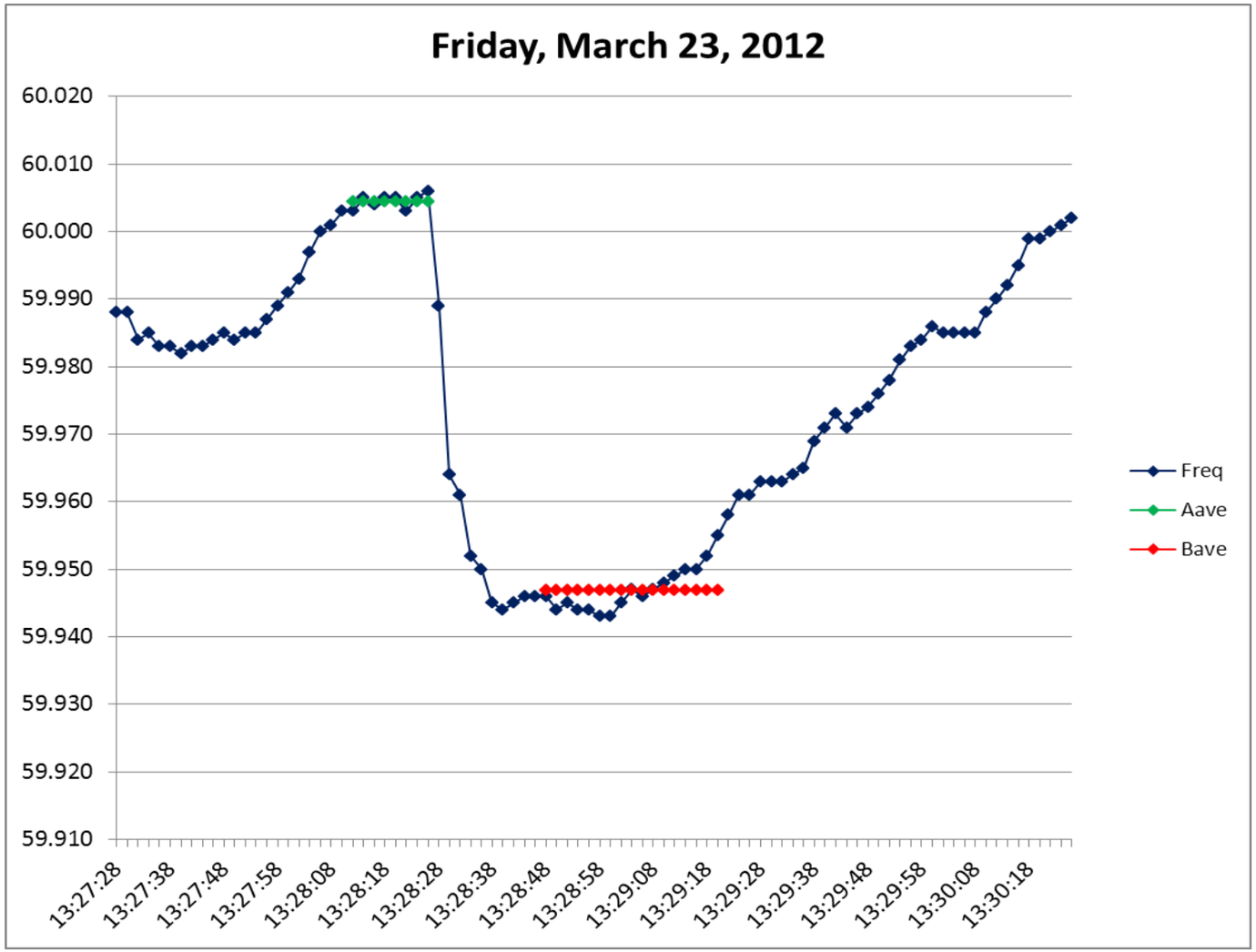
13:54:30
13:54:40
13:54:50
13:55:00
13:55:10
Freq
Aave
Bave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60.000
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59.980
59.970
59.960
59.950
59.940
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59.920
59.910
13:27:28
13:27:38
13:27:48
13:27:58
13:28:08
13:28:18
13:28:28
13:28:38
13:28:48
13:28:58
13:29:08
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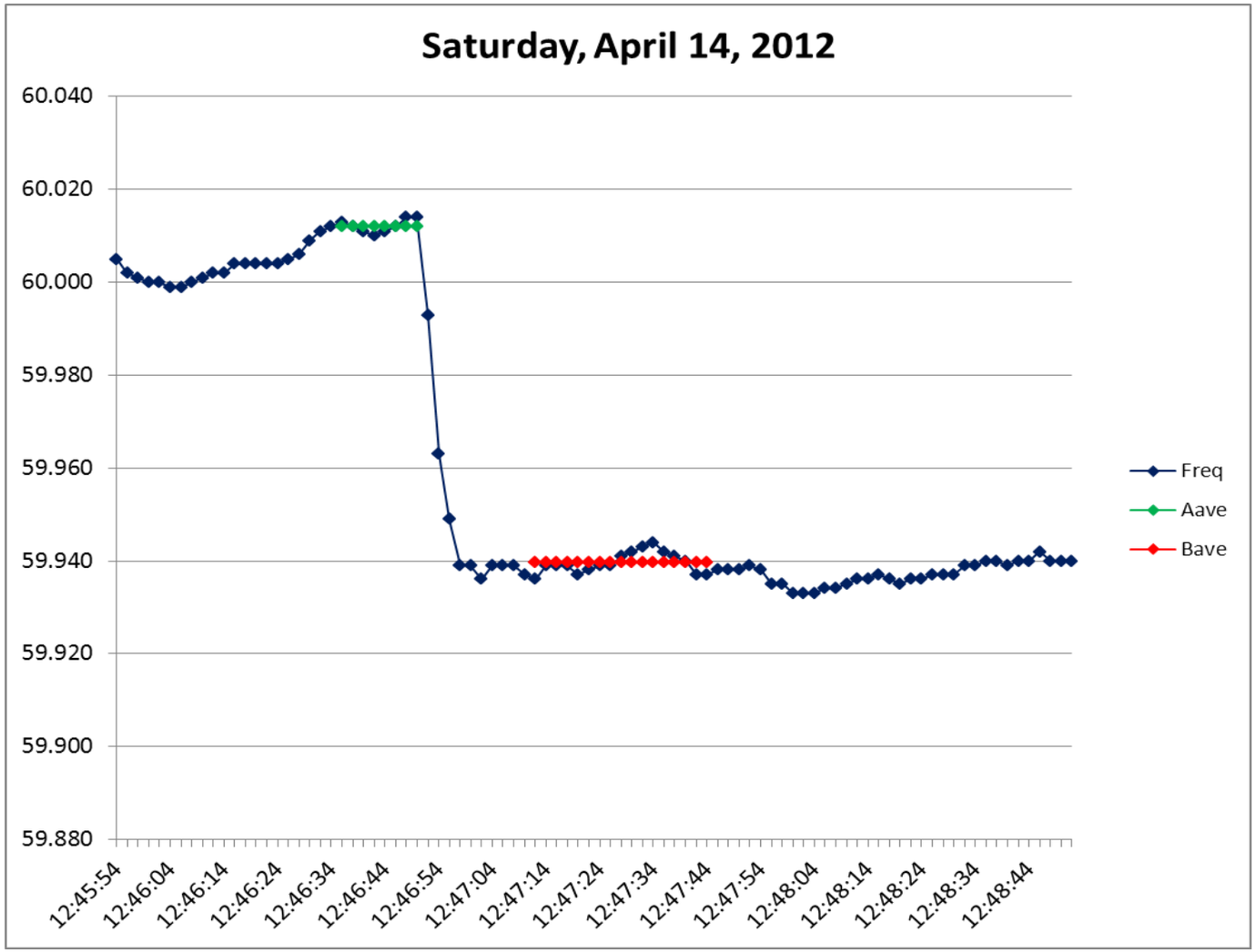
13:29:38
13:29:48
13:29:58
13:30:08
13:30:18
Freq
Aave
Bave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60.000
59.980
59.960
59.940
59.920
59.900
59.880
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12:46:14
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12:46:44
12:46:54
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12:47:14
12:47:24
12:47:34
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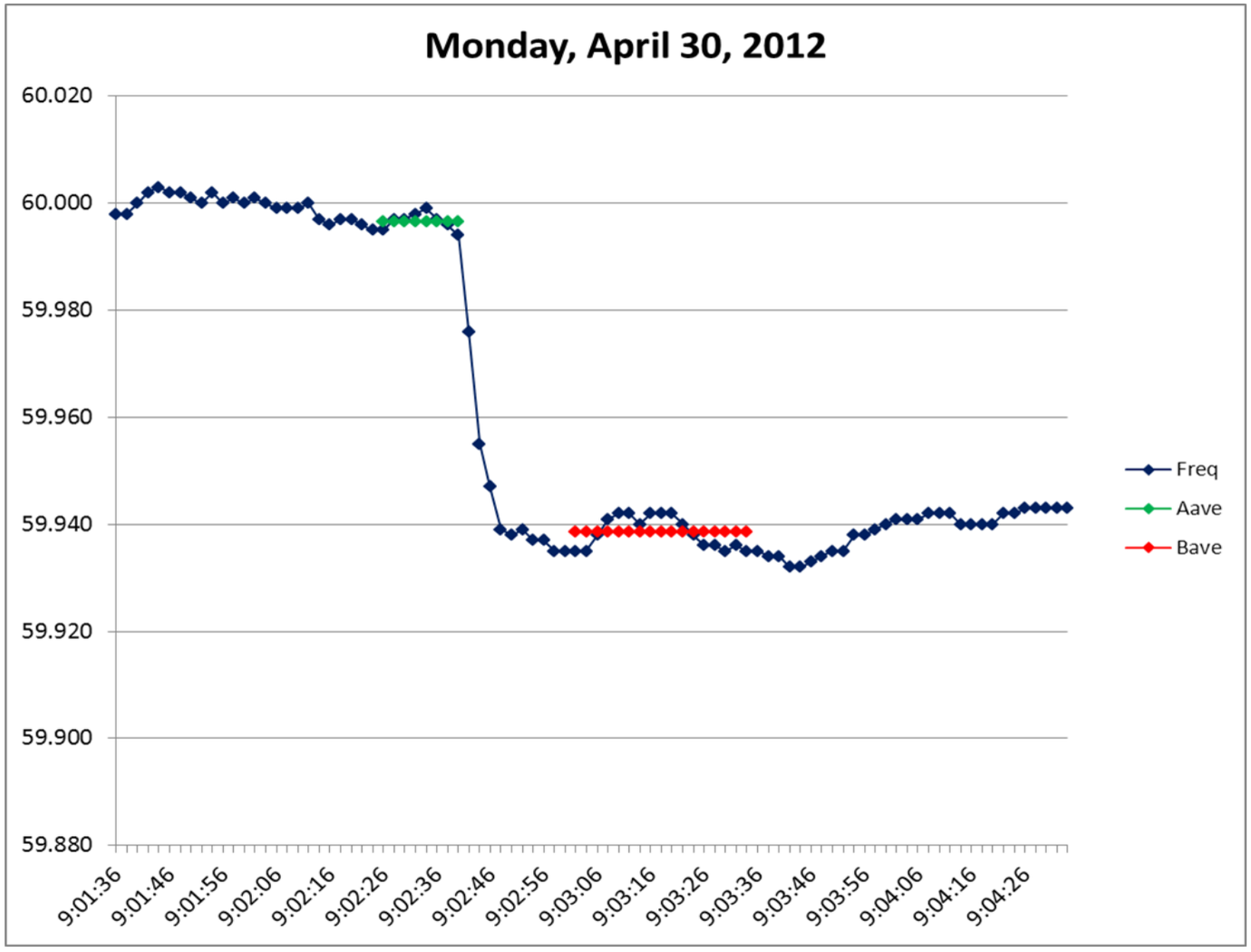
12:48:04
12:48:14
12:48:24
12:48:34
12:48:44
Freq
Aave
Bave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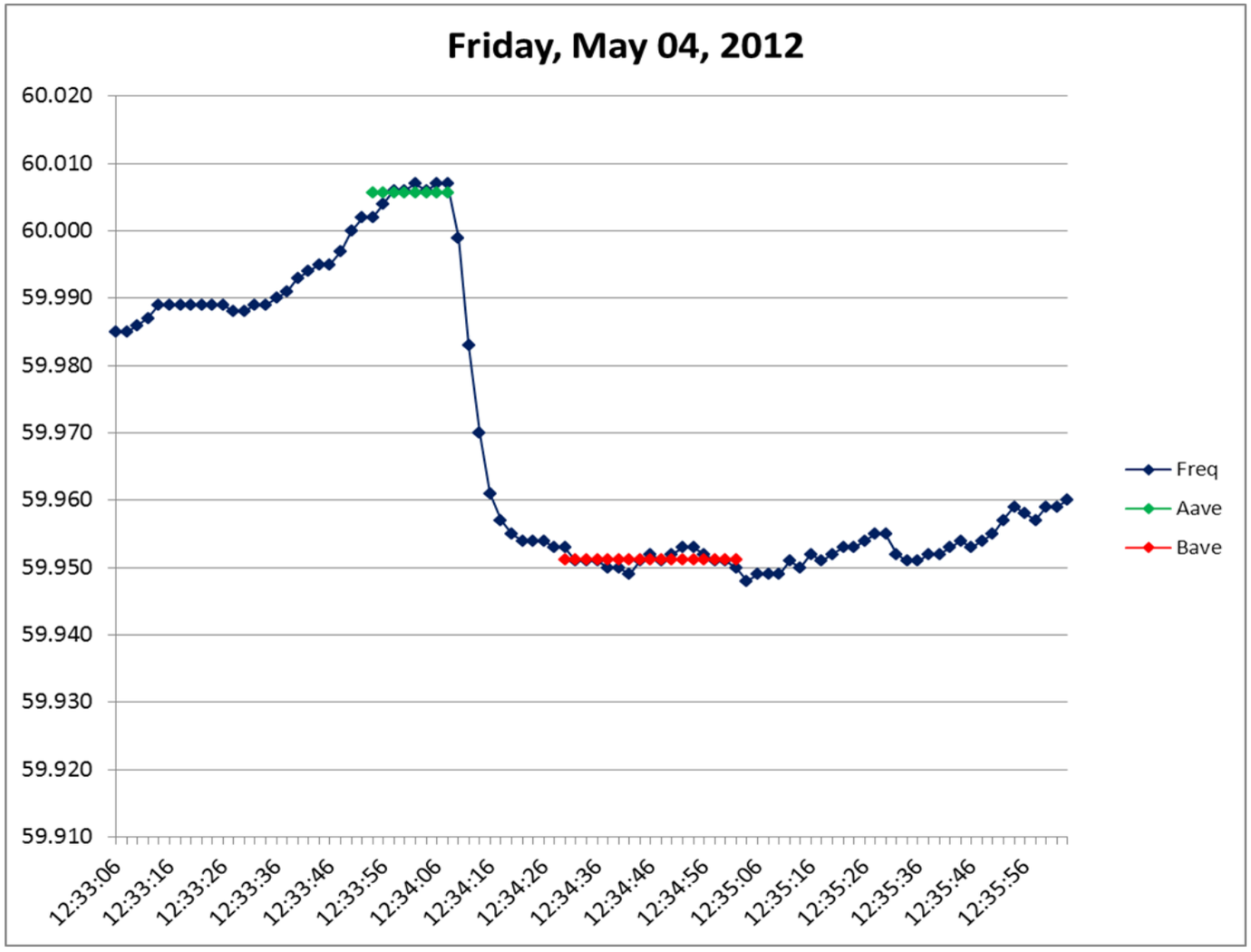
60.020
60.000
59.980
59.960
59.940
59.920
59.900
59.880
9:01:36
9:01:46
9:01:56
9:02:06
9:02:16
9:02:26
9:02:36
9:02:46
9:02:56
9:03:06
9:03:16
9:03:26
9:03:36
9:03:46
9:03:56
9:04:06
9:04:16
9:04:26
Freq
Aave
Bave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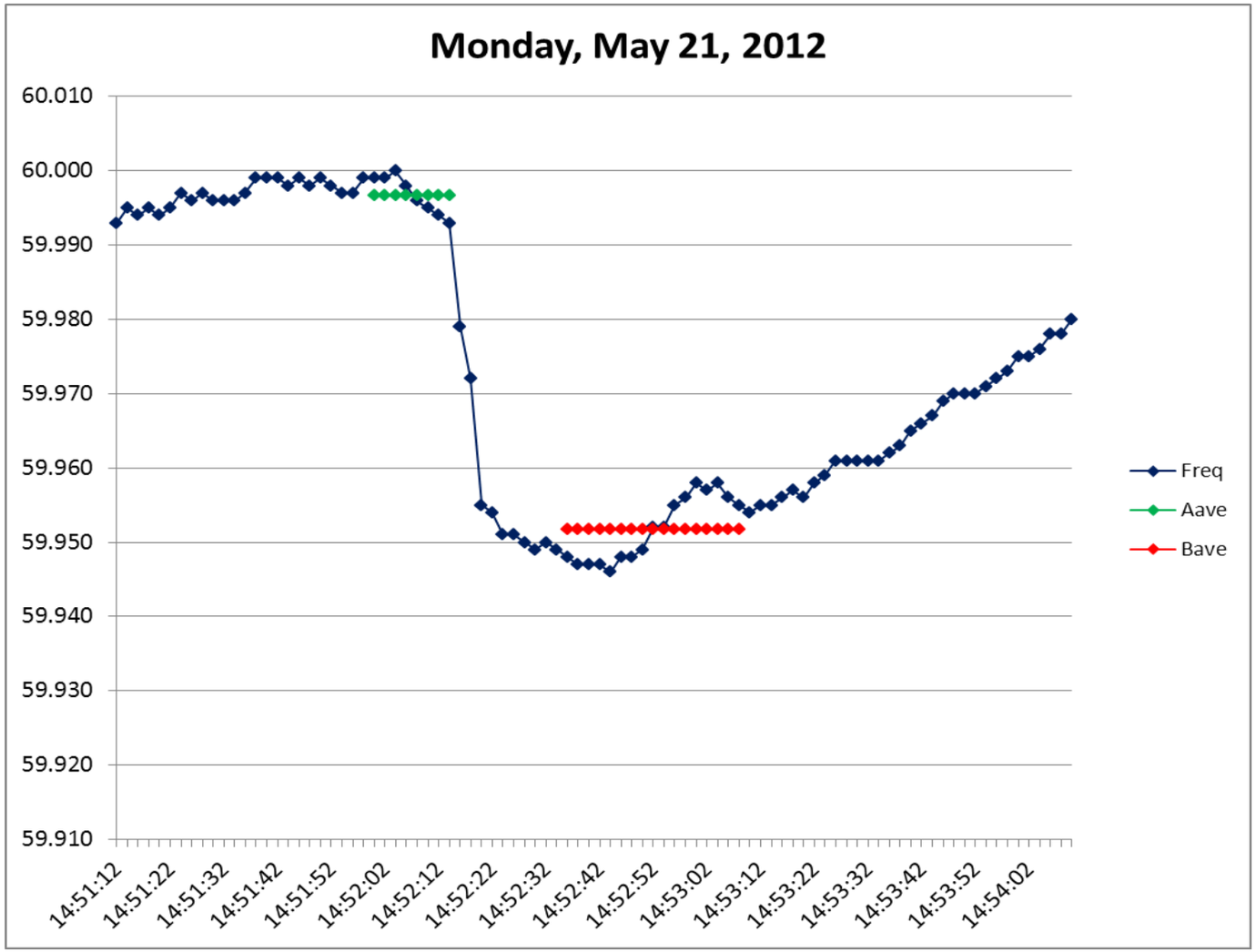
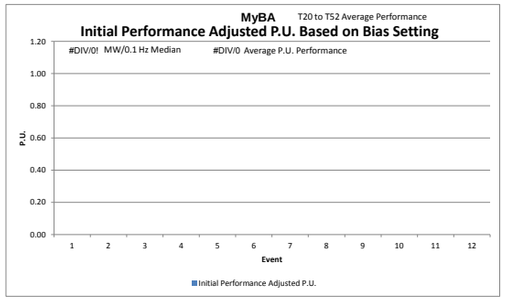
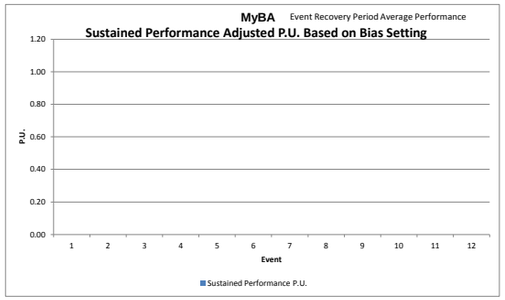
59.950
59.940
59.930
59.920
59.910
12:33:06
12:33:16
12:33:26
12:33:36
12:33:46
12:33:56
12:34:06
12:34:16
12:34:26
12:34:36
12:34:46
12:34:56
12:35:06
12:35:16
12:35:26
12:35:36
12:35:46
12:35:56
Freq
Aave
Bave


Monday, May 21, 2012
60.010
60.000
59.990
59.980
59.970
59.960
59.950
59.940
59.930
59.920
59.910
14:51:12
14:51:22
14:51:32
14:51:42
14:51:52
14:52:02
14:52:12
14:52:22
14:52:32
14:52:42
14:52:52
14:53:02
14:53:12
14:53:22
14:53:32
14:53:42
14:53:52
14:54:02
Freq
Aave
Bave





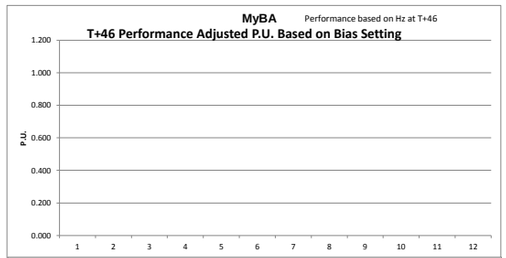
FRI - NERC Frequency Response Initiative

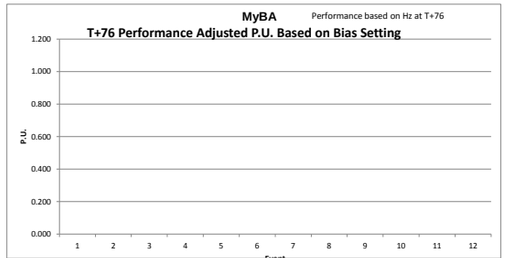
The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

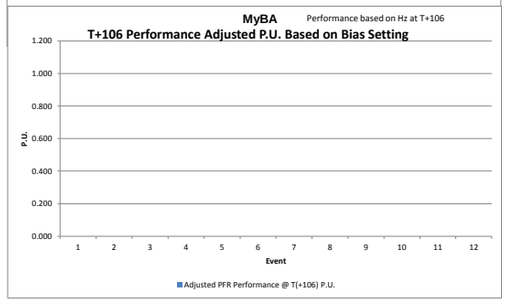
Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

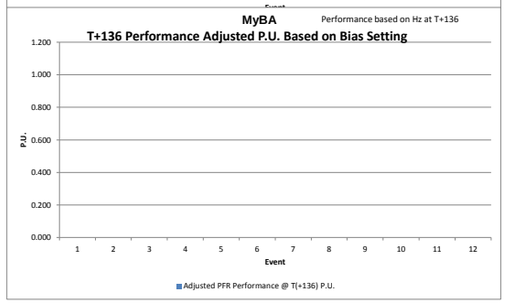
Some basic observations from this data:

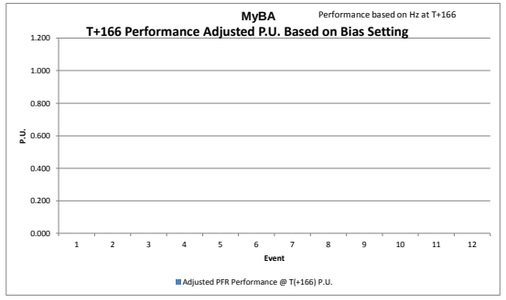
1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.











Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

Balancing Authority: ERCOT

NERC FRS FORM 1 20 to 52 second Value B

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information MW/Load Lost	Value "A" Information Adjustment	Value "B" Information MW/Load Lost	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Reason(s)
1	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
2	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
8	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
9	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
10	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
																Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Enter Addition Data in column W ==>

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

1901	Bias Calculation Form 1 for Year
ERCOT	Interconnection
ERCOT	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
1	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
1	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
1	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
1	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-286	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
-286.00	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
-286.00	**1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.**
Calculate Regression	
	BA Bias Type and Bias Setting
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
65300	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
-587.70	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-653.00	Balancing Authority desired Bias Setting: Single BA Interconnections have no minimum or maximum Bias Setting requirement. If variable Bias is used, enter "Variable".
-653.00	**1901 Frequency Bias Setting - (Single BA Interconnections have no minimum or maximum Bias Setting requirement)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
-529.36	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
-529.36	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Select Reason(s) for adjustment

Instructions

Step 1	Enter data in all green cells on this "Data Entry" worksheet.
Step 2	For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.
Step 3	PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.
Step 4	Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)
	ERCOT_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.0525249	80.66089	Invalid Data (ID)
-0.0709052	-26.8976	Transfered Frequency Response (TFR)
-0.0519068	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.0755724	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.0499992	11.10075	DS & NL & PH
-0.052	-19.9068	DS & NL & ID
-0.0559998	12.32546	JOU DS & NL & TFR
-0.0584984	0.750192	DS & NL & CBA
-0.0485001	2.230058	DS & NL & PH & ID
-0.0450001	9.477859	DS & NL & PH & TFR
-0.0375023	0.355309	DS & NL & PH & CBA
-0.0475006	2.170702	DS & NL & PH & ID & TFR
-0.0555	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
	N	NL & PH & ID & CBA
	Y	NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq	10 X BA DelFreq	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics	
	For Bias	For R1			For Bias	
421.0875	-1.014658	-1.01466	-415.0044	-415.0044	-529.362	0
726.0243	-1.212405	-1.21241	-598.8298	-598.8298	18.2575	#N/A
518.4755	-0.89661	-0.89661	-578.262	-578.262	0.98708	75.0207
785.5412	-1.445673	-1.44567	-543.3742	-543.3742	840.664	11
691.8045	-1.32911	-1.32911	-520.5021	-520.5021	4731351	61909.2
-226.24	0.355891	0.355891	-635.7002	-635.7002		
661.2317	-1.311035	-1.31103	-504.3586	-504.3586	For R1	
995.0827	-1.97183	-1.97183	-504.6492	-504.6492	-529.362	0
533.3253	-0.920725	-0.92072	-579.245	-579.245	18.2575	#N/A
762.3234	-1.179408	-1.17941	-646.3608	-646.3608	0.98708	75.0207
480.61	-0.929121	-0.92912	-517.2738	-517.2738	840.664	11
386.25	-0.942728	-0.94273	-409.7153	-409.7153	4731351	61909.2

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

Event Number	Balancing Authority	ERCOT	Load Resources Tripped		Non conforming Load		Not Used		Not Used		Not Used		Not Used		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
   Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
   (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: ERCOT

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**
**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecialValues the data copied from FRS Form 2 for each event.

Value A Data BA Performance

Value B 20 to 52 second Average Period Evaluation

Average P.U. Performance #DIV/0! #DIV/0! #DIV/0!

Event Number	Date/Time (Central Prevailing)	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t'01 Time	C Value Hz	Value A Data BA Performance: Frequency Hz	Continent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Value B 20 to 52 second Average Period Evaluation: Frequency Hz	Continent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points: #DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
																																			Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
1	1/0/1900 0:00	0.000																																											
2	1/0/1900 0:00	0.000																																											
3	1/0/1900 0:00	0.000																																											
4	1/0/1900 0:00	0.000																																											
5	1/0/1900 0:00	0.000																																											
6	1/0/1900 0:00	0.000																																											
7	1/0/1900 0:00	0.000																																											
8	1/0/1900 0:00	0.000																																											
9	1/0/1900 0:00	0.000																																											
10	1/0/1900 0:00	0.000																																											
11	1/0/1900 0:00	0.000																																											
12	1/0/1900 0:00	0.000																																											
13	1/0/1900 0:00	0.000																																											
14	1/0/1900 0:00	0.000																																											
15	1/0/1900 0:00	0.000																																											
16	1/0/1900 0:00	0.000																																											
17	1/0/1900 0:00	0.000																																											
18	1/0/1900 0:00	0.000																																											
19	1/0/1900 0:00	0.000																																											
20	1/0/1900 0:00	0.000																																											
21	1/0/1900 0:00	0.000																																											
22	1/0/1900 0:00	0.000																																											
23	1/0/1900 0:00	0.000																																											
24	1/0/1900 0:00	0.000																																											
25	1/0/1900 0:00	0.000																																											
26	1/0/1900 0:00	0.000																																											
27	1/0/1900 0:00	0.000																																											
28	1/0/1900 0:00	0.000																																											
29	1/0/1900 0:00	0.000																																											
30	1/0/1900 0:00	0.000																																											
31	1/0/1900 0:00	0.000																																											
32	1/0/1900 0:00	0.000																																											
33	1/0/1900 0:00	0.000																																											
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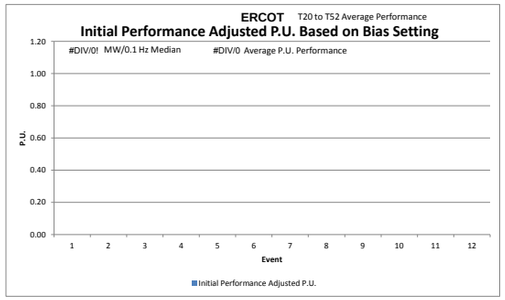
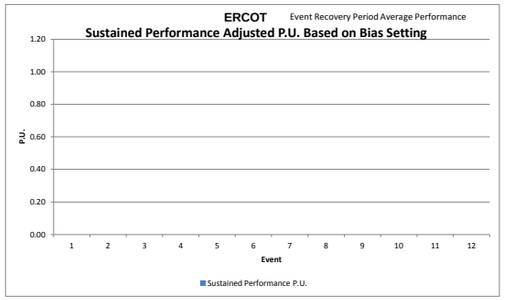
37	1/0/1900 0:00	0.000																																											
38	1/0/1900 0:00	0.000																																											
39	1/0/1900 0:00	0.000																																											
40	1/0/1900 0:00	0.000																																											
41	1/0/1900 0:00	0.000																																											
42	1/0/1900 0:00	0.000																																											

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours





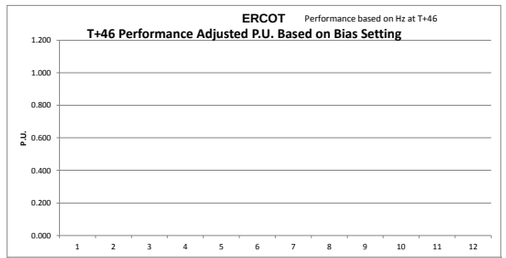
FRI - NERC Frequency Response Initiative

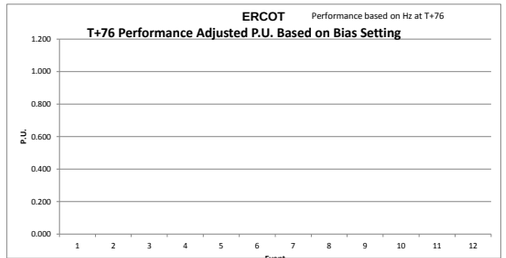
The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

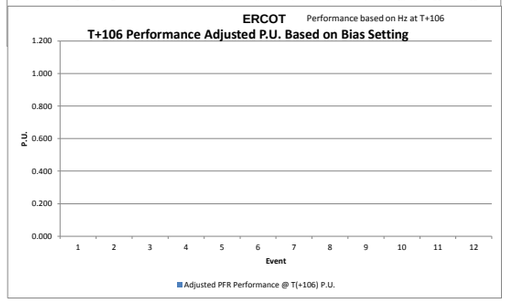
Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

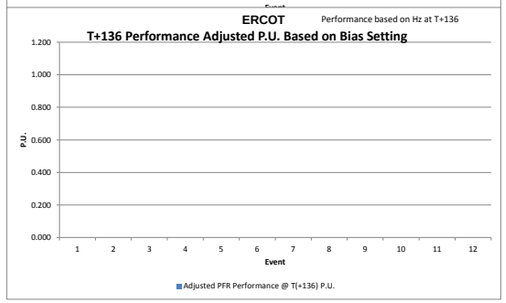
Some basic observations from this data:

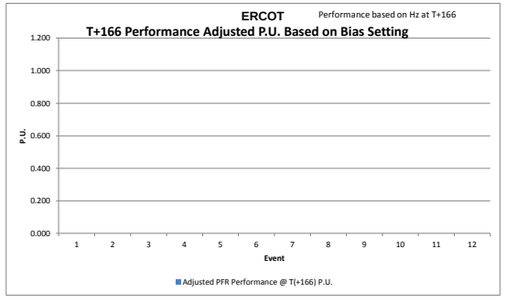
1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.











Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

Balancing Authority: HQT

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information MW/Load Lost	Value "A" Information Adjustment	Value "B" Information MW/Load Lost	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Reason(s)
1	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
2	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
8	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
9	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
10	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Select Reason(s) for adjustment

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

Value	Item
1901	Bias Calculation Form 1 for Year
HQ	Interconnection
HQT	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
1	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
1	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
1	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
1	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-179	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
-179.00	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
-179.00	**1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.**
Calculate Regression	**BA Bias Type and Bias Setting**
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
37153	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
-334.38	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-442.00	Balancing Authority desired Bias Setting: Single BA Interconnections have no minimum or maximum Bias Setting requirement. If variable Bias is used, enter "Variable".
-442.00	**1901 Frequency Bias Setting - (Single BA Interconnections have no minimum or maximum Bias Setting requirement)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

Value	Item
N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Instructions

Step 1 Enter data in all green cells on this "Data Entry" worksheet.

Step 2 For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

Step 3 PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

HQT_1901_FRS_Form_1.9.xlsm

		Reason
-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.8976	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.9068	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
	N	NL & PH & ID & CBA
	Y	NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq For Bias	10 X BA DelFreq For R1	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics For Bias	
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0	0	#N/A
0	0	0	#DIV/0!	0	1	0
0	0	0	#DIV/0!	0	#NUM!	12
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0		
0	0	0	#DIV/0!	0	For R1	
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0	0	#N/A
0	0	0	#DIV/0!	0	1	0
0	0	0	#DIV/0!	0	#NUM!	12
0	0	0	#DIV/0!	0	0	0

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

Event Number	Balancing Authority	HQT	Load Resources Tripped		Non conforming Load		Not Used		Not Used		Not Used		Not Used		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
     Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
     (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: HQT

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**

**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecial/Values the data copied from FRS Form 2 for each event.

Value A Data — BA Performance

Value B — 20 to 52 second Average Period Evaluation

Average P.U. Performance #DIV/0! #DIV/0! #DIV/0!

Event Number	Date/Time (Central Prevailing)	Date	A Point Time	FPointA Hz	A Value Hz	t/0\ Time	C Value Hz	Value A Data: Frequency Hz	Continoent Resource Lost MW	Load Resources Tripped MW	Non-Conformino Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Value B: Frequency Hz	Continoent Resource Lost MW	Load Resources Tripped MW	Non-Conformino Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
																																	Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
																																	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.		
1	1/0/1900 0:00	0.000																																									
2	1/0/1900 0:00	0.000																																									
3	1/0/1900 0:00	0.000																																									
4	1/0/1900 0:00	0.000																																									
5	1/0/1900 0:00	0.000																																									
6	1/0/1900 0:00	0.000																																									
7	1/0/1900 0:00	0.000																																									
8	1/0/1900 0:00	0.000																																									
9	1/0/1900 0:00	0.000																																									
10	1/0/1900 0:00	0.000																																									
11	1/0/1900 0:00	0.000																																									
12	1/0/1900 0:00	0.000																																									
13	1/0/1900 0:00	0.000																																									
14	1/0/1900 0:00	0.000																																									
15	1/0/1900 0:00	0.000																																									
16	1/0/1900 0:00	0.000																																									
17	1/0/1900 0:00	0.000																																									
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29	1/0/1900 0:00	0.000																																									
30	1/0/1900 0:00	0.000																																									
31	1/0/1900 0:00	0.000																																									
32	1/0/1900 0:00	0.000																																									
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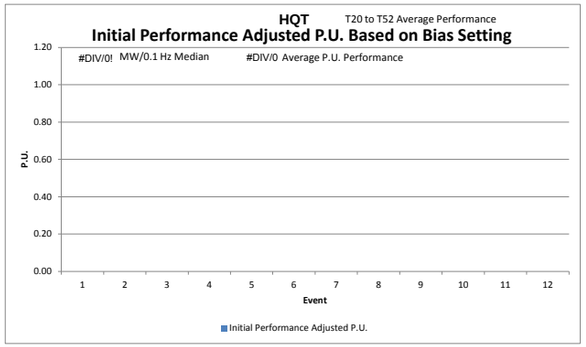
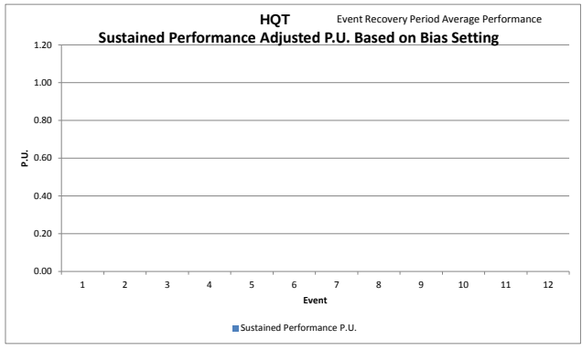
37	1/0/1900 0:00	0.000																																									
38	1/0/1900 0:00	0.000																																									
39	1/0/1900 0:00	0.000																																									
40	1/0/1900 0:00	0.000																																									
41	1/0/1900 0:00	0.000																																									
42	1/0/1900 0:00	0.000																																									

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours





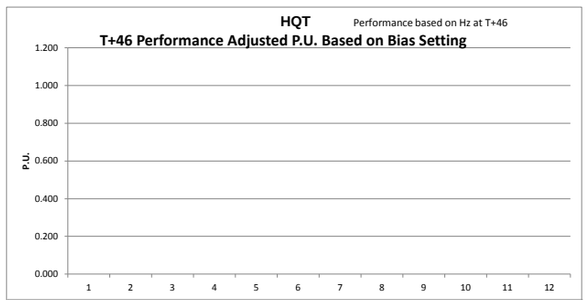
FRI - NERC Frequency Response Initiative

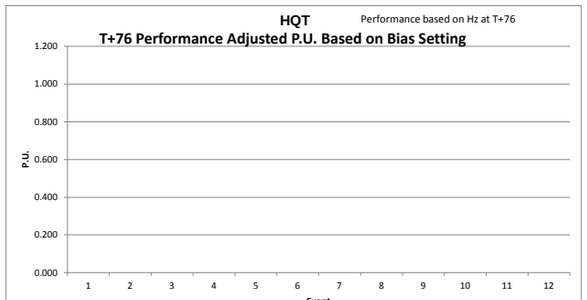
The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

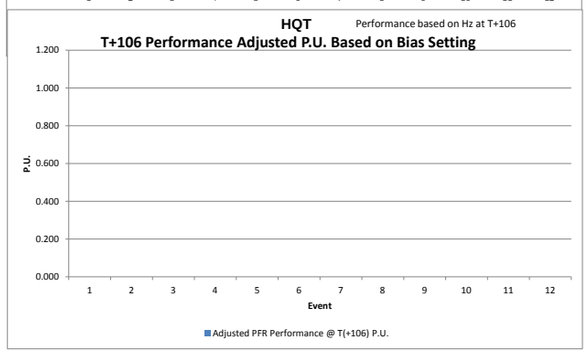
Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

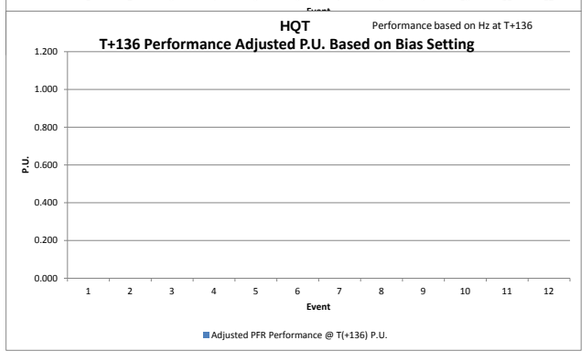
Some basic observations from this data:

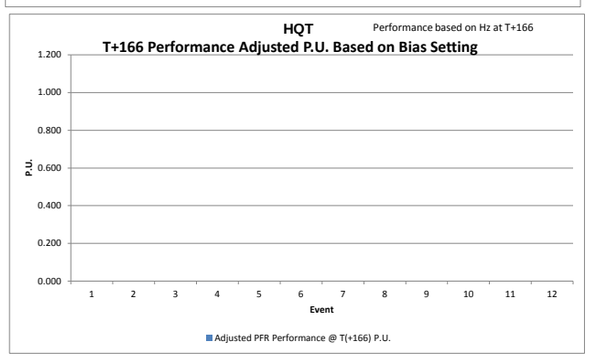
1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.











Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

Balancing Authority MyBA

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information NAI	Value "A" Information Adjustment	Value "B" Information NAI	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Select Reason(s) for adjustment Reason(s)
1	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
2	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
8	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
9	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
10	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

Value	Description
1901	Bias Calculation Form 1 for Year
Eastern	Interconnection
MyBA	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-964	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
#DIV/0!	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
	1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.
Calculate Regression	
	BA Bias Type and Bias Setting
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
621018	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-20.87	Balancing Authority desired Bias Setting: May be set to a value between 100% to 125% of its FRM if this value is more negative than the minimum Bias based on Peak Demand. If not more negative, then the Bias must be the minimum Bias based on Peak Demand. If variable Bias is used, enter "Variable".
#DIV/0!	**1901 Frequency Bias Setting - (minimum of 100% to 125% of FRM, or 0.9% of Historical Peak Demand if not Variable)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

Value	Description
N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Instructions

Step 1 Enter data in all green cells on this "Data Entry" worksheet.

Step 2 For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

Step 3 PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

MyBA_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.8976	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.9068	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
	N	NL & PH & ID & CBA
	Y	NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq For Bias	10 X BA DelFreq For R1	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics For Bias	
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0	0	#N/A
0	0	595	#DIV/0!	0	1	0
0	0	595	#DIV/0!	0	#NUM!	12
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0		
0	0	595	#DIV/0!	0	For R1	
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0	0	#N/A
0	0	595	#DIV/0!	0	1	0
0	0	595	#DIV/0!	0	#NUM!	11
0	0	595	#DIV/0!	0	0	0

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

Event Number	Balancing Authority	MyBA	JOU Dynamic Schedules		Non conforming Load		Pumped Hydro		Not Used		Transferred Frequency Response		Contingent BA Adjustment		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify.
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
   Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
   (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: MyBA

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**
**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecial/Values the data copied from FRS Form 2 for each event.

Value A Data BA Performance

Value B 20 to 52 second Average Period Evaluation

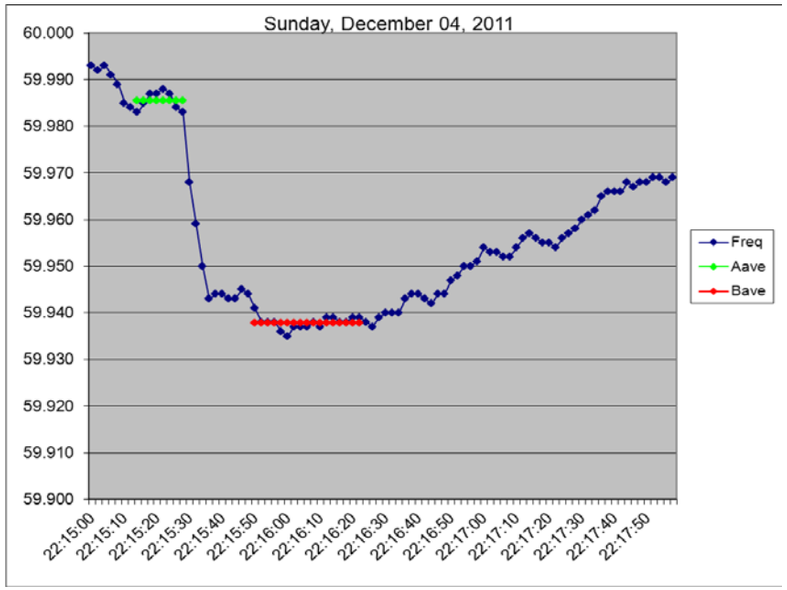
Average P.U. Performance #DIV/0! #DIV/0! #DIV/0!

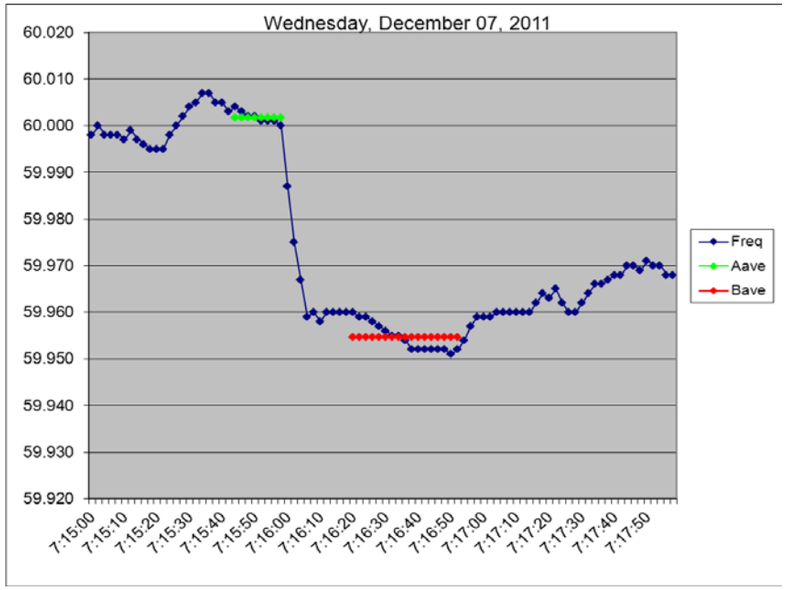
#DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0! #DIV/0!

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

Event Number	Date/Time (Central Prevailing)	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t/0\ Time	C Value Hz	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conformino Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conformino Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
1	1/0/1900 0:00	0.000																																									
2	1/0/1900 0:00	0.000																																									
3	1/0/1900 0:00	0.000																																									
4	1/0/1900 0:00	0.000																																									
5	1/0/1900 0:00	0.000																																									
6	1/0/1900 0:00	0.000																																									
7	1/0/1900 0:00	0.000																																									
8	1/0/1900 0:00	0.000																																									
9	1/0/1900 0:00	0.000																																									
10	1/0/1900 0:00	0.000																																									
11	1/0/1900 0:00	0.000																																									
12	1/0/1900 0:00	0.000																																									
13	1/0/1900 0:00	0.000																																									
14	1/0/1900 0:00	0.000																																									
15	1/0/1900 0:00	0.000																																									
16	1/0/1900 0:00	0.000																																									
17	1/0/1900 0:00	0.000																																									
18	1/0/1900 0:00	0.000																																									
19	1/0/1900 0:00	0.000																																									
20	1/0/1900 0:00	0.000																																									
21	1/0/1900 0:00	0.000																																									
22	1/0/1900 0:00	0.000																																									
23	1/0/1900 0:00	0.000																																									
24	1/0/1900 0:00	0.000																																									
25	1/0/1900 0:00	0.000																																									
26	1/0/1900 0:00	0.000																																									
27	1/0/1900 0:00	0.000																																									
28	1/0/1900 0:00	0.000																																									
29	1/0/1900 0:00	0.000																																									
30	1/0/1900 0:00	0.000																																									
31	1/0/1900 0:00	0.000																																									
32	1/0/1900 0:00	0.000																																									
33	1/0/1900 0:00	0.000																																									
34	1/0/1900 0:00	0.000																																									
35	1/0/1900 0:00	0.000																																									
36	1/0/1900 0:00	0.000																																									
37	1/0/1900 0:00	0.000																																									
38	1/0/1900 0:00	0.000																																									
39	1/0/1900 0:00	0.000																																									
40	1/0/1900 0:00	0.000																																									
41	1/0/1900 0:00	0.000																																									
42	1/0/1900 0:00	0.000																																									

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours


Sunday, December 04, 2011
60.000
59.990
59.980
59.970
59.960
59.950
59.940
59.930
59.920
59.910
59.900
22:15:00
22:15:10
22:15:20
22:15:30
22:15:40
22:15:50
22:16:00
22:16:10
22:16:20
22:16:30
22:16:40
22:16:50
22:17:00
22:17:10
22:17:20
22:17:30
22:17:40
22:17:50
Freq
Aave
Bave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7:15:20
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7:16:00
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7:16:20
7:16:30
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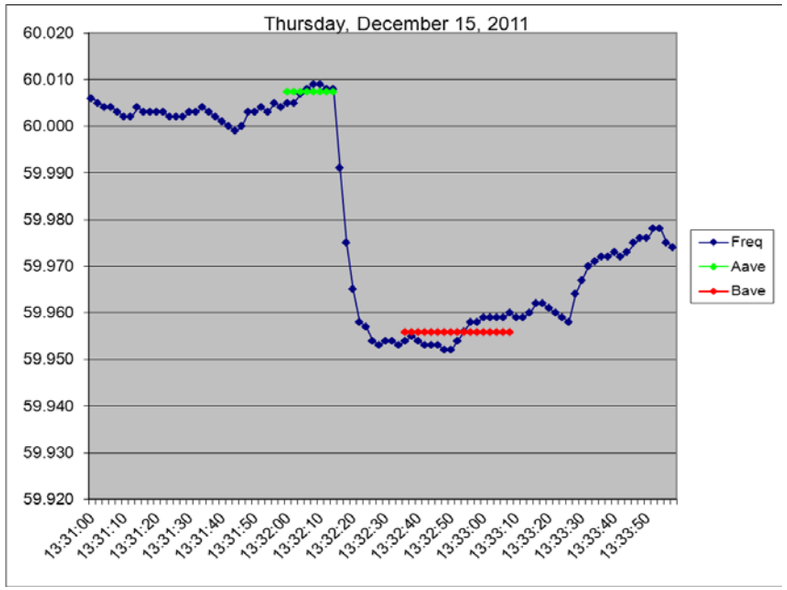
Freq
Aave
Bave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13:32:30
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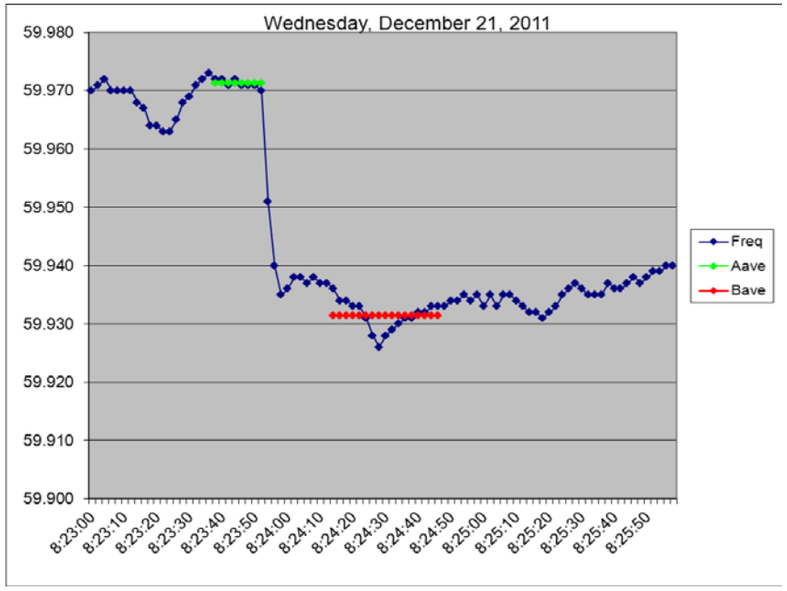
Freq
Aave
Bave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Freq
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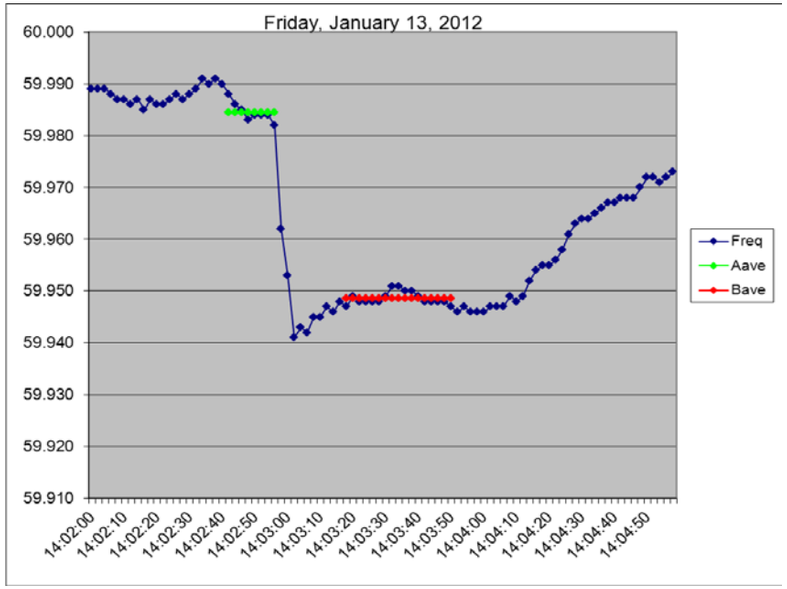
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14:02:50
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14:03:20
14:03:30
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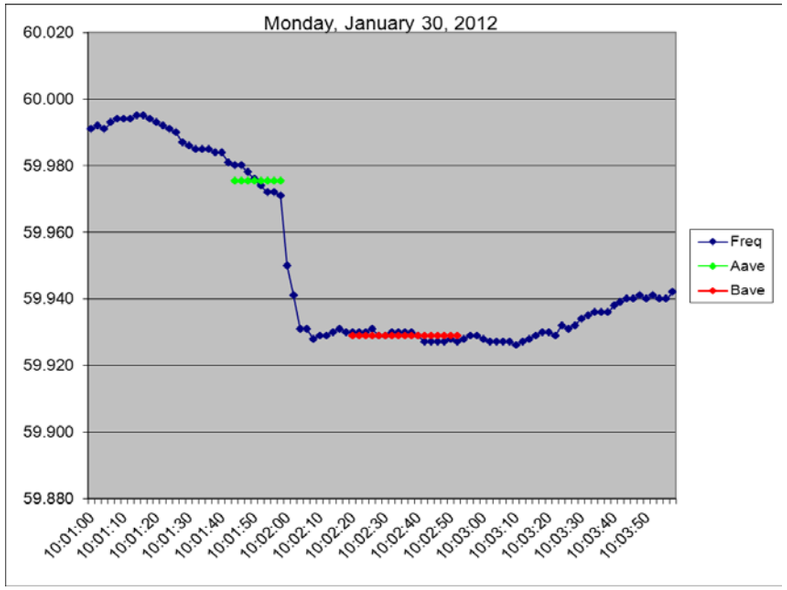
Freq
Aave
Bave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10:02:40
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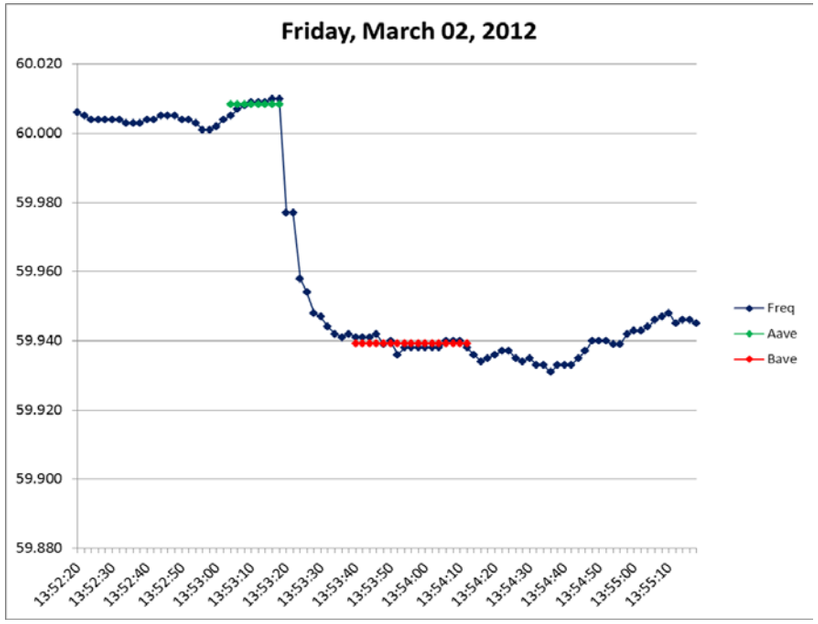
Freq
Aave
Bave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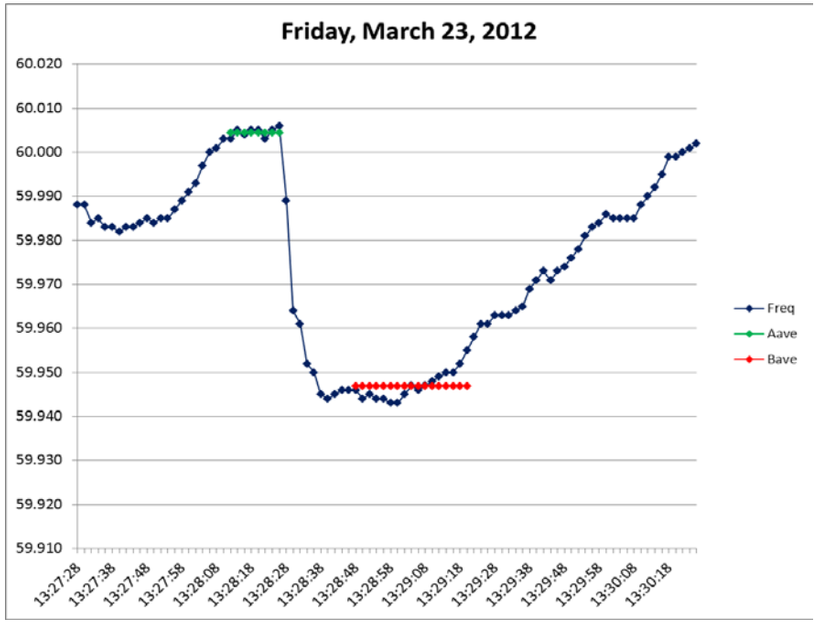
Freq
Aave
Bave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59.970
59.960
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59.940
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59.920
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13:27:48
13:27:58
13:28:08
13:28:18
13:28:28
13:28:38
13:28:48
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13:29:08
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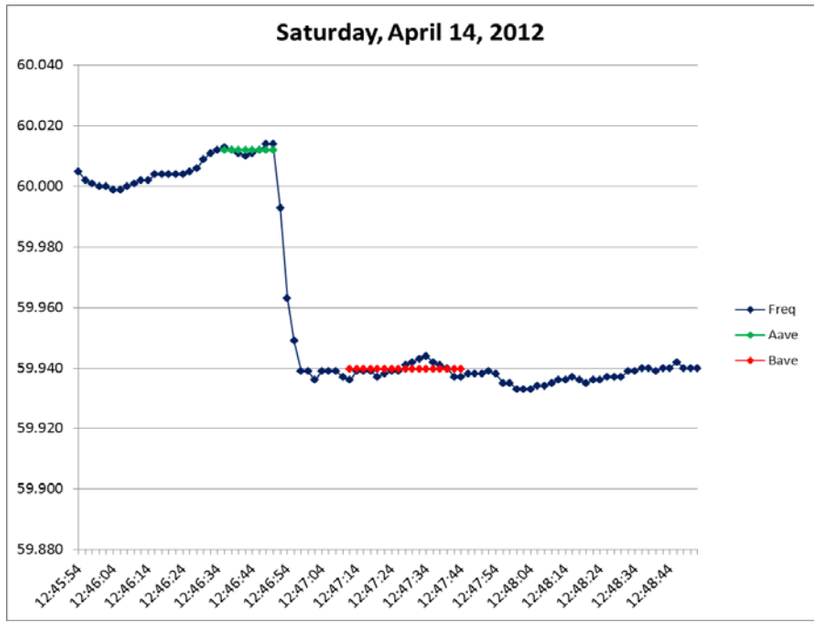
13:30:08
13:30:18
Freq
Aave
Bave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12:47:34
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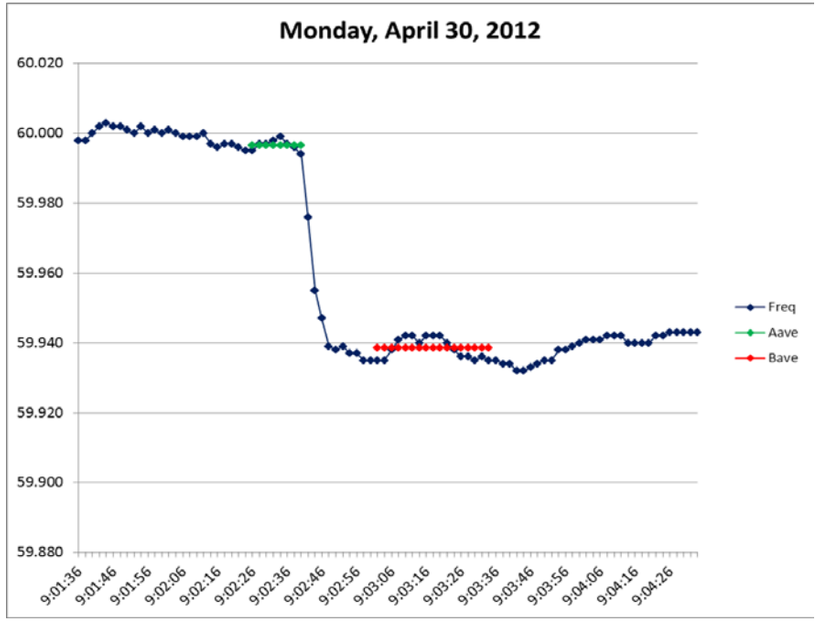
12:48:24
12:48:34
12:48:44
Freq
Aave
Bave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59.920
59.900
59.880
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9:02:16
9:02:26
9:02:36
9:02:46
9:02:56
9:03:06
9:03:16
9:03:26
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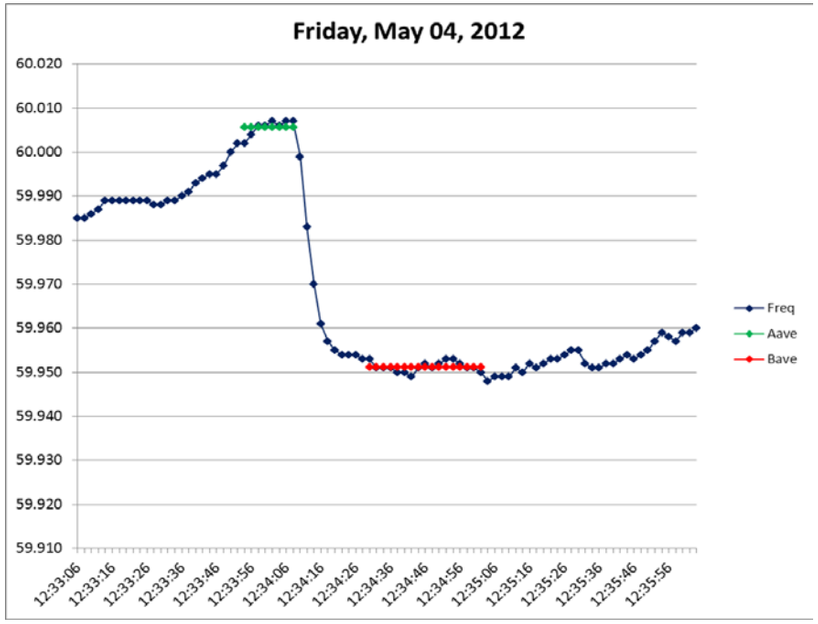
9:03:46
9:03:56
9:04:06
9:04:16
9:04:26
Freq
Aave
Bave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12:33:26
12:33:36
12:33:46
12:33:56
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12:34:16
12:34:26
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12:34:46
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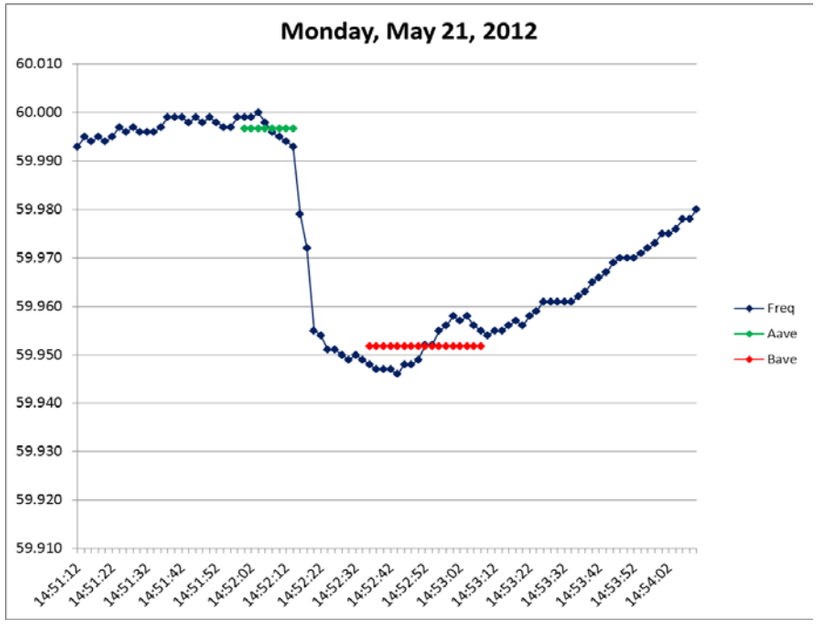
12:35:46
12:35:56
Freq
Aave
Bave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14:51:52
14:52:02
14:52:12
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14:52:32
14:52:42
14:52:52
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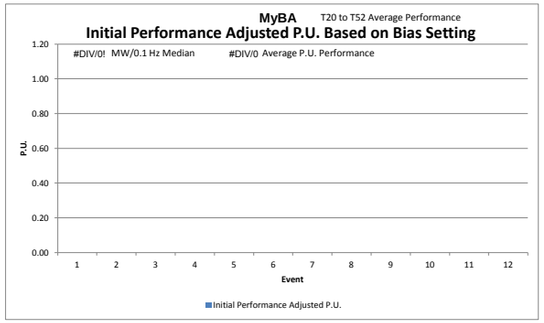
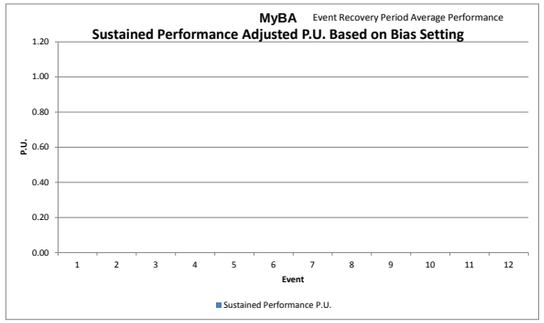
14:53:22
14:53:32
14:53:42
14:53:52
14:54:02
Freq
Aave
Bave





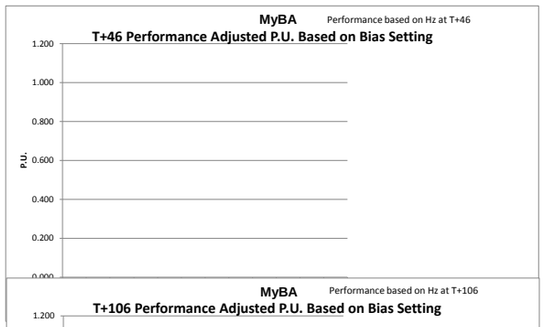
FRI - NERC Frequency Response Initiative

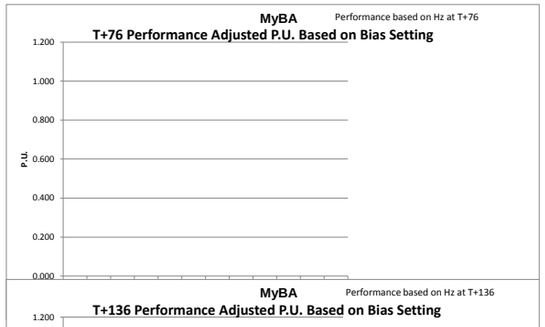
The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

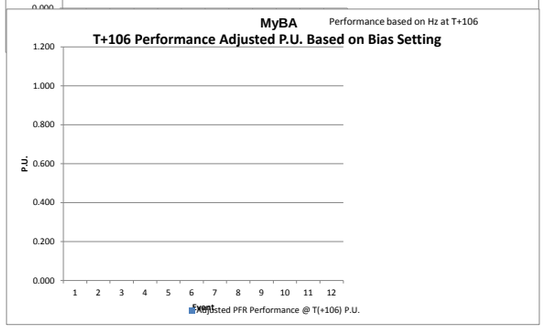
Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

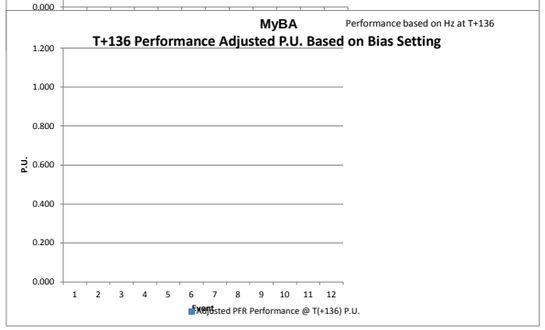
Some basic observations from this data:

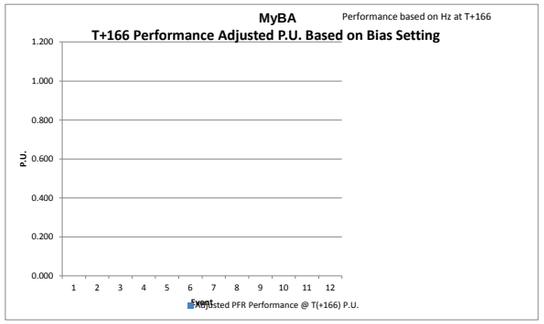
1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.











Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

Balancing Authority: ERCOT

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

Select Reason(s) for adjustment

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information MW/Load Lost	Value "A" Information Adjustment	Value "B" Information MW/Load Lost	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Reason(s)
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2	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
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12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
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22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

Value	Description
1901	Bias Calculation Form 1 for Year
ERCOT	Interconnection
ERCOT	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
1	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
1	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
1	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
1	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-286	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
-286.00	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
-286.00	**1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.**
Calculate Regression	
	BA Bias Type and Bias Setting
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
65300	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
-587.70	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-653.00	Balancing Authority desired Bias Setting: Single BA Interconnections have no minimum or maximum Bias Setting requirement. If variable Bias is used, enter "Variable".
-653.00	**1901 Frequency Bias Setting - (Single BA Interconnections have no minimum or maximum Bias Setting requirement)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
-529.36	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
-529.36	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

Value	Description
N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Instructions

Step 1 Enter data in all green cells on this "Data Entry" worksheet.

Step 2 For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

Step 3 PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

ERCOT_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.8976	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.9068	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
N		NL & PH & ID & CBA
Y		NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq	10 X BA DelFreq	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics	
	For Bias	For R1			For Bias	
421.08749	-1.014658	-1.014658	-415.00442	-415.00442	-529.362	0
726.02426	-1.212405	-1.212405	-598.8298	-598.8298	18.25749	#N/A
518.4755	-0.89661	-0.89661	-578.26195	-578.26195	0.987084	75.02074
785.54117	-1.445673	-1.445673	-543.37416	-543.37416	840.664	11
691.80448	-1.32911	-1.32911	-520.50213	-520.50213	4731351	61909.23
-226.24	0.3558911	0.355891	-635.70015	-635.70015		
661.23172	-1.311035	-1.311035	-504.3586	-504.3586	For R1	
995.08267	-1.97183	-1.97183	-504.6492	-504.6492	-529.362	0
533.32526	-0.920725	-0.920725	-579.24498	-579.24498	18.25749	#N/A
762.32339	-1.179408	-1.179408	-646.3608	-646.3608	0.987084	75.02074
480.61002	-0.929121	-0.929121	-517.2738	-517.2738	840.664	11
386.25	-0.942728	-0.942728	-409.71529	-409.71529	4731351	61909.23

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

Event Number	Balancing Authority	ERCOT	Load Resources Tripped		Non conforming Load		Not Used		Not Used		Not Used		Not Used		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
   Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced. (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: ERCOT

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**
**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecial/Values the data copied from FRS Form 2 for each event.

Value A Data BA Performance

Value B 20 to 52 second Average Period Evaluation

Average P.U. Performance #DIV/0! #DIV/0! #DIV/0!

Event Number	Date/Time (Central Prevailing)	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t/0\ Time	C Value Hz	Value A Data: Frequency Hz	Continoent Resource Lost MW	Load Resources Tripped MW	Non-Conformino Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Value B: Frequency Hz	Continoent Resource Lost MW	Load Resources Tripped MW	Non-Conformino Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
																																		Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
																																		Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.		
1	1/0/1900 0:00	0.000																																									
2	1/0/1900 0:00	0.000																																									
3	1/0/1900 0:00	0.000																																									
4	1/0/1900 0:00	0.000																																									
5	1/0/1900 0:00	0.000																																									
6	1/0/1900 0:00	0.000																																									
7	1/0/1900 0:00	0.000																																									
8	1/0/1900 0:00	0.000																																									
9	1/0/1900 0:00	0.000																																									
10	1/0/1900 0:00	0.000																																									
11	1/0/1900 0:00	0.000																																									
12	1/0/1900 0:00	0.000																																									
13	1/0/1900 0:00	0.000																																									
14	1/0/1900 0:00	0.000																																									
15	1/0/1900 0:00	0.000																																									
16	1/0/1900 0:00	0.000																																									
17	1/0/1900 0:00	0.000																																									
18	1/0/1900 0:00	0.000																																									
19	1/0/1900 0:00	0.000																																									
20	1/0/1900 0:00	0.000																																									
21	1/0/1900 0:00	0.000																																									
22	1/0/1900 0:00	0.000																																									
23	1/0/1900 0:00	0.000																																									
24	1/0/1900 0:00	0.000																																									
25	1/0/1900 0:00	0.000																																									
26	1/0/1900 0:00	0.000																																									
27	1/0/1900 0:00	0.000																																									
28	1/0/1900 0:00	0.000																																									
29	1/0/1900 0:00	0.000																																									
30	1/0/1900 0:00	0.000																																									
31	1/0/1900 0:00	0.000																																									
32	1/0/1900 0:00	0.000																																									
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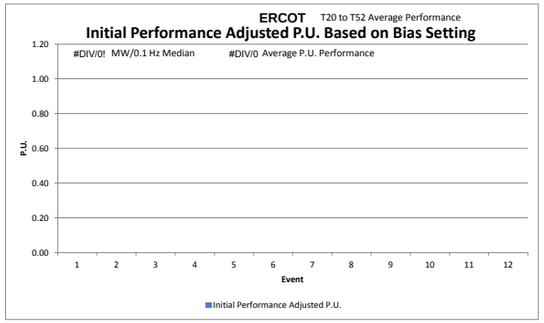
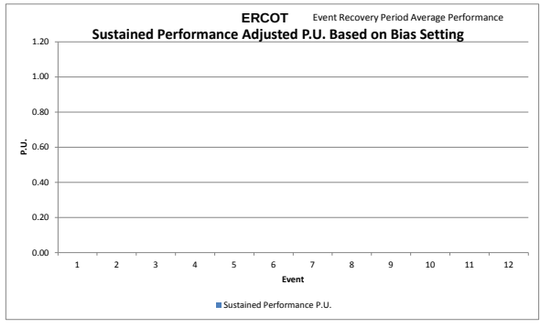
39	1/0/1900 0:00	0.000																																									
40	1/0/1900 0:00	0.000																																									
41	1/0/1900 0:00	0.000																																									
42	1/0/1900 0:00	0.000																																									

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours





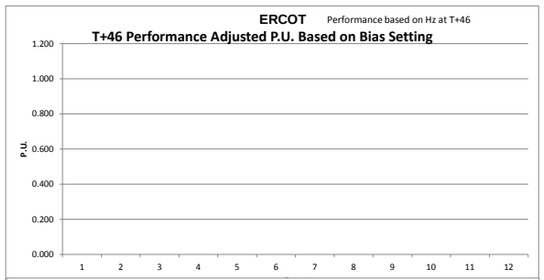
FRI - NERC Frequency Response Initiative

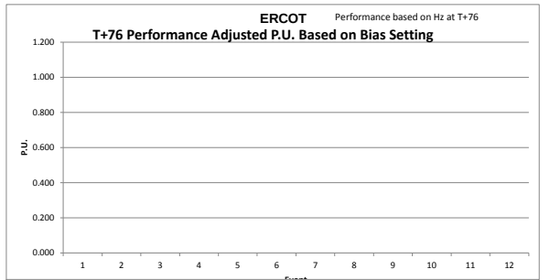
The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

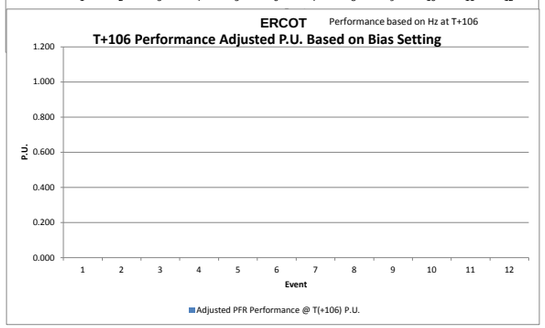
Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

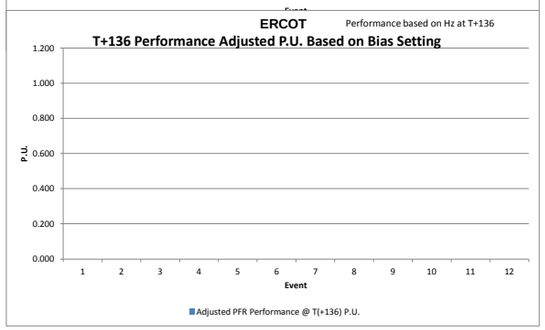
Some basic observations from this data:

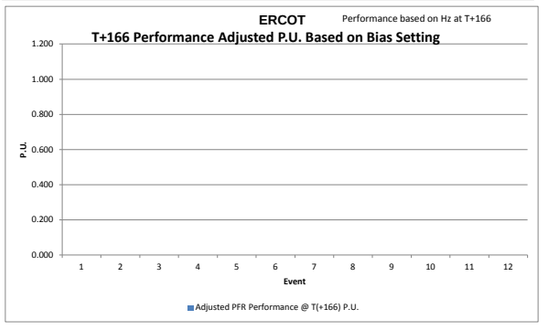
1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.











Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

003292

Balancing Authority **HQT**

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information MW/Load Lost	Value "A" Information Adjustment	Value "B" Information MW/Load Lost	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Select Reason(s) for adjustment: Reason(s)
1	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
2	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
8	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
9	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
10	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
																Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

Value	Description
1901	Bias Calculation Form 1 for Year
HQ	Interconnection
HQT	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
1	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
1	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
1	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
1	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-179	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
-179.00	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
-179.00	**1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.**
Calculate Regression	**BA Bias Type and Bias Setting**
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
37153	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
-334.38	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-442.00	Balancing Authority desired Bias Setting: Single BA Interconnections have no minimum or maximum Bias Setting requirement. If variable Bias is used, enter "Variable".
-442.00	**1901 Frequency Bias Setting - (Single BA Interconnections have no minimum or maximum Bias Setting requirement)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

Value	Description
N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Instructions

Step 1 Enter data in all green cells on this "Data Entry" worksheet.

Step 2 For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

Step 3 PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

HQT_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.8976	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.9068	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
N		NL & PH & ID & CBA
Y		NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq For Bias	10 X BA DelFreq For R1	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics	
					For Bias	
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0	0	#N/A
0	0	0	#DIV/0!	0	1	0
0	0	0	#DIV/0!	0	#NUM!	12
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0		
0	0	0	#DIV/0!	0	For R1	
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0	0	#N/A
0	0	0	#DIV/0!	0	1	0
0	0	0	#DIV/0!	0	#NUM!	12
0	0	0	#DIV/0!	0	0	0

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

Event Number	Balancing Authority	HQT	Load Resources Tripped		Non conforming Load		Not Used		Not Used		Not Used		Not Used		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify.
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
   Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
   (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: HQT

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**

**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecial/Values the data copied from FRS Form 2 for each event.

Value A Data — BA Performance

Value B — 20 to 52 second Average Period Evaluation

Average P.U. Performance #DIV/0! #DIV/0! #DIV/0!

Event Number	Date/Time (Central Prevailing)	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t/0\ Time	C Value Hz	Value A Data: Frequency Hz	Continoent Resource Lost MW	Load Resources Tripped MW	Non-Conformino Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Value B: Frequency Hz	Continoent Resource Lost MW	Load Resources Tripped MW	Non-Conformino Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
																																		Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
																																		Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.		
1	1/0/1900 0:00	0.000																																									
2	1/0/1900 0:00	0.000																																									
3	1/0/1900 0:00	0.000																																									
4	1/0/1900 0:00	0.000																																									
5	1/0/1900 0:00	0.000																																									
6	1/0/1900 0:00	0.000																																									
7	1/0/1900 0:00	0.000																																									
8	1/0/1900 0:00	0.000																																									
9	1/0/1900 0:00	0.000																																									
10	1/0/1900 0:00	0.000																																									
11	1/0/1900 0:00	0.000																																									
12	1/0/1900 0:00	0.000																																									
13	1/0/1900 0:00	0.000																																									
14	1/0/1900 0:00	0.000																																									
15	1/0/1900 0:00	0.000																																									
16	1/0/1900 0:00	0.000																																									
17	1/0/1900 0:00	0.000																																									
18	1/0/1900 0:00	0.000																																									
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28	1/0/1900 0:00	0.000																																									
29	1/0/1900 0:00	0.000																																									
30	1/0/1900 0:00	0.000																																									
31	1/0/1900 0:00	0.000																																									
32	1/0/1900 0:00	0.000																																									
33	1/0/1900 0:00	0.000																																									
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36	1/0/1900 0:00	0.000																																									
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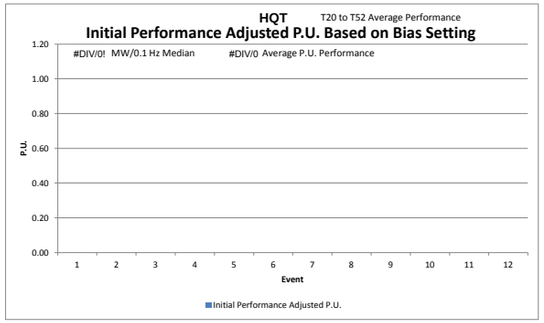
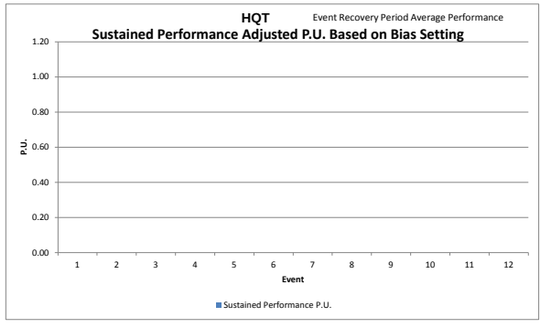
38	1/0/1900 0:00	0.000																																									
39	1/0/1900 0:00	0.000																																									
40	1/0/1900 0:00	0.000																																									
41	1/0/1900 0:00	0.000																																									
42	1/0/1900 0:00	0.000																																									

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours





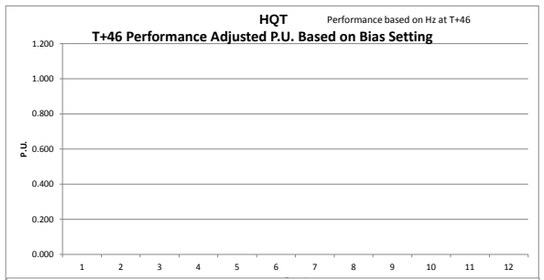
FRI - NERC Frequency Response Initiative

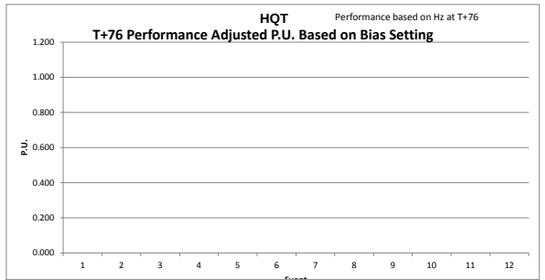
The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

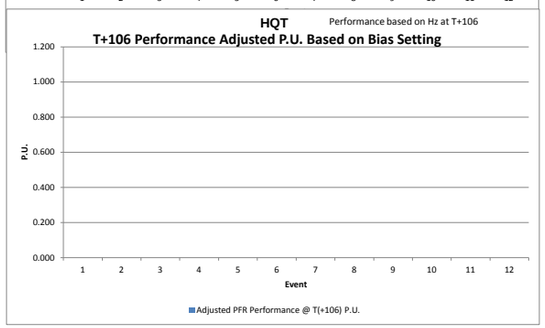
Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

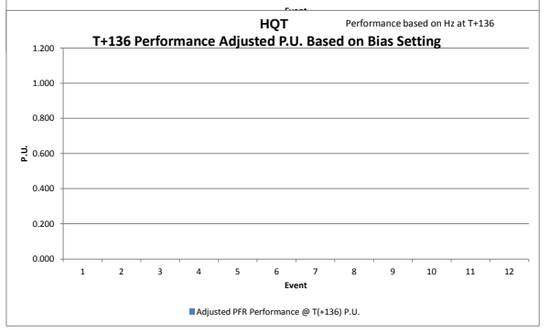
Some basic observations from this data:

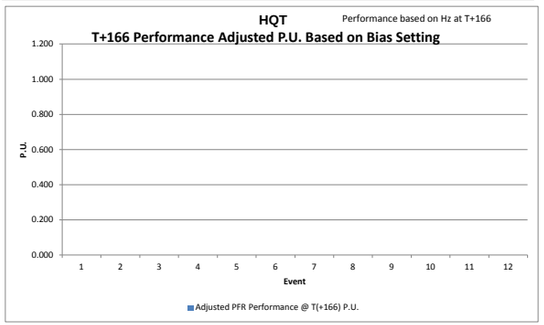
1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.











Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:17:26	60.007	3679.946	350	-331.852966	0	81.5	10	15	-103	7553.79
10/12/09 02:17:28	60.009	3679.44	350	-331.852966	0	82	10	15	-103	7554.12
10/12/09 02:17:30	60.009	3679.912	350	-331.852966	0	82.5	10	15	-103	7554.45
10/12/09 02:17:32	60.006	3679.517	350	-331.852966	0	83	10	15	-103	7554.78
10/12/09 02:17:34	60.006	3679.888	350	-331.852966	0	83.5	10	15	-103	7555.11
10/12/09 02:17:36	60.009	3679.608	350	-329.98822	0	84	10	15	-103	7555.44
10/12/09 02:17:38	60.009	3679.06	350	-329.98822	0	84.5	10	15	-103	7555.77
10/12/09 02:17:40	60.008	3679.261	350	-329.98822	0	85	10	15	-103	7556.1
10/12/09 02:17:42	60.009	3679.164	350	-329.98822	0	85.5	10	15	-103	7556.43
10/12/09 02:17:44	60.009	3679.025	350	-329.98822	0	86	10	15	-103	7556.76
10/12/09 02:17:46	60.005	3679.152	350	-255.444168	0	86.5	10	15	-103	7557.09
10/12/09 02:17:48	60.004	3678.572	350	-255.444168	0	87	10	15	-103	7557.42
10/12/09 02:17:50	60.001	3678.295	350	-255.444168	0	87.5	10	15	-103	7557.75
10/12/09 02:17:52	59.999	3678.249	350	-255.444168	0	88	10	15	-103	7558.08
10/12/09 02:17:54	59.993	3678.236	350	-255.444168	0	88.5	10	15	-103	7558.41
10/12/09 02:17:56	59.991	3677.83	350	-254.838303	0	89	10	15	-103	7558.74
10/12/09 02:17:58	59.994	3677.955	350	-254.838303	0	89.5	10	15	-103	7559.07
10/12/09 02:18:00	59.992	3677.772	350	-254.838303	0	90	10	15	-103	7559.4
10/12/09 02:18:02	59.994	3676.666	350	-254.838303	0	90.5	10	15	-103	7559.73
10/12/09 02:18:04	59.992	3677.093	350	-254.838303	0	91	10	15	-103	7560.06
10/12/09 02:18:06	59.994	3677.141	350	-257.146973	0	91.5	10	15	-103	7560.39
10/12/09 02:18:08	59.995	3676.401	350	-257.146973	0	92	10	15	-103	7560.72
10/12/09 02:18:10	59.993	3678.516	350	-257.146973	0	92.5	10	15	-103	7561.05
10/12/09 02:18:12	59.99	3679.872	350	-257.146973	0	93	10	15	-103	7561.38
10/12/09 02:18:14	59.99	3680.197	350	-257.146973	0	93.5	10	15	-103	7561.71
10/12/09 02:18:16	59.987	3678.743	350	-262.289368	0	94	10	15	-103	7562.04
10/12/09 02:18:18	59.983	3678.428	350	-262.289368	0	94.5	10	15	-103	7562.37
10/12/09 02:18:20	59.977	3677.921	350	-262.289368	0	95	10	15	-103	7562.7
10/12/09 02:18:22	59.977	3680.254	350	-262.289368	0	95.5	10	15	-103	7563.03
10/12/09 02:18:24	59.989	3682.07	350	-262.289368	0	96	10	15	-103	7563.36
10/12/09 02:18:26	59.995	3681.329	350	-256.647949	0	96.5	10	15	-103	7563.69
10/12/09 02:18:28	59.999	3678.656	350	-256.647949	0	97	10	15	-103	7564.02
10/12/09 02:18:30	59.994	3678.077	350	-256.647949	0	97.5	10	15	-103	7564.35
10/12/09 02:18:32	59.989	3677.78	350	-256.647949	0	98	10	15	-103	7564.68
10/12/09 02:18:34	59.987	3678.427	350	-256.647949	0	98.5	10	15	-103	7565.01
10/12/09 02:18:36	59.986	3678.473	350	-256.307251	0	99	10	15	-103	7565.34
10/12/09 02:18:38	59.984	3678.278	350	-256.307251	0	99.5	10	15	-103	7565.67
10/12/09 02:18:40	59.983	3677.822	350	-256.307251	0	100	10	15	-103	7566
10/12/09 02:18:42	59.985	3676.615	350	-256.307251	0	100.5	10	15	-103	7566.33

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
	0				
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.004	0.004	
0	0	0	-0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.006	0.006	
0	0	0	-0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.004	0.004	
0	0	0	-0.006	0.006	
0	0	0	0.000	0.000	
0	0	0	0.012	0.012	
0	0	0	0.006	0.006	
0	0	0	0.004	0.004	
0	0	0	-0.005	0.005	
0	0	0	-0.005	0.005	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:18:44	59.986	3677.397	350	-256.307251	0	101	10	15	-103	7566.66
10/12/09 02:18:46	59.985	3677.917	350	-249.086395	0	101.5	10	15	-103	7566.99
10/12/09 02:18:48	59.986	3677.95	350	-249.086395	0	102	10	15	-103	7567.32
10/12/09 02:18:50	59.98	3678.617	350	-249.086395	0	102.5	10	15	-103	7567.65
10/12/09 02:18:52	59.981	3678.963	350	-249.086395	0	103	10	15	-103	7567.98
10/12/09 02:18:54	59.981	3681.252	350	-249.086395	0	103.5	10	15	-103	7568.31
10/12/09 02:18:56	59.989	3680.737	350	-253.742477	0	104	10	15	-103	7568.64
10/12/09 02:18:58	59.998	3680.045	350	-253.742477	0	104.5	10	15	-103	7568.97
10/12/09 02:19:00	60.007	3678.161	350	-253.742477	0	105	10	15	-103	7569.3
10/12/09 02:19:02	60.007	3674.076	350	-253.742477	0	105.5	10	15	-103	7569.63
10/12/09 02:19:04	59.997	3676.222	350	-253.742477	0	106	10	15	-103	7569.96
10/12/09 02:19:06	59.986	3676.669	350	-257.421204	0	106.5	10	15	-103	7570.29
10/12/09 02:19:08	59.981	3677.497	350	-257.421204	0	107	10	15	-103	7570.62
10/12/09 02:19:10	59.977	3677.49	350	-257.421204	0	107.5	10	15	-103	7570.95
10/12/09 02:19:12	59.974	3675.186	350	-257.421204	0	108	10	15	-103	7571.28
10/12/09 02:19:14	59.976	3675.437	350	-257.421204	0	108.5	10	15	-103	7571.61
10/12/09 02:19:16	59.974	3680.451	350	-261.73822	0	109	10	15	-103	7571.94
10/12/09 02:19:18	59.974	3682.032	350	-261.73822	0	109.5	10	15	-103	7572.27
10/12/09 02:19:20	59.977	3683.829	350	-261.73822	0	110	10	15	-103	7572.6
10/12/09 02:19:22	59.979	3682.843	350	-261.73822	0	110.5	10	15	-103	7572.93
10/12/09 02:19:24	59.979	3681.108	350	-261.73822	0	111	10	15	-103	7573.26
10/12/09 02:19:26	59.982	3680.566	350	-271.875977	0	111.5	10	15	-103	7573.59
10/12/09 02:19:28	59.984	3678.229	350	-271.875977	0	112	10	15	-103	7573.92
10/12/09 02:19:30	59.987	3676.752	350	-271.875977	0	112.5	10	15	-103	7574.25
10/12/09 02:19:32	59.988	3675.759	350	-271.875977	0	113	10	15	-103	7574.58
10/12/09 02:19:34	59.988	3671.942	350	-271.875977	0	113.5	10	15	-103	7574.91
10/12/09 02:19:36	59.987	3671.166	350	-262.073486	0	114	10	15	-103	7575.24
10/12/09 02:19:38	59.987	3670.476	350	-262.073486	0	114.5	10	15	-103	7575.57
10/12/09 02:19:40	59.987	3670.129	350	-262.073486	0	115	10	15	-103	7575.9
10/12/09 02:19:42	59.985	3671.542	350	-262.073486	0	115.5	10	15	-103	7576.23
10/12/09 02:19:44	59.984	3672.048	350	-262.073486	0	116	10	15	-103	7576.56
10/12/09 02:19:46	59.982	3671.576	350	-260.36441	0	116.5	10	15	-103	7576.89
10/12/09 02:19:48	59.983	3672.104	350	-260.36441	0	117	10	15	-103	7577.22
10/12/09 02:19:50	59.989	3672.414	350	-260.36441	0	117.5	10	15	-103	7577.55
10/12/09 02:19:52	59.989	3671.882	350	-260.36441	0	118	10	15	-103	7577.88
10/12/09 02:19:54	59.988	3671.837	350	-260.36441	0	118.5	10	15	-103	7578.21
10/12/09 02:19:56	59.984	3671.336	350	-352.644379	0	119	10	15	-103	7578.54
10/12/09 02:19:58	59.982	3670.726	350	-352.644379	0	119.5	10	15	-103	7578.87
10/12/09 02:20:00	59.983	3670.372	350	-352.644379	0	120	10	15	-103	7579.2

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.006	0.006	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.008	0.008	
0	0	0	0.009	0.009	
0	0	0	0.009	0.009	
0	0	0	0.000	0.000	
0	0	0	-0.010	0.010	
0	0	0	-0.011	0.011	
0	0	0	-0.005	0.005	
0	0	0	-0.004	0.004	
0	0	0	-0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.006	0.006	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:20:02	59.981	3671.364	350	-352.644379	0	120.5	10	15	-103	7579.53
10/12/09 02:20:04	59.982	3671.401	350	-352.644379	0	121	10	15	-103	7579.86
10/12/09 02:20:06	59.983	3672.156	350	-354.89566	0	121.5	10	15	-103	7580.19
10/12/09 02:20:08	59.986	3672.181	350	-354.89566	0	122	10	15	-103	7580.52
10/12/09 02:20:10	59.989	3670.296	350	-354.89566	0	122.5	10	15	-103	7580.85
10/12/09 02:20:12	59.987	3668.071	350	-354.89566	0	123	10	15	-103	7581.18
10/12/09 02:20:14	59.985	3668.59	350	-354.89566	0	123.5	10	15	-103	7581.51
10/12/09 02:20:16	59.98	3669.908	350	-340.46936	0	124	10	15	-103	7581.84
10/12/09 02:20:18	59.98	3670.399	350	-340.46936	0	124.5	10	15	-103	7582.17
10/12/09 02:20:20	59.983	3670.263	350	-340.46936	0	125	10	15	-103	7582.5
10/12/09 02:20:22	59.98	3669.382	350	-340.46936	0	125.5	10	15	-103	7582.83
10/12/09 02:20:24	59.979	3670.102	350	-340.46936	0	126	10	15	-103	7583.16
10/12/09 02:20:26	59.979	3670.438	350	-337.642914	0	126.5	10	15	-103	7583.49
10/12/09 02:20:28	59.981	3671.403	350	-337.642914	0	127	10	15	-103	7583.82
10/12/09 02:20:30	59.981	3672.442	350	-337.642914	0	127.5	10	15	-103	7584.15
10/12/09 02:20:32	59.98	3672.372	350	-337.642914	0	128	10	15	-103	7584.48
10/12/09 02:20:34	59.98	3671.947	350	-337.642914	0	128.5	10	15	-103	7584.81
10/12/09 02:20:36	59.981	3670.938	350	-284.36084	0	129	10	15	-103	7585.14
10/12/09 02:20:38	59.98	3670.705	350	-284.36084	0	129.5	10	15	-103	7585.47
10/12/09 02:20:40	59.98	3670.137	350	-284.36084	0	130	10	15	-103	7585.8
10/12/09 02:20:42	59.977	3669.279	350	-284.36084	0	130.5	10	15	-103	7586.13
10/12/09 02:20:44	59.979	3672.391	350	-284.36084	0	131	10	15	-103	7586.46
10/12/09 02:20:46	59.981	3672.558	350	-260.467987	0	131.5	10	15	-103	7586.79
10/12/09 02:20:48	59.979	3674.052	350	-260.467987	0	132	10	15	-103	7587.12
10/12/09 02:20:50	59.976	3672.626	350	-260.467987	0	132.5	10	15	-103	7587.45
10/12/09 02:20:52	59.977	3671.8	350	-260.467987	0	133	10	15	-103	7587.78
10/12/09 02:20:54	59.972	3673.183	350	-260.467987	0	133.5	10	15	-103	7588.11
10/12/09 02:20:56	59.971	3673.874	350	-253.141541	0	134	10	15	-103	7588.44
10/12/09 02:20:58	59.973	3676.263	350	-253.141541	0	134.5	10	15	-103	7588.77
10/12/09 02:21:00	59.973	3676.623	350	-253.141541	0	135	10	15	-103	7589.1
10/12/09 02:21:02	59.973	3676.87	350	-253.141541	0	135.5	10	15	-103	7589.43
10/12/09 02:21:04	59.974	3676.543	350	-253.141541	0	136	10	15	-103	7589.76
10/12/09 02:21:06	59.971	3675.464	350	-251.929871	0	136.5	10	15	-103	7590.09
10/12/09 02:21:08	59.975	3675.752	350	-251.929871	0	137	10	15	-103	7590.42
10/12/09 02:21:10	59.977	3675.256	350	-251.929871	0	137.5	10	15	-103	7590.75
10/12/09 02:21:12	59.977	3674.87	350	-251.929871	0	138	10	15	-103	7591.08
10/12/09 02:21:14	59.975	3671.277	350	-251.929871	0	138.5	10	15	-103	7591.41
10/12/09 02:21:16	59.976	3671.593	350	-250.674194	0	139	10	15	-103	7591.74
10/12/09 02:21:18	59.98	3670.587	350	-250.674194	0	139.5	10	15	-103	7592.07

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
0	0	0	-0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	-0.005	0.005	
0	0	0	-0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:21:20	59.979	3669.963	350	-250.674194	0	140	10	15	-103	7592.4
10/12/09 02:21:22	59.981	3669.54	350	-250.674194	0	140.5	10	15	-103	7592.73
10/12/09 02:21:24	59.982	3669.497	350	-250.674194	0	141	10	15	-103	7593.06
10/12/09 02:21:26	59.982	3668.706	350	-253.631866	0	141.5	10	15	-103	7593.39
10/12/09 02:21:28	59.982	3667.677	350	-253.631866	0	142	10	15	-103	7593.72
10/12/09 02:21:30	59.982	3666.482	350	-253.631866	0	142.5	10	15	-103	7594.05
10/12/09 02:21:32	59.981	3666.599	350	-253.631866	0	143	10	15	-103	7594.38
10/12/09 02:21:34	59.982	3666.911	350	-253.631866	0	143.5	10	15	-103	7594.71
10/12/09 02:21:36	59.984	3666.442	350	-246.957306	0	144	10	15	-103	7595.04
10/12/09 02:21:38	59.985	3666.405	350	-246.957306	0	144.5	10	15	-103	7595.37
10/12/09 02:21:40	59.987	3667.456	350	-246.957306	0	145	10	15	-103	7595.7
10/12/09 02:21:42	59.989	3666.38	350	-246.957306	0	145.5	10	15	-103	7596.03
10/12/09 02:21:44	59.993	3665.262	350	-246.957306	0	146	10	15	-103	7596.36
10/12/09 02:21:46	59.996	3664.031	350	-254.541779	0	146.5	10	15	-103	7596.69
10/12/09 02:21:48	59.998	3663.825	350	-254.541779	0	147	10	15	-103	7597.02
10/12/09 02:21:50	59.998	3663.229	350	-254.541779	0	147.5	10	15	-103	7597.35
10/12/09 02:21:52	60.004	3662.055	350	-254.541779	0	148	10	15	-103	7597.68
10/12/09 02:21:54	60.007	3661.695	350	-254.541779	0	148.5	10	15	-103	7598.01
10/12/09 02:21:56	60.01	3662.076	350	-256.571594	0	149	10	15	-103	7598.34
10/12/09 02:21:58	60.013	3662.224	350	-256.571594	0	149.5	10	15	-103	7598.67
10/12/09 02:22:00	60.014	3662.959	350	-256.571594	0	150	10	15	-103	7599
10/12/09 02:22:02	60.013	3663.794	350	-256.571594	0	150.5	10	15	-103	7599.33
10/12/09 02:22:04	60.008	3664.139	350	-256.571594	0	151	10	15	-103	7599.66
10/12/09 02:22:06	60.008	3665.278	350	-258.37262	0	151.5	10	15	-103	7599.99
10/12/09 02:22:08	60.01	3664.159	350	-258.37262	0	152	10	15	-103	7600.32
10/12/09 02:22:10	60.019	3663.265	350	-258.37262	0	152.5	10	15	-103	7600.65
10/12/09 02:22:12	60.019	3663.184	350	-258.37262	0	153	10	15	-103	7600.98
10/12/09 02:22:14	60.023	3661.929	350	-258.37262	0	153.5	10	15	-103	7601.31
10/12/09 02:22:16	60.021	3661.512	350	-263.047363	0	154	10	15	-103	7601.64
10/12/09 02:22:18	60.02	3659.172	350	-263.047363	0	154.5	10	15	-103	7601.97
10/12/09 02:22:20	60.021	3658.661	350	-263.047363	0	155	10	15	-103	7602.3
10/12/09 02:22:22	60.021	3656.785	350	-263.047363	0	155.5	10	15	-103	7602.63
10/12/09 02:22:24	60.02	3657.571	350	-263.047363	0	156	10	15	-103	7602.96
10/12/09 02:22:26	60.019	3658.126	350	-260.984375	0	156.5	10	15	-103	7603.29
10/12/09 02:22:28	60.019	3657.71	350	-260.984375	0	157	10	15	-103	7603.62
10/12/09 02:22:30	60.022	3658.015	350	-260.984375	0	157.5	10	15	-103	7603.95
10/12/09 02:22:32	60.025	3660.228	350	-260.984375	0	158	10	15	-103	7604.28
10/12/09 02:22:34	60.025	3659.224	350	-260.984375	0	158.5	10	15	-103	7604.61
10/12/09 02:22:36	60.026	3658.698	350	-261.318329	0	159	10	15	-103	7604.94

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.006	0.006	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.009	0.009	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:22:38	60.02	3658.669	350	-261.318329	0	159.5	10	15	-103	7605.27
10/12/09 02:22:40	60.02	3658.155	350	-261.318329	0	160	10	15	-103	7605.6
10/12/09 02:22:42	60.018	3659.13	350	-261.318329	0	160.5	10	15	-103	7605.93
10/12/09 02:22:44	60.018	3659.778	350	-261.318329	0	161	10	15	-103	7606.26
10/12/09 02:22:46	60.02	3660.82	350	-262.1026	0	161.5	10	15	-103	7606.59
10/12/09 02:22:48	60.019	3662.531	350	-262.1026	0	162	10	15	-103	7606.92
10/12/09 02:22:50	60.019	3662.387	350	-262.1026	0	162.5	10	15	-103	7607.25
10/12/09 02:22:52	60.023	3662.079	350	-262.1026	0	163	10	15	-103	7607.58
10/12/09 02:22:54	60.022	3662.39	350	-262.1026	0	163.5	10	15	-103	7607.91
10/12/09 02:22:56	60.022	3662.678	350	-262.71701	0	164	10	15	-103	7608.24
10/12/09 02:22:58	60.025	3663.577	350	-262.71701	0	164.5	10	15	-103	7608.57
10/12/09 02:23:00	60.02	3663.539	350	-262.71701	0	165	10	15	-103	7608.9
10/12/09 02:23:02	60.02	3662.959	350	-262.71701	0	165.5	10	15	-103	7609.23
10/12/09 02:23:04	60.02	3662.552	350	-262.71701	0	166	10	15	-103	7609.56
10/12/09 02:23:06	60.02	3662.543	350	-260.016479	0	166.5	10	15	-103	7609.89
10/12/09 02:23:08	60.02	3663.601	350	-260.016479	0	167	10	15	-103	7610.22
10/12/09 02:23:10	60.021	3663.91	350	-260.016479	0	167.5	10	15	-103	7610.55
10/12/09 02:23:12	60.021	3663.69	350	-260.016479	0	168	10	15	-103	7610.88
10/12/09 02:23:14	60.018	3662.791	350	-260.016479	0	168.5	10	15	-103	7611.21
10/12/09 02:23:16	60.014	3663.396	350	-263.87323	0	169	10	15	-103	7611.54
10/12/09 02:23:18	60.014	3663.698	350	-263.87323	0	169.5	10	15	-103	7611.87
10/12/09 02:23:20	60.014	3664.315	350	-263.87323	0	170	10	15	-103	7612.2
10/12/09 02:23:22	60.013	3665.313	350	-263.87323	0	170.5	10	15	-103	7612.53
10/12/09 02:23:24	60.013	3665.798	350	-263.87323	0	171	10	15	-103	7612.86
10/12/09 02:23:26	60.01	3666.141	350	-264.5979	0	171.5	10	15	-103	7613.19
10/12/09 02:23:28	60.008	3666.726	350	-264.5979	0	172	10	15	-103	7613.52
10/12/09 02:23:30	60.011	3667.677	350	-264.5979	0	172.5	10	15	-103	7613.85
10/12/09 02:23:32	60.011	3667.545	350	-264.5979	0	173	10	15	-103	7614.18
10/12/09 02:23:34	60.012	3666.688	350	-264.5979	0	173.5	10	15	-103	7614.51
10/12/09 02:23:36	60.012	3666.449	350	-262.415924	0	174	10	15	-103	7614.84
10/12/09 02:23:38	60.009	3666.71	350	-262.415924	0	174.5	10	15	-103	7615.17
10/12/09 02:23:40	60.009	3667.696	350	-262.415924	0	175	10	15	-103	7615.5
10/12/09 02:23:42	60.009	3667.398	350	-262.415924	0	175.5	10	15	-103	7615.83
10/12/09 02:23:44	60.009	3667.043	350	-262.415924	0	176	10	15	-103	7616.16
10/12/09 02:23:46	60.005	3666.624	350	-259.685242	0	176.5	10	15	-103	7616.49
10/12/09 02:23:48	60.002	3666.223	350	-259.685242	0	177	10	15	-103	7616.82
10/12/09 02:23:50	59.999	3665.88	350	-259.685242	0	177.5	10	15	-103	7617.15
10/12/09 02:23:52	59.996	3665.403	350	-259.685242	0	178	10	15	-103	7617.48
10/12/09 02:23:54	59.995	3665.802	350	-259.685242	0	178.5	10	15	-103	7617.81

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
0	0	0	-0.006	0.006	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.004	0.004	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:23:56	59.997	3665.68	350	-255.911011	0	179	10	15	-103	7618.14
10/12/09 02:23:58	59.998	3665.352	350	-255.911011	0	179.5	10	15	-103	7618.47
10/12/09 02:24:00	59.998	3664.948	350	-255.911011	0	180	10	15	-103	7618.8
10/12/09 02:24:02	59.998	3665.065	350	-255.911011	0	180.5	10	15	-103	7619.13
10/12/09 02:24:04	59.998	3666.133	350	-255.911011	0	181	10	15	-103	7619.46
10/12/09 02:24:06	59.995	3666.64	350	-258.148193	0	181.5	10	15	-103	7619.79
10/12/09 02:24:08	59.995	3666.735	350	-258.148193	0	182	10	15	-103	7620.12
10/12/09 02:24:10	59.992	3667.084	350	-258.148193	0	182.5	10	15	-103	7620.45
10/12/09 02:24:12	59.993	3667.557	350	-258.148193	0	183	10	15	-103	7620.78
10/12/09 02:24:14	59.988	3667.337	350	-258.148193	0	183.5	10	15	-103	7621.11
10/12/09 02:24:16	59.988	3667.853	350	-258.873596	0	184	10	15	-103	7621.44
10/12/09 02:24:18	59.982	3668.116	350	-258.873596	0	184.5	10	15	-103	7621.77
10/12/09 02:24:20	59.982	3668.691	350	-258.873596	0	185	10	15	-103	7622.1
10/12/09 02:24:22	59.982	3669.399	350	-258.873596	0	185.5	10	15	-103	7622.43
10/12/09 02:24:24	59.982	3669.606	350	-258.873596	0	186	10	15	-103	7622.76
10/12/09 02:24:26	59.984	3671.228	350	-249.33757	0	186.5	10	15	-103	7623.09
10/12/09 02:24:28	59.982	3670.25	350	-249.33757	0	187	10	15	-103	7623.42
10/12/09 02:24:30	59.978	3670.265	350	-249.33757	0	187.5	10	15	-103	7623.75
10/12/09 02:24:32	59.978	3671.549	350	-249.33757	0	188	10	15	-103	7624.08
10/12/09 02:24:34	59.976	3673.243	350	-249.33757	0	188.5	10	15	-103	7624.41
10/12/09 02:24:36	59.975	3674.263	350	-258.278168	0	189	10	15	-103	7624.74
10/12/09 02:24:38	59.974	3675.824	350	-258.278168	0	189.5	10	15	-103	7625.07
10/12/09 02:24:40	59.974	3676.418	350	-258.278168	0	190	10	15	-103	7625.4
10/12/09 02:24:42	59.979	3676.306	350	-258.278168	0	190.5	10	15	-103	7625.73
10/12/09 02:24:44	59.98	3674.637	350	-258.278168	0	191	10	15	-103	7626.06
10/12/09 02:24:46	59.981	3675.329	350	-258.406372	0	191.5	10	15	-103	7626.39
10/12/09 02:24:48	59.98	3675.226	350	-258.406372	0	192	10	15	-103	7626.72
10/12/09 02:24:50	59.984	3674.768	350	-258.406372	0	192.5	10	15	-103	7627.05
10/12/09 02:24:52	59.987	3674.399	350	-258.406372	0	193	10	15	-103	7627.38
10/12/09 02:24:54	59.988	3673.514	350	-258.406372	0	193.5	10	15	-103	7627.71
10/12/09 02:24:56	59.988	3673.04	350	-260.538879	0	194	10	15	-103	7628.04
10/12/09 02:24:58	59.99	3672.442	350	-260.538879	0	194.5	10	15	-103	7628.37
10/12/09 02:25:00	59.992	3673.056	350	-260.538879	0	195	10	15	-103	7628.7
10/12/09 02:25:02	59.991	3671.68	350	-260.538879	0	195.5	10	15	-103	7629.03
10/12/09 02:25:04	59.991	3671.493	350	-260.538879	0	196	10	15	-103	7629.36
10/12/09 02:25:06	59.991	3669.53	350	-257.88208	0	196.5	10	15	-103	7629.69
10/12/09 02:25:08	59.993	3670.066	350	-257.88208	0	197	10	15	-103	7630.02
10/12/09 02:25:10	59.993	3670.028	350	-257.88208	0	197.5	10	15	-103	7630.35
10/12/09 02:25:12	59.996	3671.744	350	-257.88208	0	198	10	15	-103	7630.68

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	-0.006	0.006	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.005	0.005	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:25:14	60.002	3671.578	350	-257.88208	0	198.5	10	15	-103	7631.01
10/12/09 02:25:16	60.002	3672.625	350	-258.588654	0	199	10	15	-103	7631.34
10/12/09 02:25:18	60.003	3672.674	350	-258.588654	0	199.5	10	15	-103	7631.67
10/12/09 02:25:20	60.004	3673.819	350	-258.588654	0	200	10	15	-103	7632
10/12/09 02:25:22	60.005	3673.25	350	-258.588654	0	200.5	10	15	-103	7632.33
10/12/09 02:25:24	60.004	3673.182	350	-258.588654	0	201	10	15	-103	7632.66
10/12/09 02:25:26	60.002	3673.496	350	-261.906158	0	201.5	10	15	-103	7632.99
10/12/09 02:25:28	60.004	3672.418	350	-261.906158	0	202	10	15	-103	7633.32
10/12/09 02:25:30	60.008	3672.363	350	-261.906158	0	202.5	10	15	-103	7633.65
10/12/09 02:25:32	60.01	3672.217	350	-261.906158	0	203	10	15	-103	7633.98
10/12/09 02:25:34	60.01	3672.261	350	-261.906158	0	203.5	10	15	-103	7634.31
10/12/09 02:25:36	60.01	3673.182	350	-256.747803	0	204	10	15	-103	7634.64
10/12/09 02:25:38	60.011	3673.603	350	-256.747803	0	204.5	10	15	-103	7634.97
10/12/09 02:25:40	60.013	3673.553	350	-256.747803	0	205	10	15	-103	7635.3
10/12/09 02:25:42	60.014	3674.312	350	-256.747803	0	205.5	10	15	-103	7635.63
10/12/09 02:25:44	60.013	3674.537	350	-256.747803	0	206	10	15	-103	7635.96
10/12/09 02:25:46	60.012	3673.813	350	-167.431976	0	206.5	10	15	-103	7636.29
10/12/09 02:25:48	60.011	3673.204	350	-167.431976	0	207	10	15	-103	7636.62
10/12/09 02:25:50	60.011	3672.563	350	-167.431976	0	207.5	10	15	-103	7636.95
10/12/09 02:25:52	60.017	3673.068	350	-167.431976	0	208	10	15	-103	7637.28
10/12/09 02:25:54	60.022	3672.388	350	-167.431976	0	208.5	10	15	-103	7637.61
10/12/09 02:25:56	60.017	3672.52	350	-164.973404	0	209	10	15	-103	7637.94
10/12/09 02:25:58	60.014	3671.25	350	-164.973404	0	209.5	10	15	-103	7638.27
10/12/09 02:26:00	60.013	3671.288	350	-164.973404	0	210	10	15	-103	7638.6
10/12/09 02:26:02	60.014	3672.989	350	-164.973404	0	210.5	10	15	-103	7638.93
10/12/09 02:26:04	60.017	3672.982	350	-164.973404	0	211	10	15	-103	7639.26
10/12/09 02:26:06	60.017	3672.915	350	-157.628082	0	211.5	10	15	-103	7639.59
10/12/09 02:26:08	60.019	3671.952	350	-157.628082	0	212	10	15	-103	7639.92
10/12/09 02:26:10	60.019	3671.193	350	-157.628082	0	212.5	10	15	-103	7640.25
10/12/09 02:26:12	60.019	3671.627	350	-157.628082	0	213	10	15	-103	7640.58
10/12/09 02:26:14	60.027	3671.189	350	-157.628082	0	213.5	10	15	-103	7640.91
10/12/09 02:26:16	60.026	3668.611	350	-155.531708	0	214	10	15	-103	7641.24
10/12/09 02:26:18	60.026	3665.232	350	-155.531708	0	214.5	10	15	-103	7641.57
10/12/09 02:26:20	60.022	3664.495	350	-155.531708	0	215	10	15	-103	7641.9
10/12/09 02:26:22	60.019	3666.062	350	-155.531708	0	215.5	10	15	-103	7642.23
10/12/09 02:26:24	60.017	3666.821	350	-155.531708	0	216	10	15	-103	7642.56
10/12/09 02:26:26	60.019	3666.787	350	-160.447235	0	216.5	10	15	-103	7642.89
10/12/09 02:26:28	60.02	3670.454	350	-160.447235	0	217	10	15	-103	7643.22
10/12/09 02:26:30	60.019	3670.267	350	-160.447235	0	217.5	10	15	-103	7643.55

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
0	0	0	0.006	0.006	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.006	0.006	
0	0	0	0.005	0.005	
0	0	0	-0.005	0.005	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.008	0.008	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.004	0.004	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:26:32	60.021	3671.668	350	-160.447235	0	218	10	15	-103	7643.88
10/12/09 02:26:34	60.021	3672.493	350	-160.447235	0	218.5	10	15	-103	7644.21
10/12/09 02:26:36	60.021	3672.685	350	-163.958603	0	219	10	15	-103	7644.54
10/12/09 02:26:38	60.019	3672.857	350	-163.958603	0	219.5	10	15	-103	7644.87
10/12/09 02:26:40	60.018	3672.164	350	-163.958603	0	220	10	15	-103	7645.2
10/12/09 02:26:42	60.022	3671.413	350	-163.958603	0	220.5	10	15	-103	7645.53
10/12/09 02:26:44	60.031	3669.983	350	-163.958603	0	221	10	15	-103	7645.86
10/12/09 02:26:46	60.037	3666.467	350	-166.072449	0	221.5	10	15	-103	7646.19
10/12/09 02:26:48	60.037	3663.758	350	-166.072449	0	222	10	15	-103	7646.52
10/12/09 02:26:50	60.036	3661.599	350	-166.072449	0	222.5	10	15	-103	7646.85
10/12/09 02:26:52	60.037	3660.672	350	-166.072449	0	223	10	15	-103	7647.18
10/12/09 02:26:54	60.046	3651.492	350	-166.072449	0	223.5	10	15	-103	7647.51
10/12/09 02:26:56	60.048	3649.19	350	-163.766586	0	224	10	15	-103	7647.84
10/12/09 02:26:58	60.048	3650.025	350	-163.766586	0	224.5	10	15	-103	7648.17
10/12/09 02:27:00	60.043	3648.246	350	-163.766586	0	225	10	15	-103	7648.5
10/12/09 02:27:02	60.041	3649.512	350	-163.766586	0	225.5	10	15	-103	7648.83
10/12/09 02:27:04	60.041	3654.294	350	-163.766586	0	226	10	15	-103	7649.16
10/12/09 02:27:06	60.041	3655.007	350	-165.101685	0	226.5	10	15	-103	7649.49
10/12/09 02:27:08	60.039	3651.874	350	-165.101685	0	227	10	15	-103	7649.82
10/12/09 02:27:10	60.041	3651.059	350	-165.101685	0	227.5	10	15	-103	7650.15
10/12/09 02:27:12	60.043	3649.187	350	-165.101685	0	228	10	15	-103	7650.48
10/12/09 02:27:14	60.045	3648.236	350	-165.101685	0	228.5	10	15	-103	7650.81
10/12/09 02:27:16	60.046	3645.387	350	-165.476395	0	229	10	15	-103	7651.14
10/12/09 02:27:18	60.041	3644.628	350	-165.476395	0	229.5	10	15	-103	7651.47
10/12/09 02:27:20	60.041	3645.446	350	-165.476395	0	230	10	15	-103	7651.8
10/12/09 02:27:22	60.041	3640.682	350	-165.476395	0	230.5	10	15	-103	7652.13
10/12/09 02:27:24	60.039	3641.191	350	-165.476395	0	231	10	15	-103	7652.46
10/12/09 02:27:26	59.978	3659.465	350	-206.459106	0	231.5	10	15	-103	7652.79
10/12/09 02:27:28	59.852	3696.362	350	-206.459106	0	232	10	0	-103	7616
10/12/09 02:27:30	59.836	3734.904	335	-206.459106	0	232.5	10	0	-103	7626
10/12/09 02:27:32	59.869	3734.673	335	-206.459106	0	233	10	0	-103	7632
10/12/09 02:27:34	59.892	3737.157	335	-206.459106	0	233.5	10	0	-103	7632
10/12/09 02:27:36	59.891	3761.25	335	-211.256042	0	234	10	0	-103	7632
10/12/09 02:27:38	59.88	3766.113	335	-211.256042	1	234.5	10	0	-103	7632
10/12/09 02:27:40	59.876	3766.194	335	-211.256042	1	235	10	0	-103	7632
10/12/09 02:27:42	59.875	3768.877	335	-211.256042	1	235.5	10	0	-103	7632
10/12/09 02:27:44	59.883	3769.925	335	-211.256042	1	236	10	0	-103	7632
10/12/09 02:27:46	59.887	3780.621	335	-214.346695	1	236.5	10	0	-103	7632
10/12/09 02:27:48	59.886	3781.592	335	-214.346695	1	237	10	0	-103	7632

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.009	0.009	
0	0	0	0.006	0.006	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.009	0.009	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.005	0.005	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	1	-0.061	0.061	
1	0	1	-0.126	0.126	
1	0	1	-0.016	0.016	
1	0	1	0.033	0.033	
1	0	1	0.023	0.023	
1	0	1	-0.001	0.001	
1	0	1	-0.011	0.011	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	0.008	0.008	
1	0	1	0.004	0.004	
1	0	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:27:50	59.885	3782.5	335	-214.346695	1	237.5	10	0	-103	7632
10/12/09 02:27:52	59.887	3784.962	335	-214.346695	2	238	10	0	-103	7632
10/12/09 02:27:54	59.888	3784.73	335	-214.346695	3	238.5	10	0	-103	7632
10/12/09 02:27:56	59.89	3784.419	335	-212.172699	4	239	10	0	-103	7632
10/12/09 02:27:58	59.895	3788.072	335	-212.172699	5	239.5	10	0	-103	7632
10/12/09 02:28:00	59.894	3788.328	335	-212.172699	6	240	10	0	-103	7632
10/12/09 02:28:02	59.893	3788.868	335	-212.172699	7	240.5	10	0	-103	7632
10/12/09 02:28:04	59.894	3788.472	335	-212.172699	8	241	10	0	-103	7632
10/12/09 02:28:06	59.894	3792.276	335	-215.598175	9	241.5	10	0	-103	7632
10/12/09 02:28:08	59.891	3793.074	335	-215.598175	10	242	10	0	-103	7632
10/12/09 02:28:10	59.89	3794.374	335	-215.598175	11	242.5	10	0	-103	7632
10/12/09 02:28:12	59.885	3799.428	335	-215.598175	12	243	10	0	-103	7632
10/12/09 02:28:14	59.885	3800.427	335	-215.598175	13	243.5	10	0	-103	7632
10/12/09 02:28:16	59.888	3799.959	335	-218.327255	14	244	10	0	-103	7632
10/12/09 02:28:18	59.887	3803.625	335	-218.327255	15	244.5	10	0	-103	7632
10/12/09 02:28:20	59.888	3802.925	335	-218.327255	16	245	10	0	-103	7632
10/12/09 02:28:22	59.888	3802.951	335	-218.327255	16	245.5	10	0	-103	7632
10/12/09 02:28:24	59.89	3804.388	335	-218.327255	16	246	10	0	-103	7632
10/12/09 02:28:26	59.889	3805.496	335	-217.379425	16	246.5	10	0	-103	7632
10/12/09 02:28:28	59.882	3805.617	335	-217.379425	16	247	10	0	-103	7632
10/12/09 02:28:30	59.873	3809.237	335	-217.379425	16	247.5	10	0	-103	7631
10/12/09 02:28:32	59.857	3811.503	335	-217.379425	16	248	10	0	-103	7625
10/12/09 02:28:34	59.849	3814.862	335	-217.379425	16	248.5	10	0	-103	7623
10/12/09 02:28:36	59.852	3815.889	335	-214.830353	16	249	10	0	-103	7621
10/12/09 02:28:38	59.858	3825.643	335	-214.830353	16	249.5	10	0	-103	7623
10/12/09 02:28:40	59.863	3826.053	335	-214.830353	16	250	10	0	-103	7625
10/12/09 02:28:42	59.866	3826.002	335	-214.830353	16	250.5	10	0	-103	7627
10/12/09 02:28:44	59.865	3827.524	335	-214.830353	16	251	10	0	-103	7628
10/12/09 02:28:46	59.867	3826.753	335	-227.655914	16	251.5	10	0	-103	7628
10/12/09 02:28:48	59.866	3826.783	335	-227.655914	16	252	10	0	-103	7629
10/12/09 02:28:50	59.871	3826.454	335	-227.655914	16	252.5	10	0	-103	7630
10/12/09 02:28:52	59.874	3825.713	335	-227.655914	16	253	10	0	-103	7631
10/12/09 02:28:54	59.879	3823.826	335	-227.655914	16	253.5	10	0	-103	7635
10/12/09 02:28:56	59.88	3822.505	335	-225.018082	16	254	10	0	-103	7638
10/12/09 02:28:58	59.883	3819.081	335	-225.018082	16	254.5	10	0	-103	7639
10/12/09 02:29:00	59.886	3818.055	335	-225.018082	16	255	10	0	-103	7642
10/12/09 02:29:02	59.89	3816.815	335	-225.018082	16	255.5	10	0	-103	7644
10/12/09 02:29:04	59.892	3815.01	335	-225.018082	16	256	10	0	-103	7645
10/12/09 02:29:06	59.889	3813.783	335	-228.365158	16	256.5	10	0	-103	7647

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.005	0.005	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.007	0.007	
1	0	1	-0.009	0.009	
1	0	1	-0.016	0.016	
1	0	1	-0.008	0.008	
1	0	1	0.003	0.003	
1	0	1	0.006	0.006	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.005	0.005	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.004	0.004	
1	0	1	0.002	0.002	
1	0	1	-0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:29:08	59.893	3811.838	335	-228.365158	16	257	10	0	-103	7648
10/12/09 02:29:10	59.899	3809.652	335	-228.365158	16	257.5	10	0	-103	7649
10/12/09 02:29:12	59.903	3806.972	335	-228.365158	16	258	10	0	-103	7650
10/12/09 02:29:14	59.902	3805.593	335	-228.365158	16	258.5	10	0	-103	7651
10/12/09 02:29:16	59.902	3804.188	335	-234.075333	16	259	10	0	-103	7652
10/12/09 02:29:18	59.904	3796.078	335	-234.075333	16	259.5	10	0	-103	7653
10/12/09 02:29:20	59.907	3793.975	335	-234.075333	16	260	10	0	-103	7654
10/12/09 02:29:22	59.911	3792.169	335	-234.075333	16	260.5	10	0	-103	7655
10/12/09 02:29:24	59.916	3791.502	335	-234.075333	16	261	10	0	-103	7655
10/12/09 02:29:26	59.916	3789.534	335	-228.798157	16	261.5	10	0	-103	7656
10/12/09 02:29:28	59.917	3788.132	335	-228.798157	16	262	10	0	-103	7656
10/12/09 02:29:30	59.918	3784.563	335	-228.798157	16	262.5	10	0	-103	7657
10/12/09 02:29:32	59.92	3783.028	335	-228.798157	16	263	10	0	-103	7657
10/12/09 02:29:34	59.921	3781.701	335	-228.798157	16	263.5	10	0	-103	7658
10/12/09 02:29:36	59.92	3776.358	335	-229.466965	16	264	10	0	-103	7658
10/12/09 02:29:38	59.917	3775.635	335	-229.466965	16	264.5	10	0	-103	7659
10/12/09 02:29:40	59.92	3774.604	335	-229.466965	16	265	10	0	-103	7659
10/12/09 02:29:42	59.921	3773.334	335	-229.466965	16	265.5	10	0	-103	7659
10/12/09 02:29:44	59.923	3773.958	335	-229.466965	16	266	10	0	-103	7660
10/12/09 02:29:46	59.926	3772.722	335	-228.980164	16	266.5	10	0	-103	7660
10/12/09 02:29:48	59.925	3771.67	335	-228.980164	16	267	10	0	-103	7661
10/12/09 02:29:50	59.928	3769.63	335	-228.980164	16	267.5	10	0	-103	7661
10/12/09 02:29:52	59.927	3768.707	335	-228.980164	16	268	10	0	-103	7662
10/12/09 02:29:54	59.932	3767.643	335	-228.980164	16	268.5	10	0	-103	7662
10/12/09 02:29:56	59.927	3767.021	335	-219.975555	16	269	10	0	-103	7663
10/12/09 02:29:58	59.928	3767.408	335	-219.975555	16	269.5	10	0	-103	7663
10/12/09 02:30:00	59.931	3766.788	335	-219.975555	16	270	10	0	-103	7664
10/12/09 02:30:02	59.929	3766.259	335	-219.975555	16	270.5	10	0	-103	7664
10/12/09 02:30:04	59.931	3765.672	335	-219.975555	16	271	10	0	-103	7665
10/12/09 02:30:06	59.933	3766.123	335	-229.089249	16	271.5	10	0	-103	7666
10/12/09 02:30:08	59.937	3764.243	335	-229.089249	16	272	10	0	-103	7666
10/12/09 02:30:10	59.937	3765.105	335	-229.089249	16	272.5	10	0	-103	7667
10/12/09 02:30:12	59.945	3762.935	335	-229.089249	16	273	10	0	-103	7668
10/12/09 02:30:14	59.949	3758.387	335	-229.089249	16	273.5	10	0	-103	7668
10/12/09 02:30:16	59.947	3753.922	335	-229.663269	16	274	10	0	-103	7669
10/12/09 02:30:18	59.942	3749.867	335	-229.663269	16	274.5	10	0	-103	7669
10/12/09 02:30:20	59.941	3746.889	335	-229.663269	16	275	10	0	-103	7670
10/12/09 02:30:22	59.942	3747.875	335	-229.663269	16	275.5	10	0	-103	7670
10/12/09 02:30:24	59.945	3749.593	335	-229.663269	16	276	10	0	-103	7671

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	0.004	0.004	
1	0	1	0.006	0.006	
1	0	1	0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.004	0.004	
1	0	1	0.005	0.005	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.005	0.005	
1	0	1	-0.005	0.005	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.004	0.004	
1	0	1	0.000	0.000	
1	0	1	0.008	0.008	
1	0	1	0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	-0.005	0.005	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:30:26	59.948	3748.661	335	-229.233856	16	276.5	10	0	-103	7671
10/12/09 02:30:28	59.947	3746.706	335	-229.233856	16	277	10	0	-103	7672
10/12/09 02:30:30	59.949	3749.077	335	-229.233856	16	277.5	10	0	-103	7673
10/12/09 02:30:32	59.951	3742.741	335	-229.233856	16	278	10	0	-103	7673
10/12/09 02:30:34	59.952	3740.259	350	-229.233856	16	278.5	10	0	-103	7673
10/12/09 02:30:36	59.953	3736.139	350	-231.409882	16	279	10	0	-103	7673
10/12/09 02:30:38	59.951	3731.382	350	-231.409882	16	279.5	10	0	-103	7673
10/12/09 02:30:40	59.952	3727.838	350	-231.409882	16	280	10	0	-103	7673
10/12/09 02:30:42	59.952	3725.952	350	-231.409882	16	280.5	10	0	-103	7673
10/12/09 02:30:44	59.952	3722.649	350	-231.409882	16	281	10	0	-103	7673
10/12/09 02:30:46	59.955	3720.578	350	-218.622284	16	281.5	10	0	-103	7673
10/12/09 02:30:48	59.952	3717.996	350	-218.622284	16	282	10	0	-103	7673
10/12/09 02:30:50	59.954	3718.142	350	-218.622284	16	282.5	10	0	-103	7673
10/12/09 02:30:52	59.952	3715.753	350	-218.622284	16	283	10	0	-103	7673
10/12/09 02:30:54	59.953	3713.694	350	-218.622284	16	283.5	10	0	-103	7673
10/12/09 02:30:56	59.953	3713.484	350	-213.535858	16	284	10	0	-103	7673
10/12/09 02:30:58	59.952	3710.848	350	-213.535858	16	284.5	10	0	-103	7673
10/12/09 02:31:00	59.954	3710.81	350	-213.535858	16	285	10	0	-103	7673
10/12/09 02:31:02	59.954	3712.092	350	-213.535858	16	285.5	10	0	-103	7674
10/12/09 02:31:04	59.959	3714.623	350	-213.535858	16	286	10	0	-103	7675
10/12/09 02:31:06	59.957	3715.13	350	-225.651855	16	286.5	10	0	-103	7676
10/12/09 02:31:08	59.956	3716.168	350	-225.651855	16	287	10	0	-103	7677
10/12/09 02:31:10	59.954	3716.461	350	-225.651855	16	287.5	10	0	-103	7678
10/12/09 02:31:12	59.956	3716.98	350	-225.651855	16	288	10	0	-103	7679
10/12/09 02:31:14	59.955	3717.759	350	-225.651855	16	288.5	10	0	-103	7680
10/12/09 02:31:16	59.958	3722.361	350	-212.573639	16	289	10	0	-103	7681
10/12/09 02:31:18	59.961	3721.973	350	-212.573639	16	289.5	10	0	-103	7682
10/12/09 02:31:20	59.962	3722.658	350	-212.573639	16	290	10	0	-103	7684
10/12/09 02:31:22	59.962	3722.267	350	-212.573639	16	290.5	10	0	-103	7685
10/12/09 02:31:24	59.968	3722.278	350	-212.573639	16	291	10	0	-103	7687
10/12/09 02:31:26	59.966	3721.787	350	-219.897293	16	291.5	10	0	-103	7689
10/12/09 02:31:28	59.966	3723.091	350	-219.897293	16	292	10	0	-103	7690
10/12/09 02:31:30	59.968	3723.984	350	-219.897293	16	292.5	10	0	-103	7692
10/12/09 02:31:32	59.97	3723.435	350	-219.897293	16	293	10	0	-103	7692
10/12/09 02:31:34	59.974	3723.893	350	-219.897293	16	293.5	10	0	-103	7693
10/12/09 02:31:36	59.97	3725.403	350	-231.1754	16	294	10	0	-103	7693
10/12/09 02:31:38	59.969	3727.121	350	-231.1754	16	294.5	10	0	-103	7694
10/12/09 02:31:40	59.969	3728.053	350	-231.1754	16	295	10	0	-103	7694
10/12/09 02:31:42	59.97	3731.13	350	-231.1754	16	295.5	10	0	-103	7695

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.005	0.005	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.006	0.006	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.004	0.004	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:31:44	59.971	3732.53	350	-231.1754	16	296	10	0	-103	7695
10/12/09 02:31:46	59.973	3733.327	350	-226.634125	16	296.5	10	0	-103	7695
10/12/09 02:31:48	59.973	3736.535	350	-226.634125	16	297	10	0	-103	7696
10/12/09 02:31:50	59.976	3736.907	350	-226.634125	16	297.5	10	0	-103	7696
10/12/09 02:31:52	59.978	3736.822	350	-226.634125	16	298	10	0	-103	7697
10/12/09 02:31:54	59.978	3738.699	350	-226.634125	16	298.5	10	0	-103	7697
10/12/09 02:31:56	59.976	3739.944	350	-227.255066	16	299	10	0	-103	7697
10/12/09 02:31:58	59.978	3740.877	350	-227.255066	16	299.5	10	0	-103	7698
10/12/09 02:32:00	59.976	3741.794	350	-227.255066	16	300	10	0	-103	7698
10/12/09 02:32:02	59.978	3745.234	350	-227.255066	16	300.5	10	0	-103	7698.33
10/12/09 02:32:04	59.977	3746.608	350	-227.255066	16	301	10	0	-103	7698.66
10/12/09 02:32:06	59.98	3748.3	350	-229.290222	16	301.5	10	0	-103	7698.99
10/12/09 02:32:08	59.982	3750.716	350	-229.290222	16	302	10	0	-103	7699.32
10/12/09 02:32:10	59.981	3751.558	350	-229.290222	16	302.5	10	0	-103	7699.65
10/12/09 02:32:12	59.98	3752.748	350	-229.290222	16	303	10	0	-103	7699.98
10/12/09 02:32:14	59.979	3755.599	350	-229.290222	16	303.5	10	0	-103	7700.31
10/12/09 02:32:16	59.98	3756.407	350	-221.461365	16	304	10	0	-103	7700.64
10/12/09 02:32:18	59.979	3756.975	350	-221.461365	16	304.5	10	0	-103	7700.97
10/12/09 02:32:20	59.983	3760.405	350	-221.461365	16	305	10	0	-103	7701.3
10/12/09 02:32:22	59.983	3760.982	350	-221.461365	16	305.5	10	0	-103	7701.63
10/12/09 02:32:24	59.984	3761.407	350	-221.461365	16	306	10	0	-103	7701.96
10/12/09 02:32:26	59.988	3762.737	350	-241.274368	16	306.5	10	0	-103	7702.29
10/12/09 02:32:28	59.989	3763.212	350	-241.274368	16	307	10	0	-103	7702.62
10/12/09 02:32:30	59.987	3764.958	350	-241.274368	16	307.5	10	0	-103	7702.95
10/12/09 02:32:32	59.987	3766.085	350	-241.274368	16	308	10	0	-103	7703.28
10/12/09 02:32:34	59.991	3766.433	350	-241.274368	16	308.5	10	0	-103	7703.61
10/12/09 02:32:36	59.993	3767.251	350	-243.071854	16	309	10	0	-103	7703.94
10/12/09 02:32:38	59.992	3767.792	350	-243.071854	16	309.5	10	0	-103	7704.27
10/12/09 02:32:40	59.991	3768.634	350	-243.071854	16	310	10	0	-103	7704.6
10/12/09 02:32:42	59.989	3771.146	350	-243.071854	16	310.5	10	0	-103	7704.93
10/12/09 02:32:44	59.986	3772.445	350	-243.071854	16	311	10	0	-103	7705.26
10/12/09 02:32:46	59.983	3773.695	350	-241.670212	16	311.5	10	0	-103	7705.59
10/12/09 02:32:48	59.983	3774.668	350	-241.670212	16	312	10	0	-103	7705.92
10/12/09 02:32:50	59.988	3775.841	350	-241.670212	16	312.5	10	0	-103	7706.25
10/12/09 02:32:52	59.993	3775.363	350	-241.670212	16	313	10	0	-103	7706.58
10/12/09 02:32:54	59.996	3774.866	350	-241.670212	16	313.5	10	0	-103	7706.91
10/12/09 02:32:56	59.998	3775.492	350	-228.149307	16	314	10	0	-103	7707.24
10/12/09 02:32:58	59.999	3776.42	350	-228.149307	16	314.5	10	0	-103	7707.57
10/12/09 02:33:00	60.001	3778.554	350	-228.149307	16	315	10	0	-103	7707.9

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.004	0.004	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.005	0.005	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	1	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:33:02	59.999	3779.692	350	-228.149307	16	315.5	10	0	-103	7708.23
10/12/09 02:33:04	59.999	3781.256	350	-228.149307	16	316	10	0	-103	7708.56
10/12/09 02:33:06	59.999	3780.595	350	-235.128983	16	316.5	10	0	-103	7708.89
10/12/09 02:33:08	60.002	3783.092	350	-235.128983	16	317	10	0	-103	7709.22
10/12/09 02:33:10	60.005	3783.896	350	-235.128983	16	317.5	10	0	-103	7709.55
10/12/09 02:33:12	60.007	3784.421	350	-235.128983	16	318	10	0	-103	7709.88
10/12/09 02:33:14	60.008	3785.768	350	-235.128983	16	318.5	10	0	-103	7710.21
10/12/09 02:33:16	60.011	3785.463	350	-246.433136	16	319	10	0	-103	7710.54
10/12/09 02:33:18	60.014	3786.85	350	-246.433136	16	319.5	10	0	-103	7710.87
10/12/09 02:33:20	60.017	3786.304	350	-246.433136	16	320	10	0	-103	7711.2
10/12/09 02:33:22	60.019	3787.259	350	-246.433136	16	320.5	10	0	-103	7711.53
10/12/09 02:33:24	60.021	3787.516	350	-246.433136	16	321	10	0	-103	7711.86
10/12/09 02:33:26	60.017	3787.955	350	-236.553543	16	321.5	10	0	-103	7712.19
10/12/09 02:33:28	60.017	3788.03	350	-236.553543	16	322	10	0	-103	7712.52
10/12/09 02:33:30	60.019	3788.607	350	-236.553543	16	322.5	10	0	-103	7712.85
10/12/09 02:33:32	60.023	3789.216	350	-236.553543	16	323	10	0	-103	7713.18
10/12/09 02:33:34	60.024	3787.537	350	-236.553543	16	323.5	10	0	-103	7713.51
10/12/09 02:33:36	60.025	3785.842	350	-230.297562	16	324	10	0	-103	7713.84
10/12/09 02:33:38	60.021	3786.077	350	-230.297562	16	324.5	10	0	-103	7714.17
10/12/09 02:33:40	60.019	3787.93	350	-230.297562	16	325	10	0	-103	7714.5
10/12/09 02:33:42	60.024	3788.76	350	-230.297562	16	325.5	10	0	-103	7714.83
10/12/09 02:33:44	60.024	3786.875	350	-230.297562	16	326	10	0	-103	7715.16
10/12/09 02:33:46	60.021	3786.55	350	-231.175537	16	326.5	10	0	-103	7715.49
10/12/09 02:33:48	60.02	3787.358	350	-231.175537	16	327	10	0	-103	7715.82
10/12/09 02:33:50	60.025	3785.018	350	-231.175537	16	327.5	10	0	-103	7716.15
10/12/09 02:33:52	60.024	3785.614	350	-231.175537	16	328	10	0	-103	7716.48
10/12/09 02:33:54	60.02	3785.949	350	-231.175537	16	328.5	10	0	-103	7716.81
10/12/09 02:33:56	60.02	3785.804	350	-225.61763	16	329	10	0	-103	7717.14
10/12/09 02:33:58	60.022	3786.864	350	-225.61763	16	329.5	10	0	-103	7717.47
10/12/09 02:34:00	60.022	3786.877	350	-225.61763	16	330	10	0	-103	7717.8
10/12/09 02:34:02	60.022	3785.254	350	-225.61763	16	330.5	10	0	-103	7718.13
10/12/09 02:34:04	60.021	3785.726	350	-225.61763	16	331	10	0	-103	7718.46
10/12/09 02:34:06	60.021	3786.347	350	-230.734421	16	331.5	10	0	-103	7718.79
10/12/09 02:34:08	60.023	3785.821	350	-230.734421	16	332	10	0	-103	7719.12
10/12/09 02:34:10	60.023	3785.798	350	-230.734421	16	332.5	10	0	-103	7719.45
10/12/09 02:34:12	60.022	3786.284	350	-230.734421	16	333	10	0	-103	7719.78
10/12/09 02:34:14	60.019	3786.939	350	-230.734421	16	333.5	10	0	-103	7720.11
10/12/09 02:34:16	60.016	3787.627	350	-234.847107	16	334	10	0	-103	7720.44
10/12/09 02:34:18	60.018	3789.444	350	-234.847107	16	334.5	10	0	-103	7720.77

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	-0.004	0.004	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.002	0.002	
1	1	1	0.005	0.005	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.005	0.005	
1	1	1	-0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:34:20	60.018	3789.673	350	-234.847107	16	335	10	0	-103	7721.1
10/12/09 02:34:22	60.018	3789.404	350	-234.847107	16	335.5	10	0	-103	7721.43
10/12/09 02:34:24	60.019	3788.479	350	-234.847107	16	336	10	0	-103	7721.76
10/12/09 02:34:26	60.019	3789.183	350	-228.960922	16	336.5	10	0	-103	7722.09
10/12/09 02:34:28	60.016	3789.369	350	-228.960922	16	337	10	0	-103	7722.42
10/12/09 02:34:30	60.015	3789.005	350	-228.960922	16	337.5	10	0	-103	7722.75
10/12/09 02:34:32	60.016	3788.665	350	-228.960922	16	338	10	0	-103	7723.08
10/12/09 02:34:34	60.014	3788.933	350	-228.960922	16	338.5	10	0	-103	7723.41
10/12/09 02:34:36	60.013	3790.667	350	-231.177917	16	339	10	0	-103	7723.74
10/12/09 02:34:38	60.012	3790.805	350	-231.177917	16	339.5	10	0	-103	7724.07
10/12/09 02:34:40	60.012	3790.411	350	-231.177917	16	340	10	0	-103	7724.4
10/12/09 02:34:42	60.01	3789.769	350	-231.177917	16	340.5	10	0	-103	7724.73
10/12/09 02:34:44	60.007	3791.54	350	-231.177917	16	341	10	0	-103	7725.06
10/12/09 02:34:46	60.007	3792.945	350	-236.489288	16	341.5	10	0	-103	7725.39
10/12/09 02:34:48	60.009	3791.027	350	-236.489288	16	342	10	0	-103	7725.72
10/12/09 02:34:50	60.009	3791.443	350	-236.489288	16	342.5	10	0	-103	7726.05
10/12/09 02:34:52	60.01	3791.426	350	-236.489288	16	343	10	0	-103	7726.38
10/12/09 02:34:54	60.003	3790.603	350	-236.489288	16	343.5	10	0	-103	7726.71
10/12/09 02:34:56	59.999	3790.457	350	-245.038925	16	344	10	0	-103	7727.04
10/12/09 02:34:58	59.995	3790.216	350	-245.038925	16	344.5	10	0	-103	7727.37
10/12/09 02:35:00	59.992	3789.585	350	-245.038925	16	345	10	0	-103	7727.7
10/12/09 02:35:02	59.991	3788.457	350	-245.038925	16	345.5	10	0	-103	7728.03
10/12/09 02:35:04	59.992	3788.105	350	-245.038925	16	346	10	0	-103	7728.36
10/12/09 02:35:06	59.992	3788.057	350	-223.605682	16	346.5	10	0	-103	7728.69
10/12/09 02:35:08	59.988	3788.189	350	-223.605682	16	347	10	0	-103	7729.02
10/12/09 02:35:10	59.986	3788.497	350	-223.605682	16	347.5	10	0	-103	7729.35
10/12/09 02:35:12	59.985	3788.54	350	-223.605682	16	348	10	0	-103	7729.68
10/12/09 02:35:14	59.984	3788.571	350	-223.605682	16	348.5	10	0	-103	7730.01
10/12/09 02:35:16	59.985	3788.101	350	-231.119354	16	349	10	0	-103	7730.34
10/12/09 02:35:18	59.984	3787.133	350	-231.119354	16	349.5	10	0	-103	7730.67
10/12/09 02:35:20	59.982	3786.453	350	-231.119354	16	350	10	0	-103	7731
10/12/09 02:35:22	59.981	3787.732	350	-231.119354	16	350.5	10	0	-103	7731.33
10/12/09 02:35:24	59.982	3788.813	350	-231.119354	16	351	10	0	-103	7731.66
10/12/09 02:35:26	59.979	3789.285	350	-237.20665	16	351.5	10	0	-103	7731.99
10/12/09 02:35:28	59.977	3788.256	350	-237.20665	16	352	10	0	-103	7732.32
10/12/09 02:35:30	59.976	3788.41	350	-237.20665	16	352.5	10	0	-103	7732.65
10/12/09 02:35:32	59.976	3790.467	350	-237.20665	16	353	10	0	-103	7732.98
10/12/09 02:35:34	59.979	3790.665	350	-237.20665	16	353.5	10	0	-103	7733.31
10/12/09 02:35:36	59.982	3790.42	350	-240.516373	16	354	10	0	-103	7733.64

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.007	0.007	
1	0	1	-0.004	0.004	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:35:38	59.978	3789.674	350	-240.516373	16	354.5	10	0	-103	7733.97
10/12/09 02:35:40	59.976	3789.267	350	-240.516373	16	355	10	0	-103	7734.3
10/12/09 02:35:42	59.974	3789.148	350	-240.516373	16	355.5	10	0	-103	7734.63
10/12/09 02:35:44	59.976	3790.43	350	-240.516373	16	356	10	0	-103	7734.96
10/12/09 02:35:46	59.977	3789.914	350	-237.566055	16	356.5	10	0	-103	7735.29
10/12/09 02:35:48	59.977	3786.243	350	-237.566055	16	357	10	0	-103	7735.62
10/12/09 02:35:50	59.975	3787.442	350	-237.566055	16	357.5	10	0	-103	7735.95
10/12/09 02:35:52	59.973	3788.963	350	-237.566055	16	358	10	0	-103	7736.28
10/12/09 02:35:54	59.969	3790.602	350	-237.566055	16	358.5	10	0	-103	7736.61
10/12/09 02:35:56	59.97	3791.877	350	-231.581421	16	359	10	0	-103	7736.94
10/12/09 02:35:58	59.971	3792.911	350	-231.581421	16	359.5	10	0	-103	7737.27
10/12/09 02:36:00	59.973	3792.311	350	-231.581421	16	360	10	0	-103	7737.6
10/12/09 02:36:02	59.978	3789.125	350	-231.581421	16	360.5	10	0	-103	7737.93
10/12/09 02:36:04	59.981	3788.08	350	-231.581421	16	361	10	0	-103	7738.26
10/12/09 02:36:06	59.978	3787.844	350	-235.850845	16	361.5	10	0	-103	7738.59
10/12/09 02:36:08	59.975	3787.135	350	-235.850845	16	362	10	0	-103	7738.92
10/12/09 02:36:10	59.972	3787.164	350	-235.850845	16	362.5	10	0	-103	7739.25
10/12/09 02:36:12	59.976	3786.996	350	-235.850845	16	363	10	0	-103	7739.58
10/12/09 02:36:14	59.975	3787.405	350	-235.850845	16	363.5	10	0	-103	7739.91
10/12/09 02:36:16	59.973	3786.487	350	-233.559982	16	364	10	0	-103	7740.24
10/12/09 02:36:18	59.969	3787.079	350	-233.559982	16	364.5	10	0	-103	7740.57
10/12/09 02:36:20	59.966	3789.214	350	-233.559982	16	365	10	0	-103	7740.9
10/12/09 02:36:22	59.965	3790.512	350	-233.559982	16	365.5	10	0	-103	7741.23
10/12/09 02:36:24	59.966	3791.221	350	-233.559982	16	366	10	0	-103	7741.56
10/12/09 02:36:26	59.969	3792.218	350	-219.009995	16	366.5	10	0	-103	7741.89
10/12/09 02:36:28	59.97	3790.959	350	-219.009995	16	367	10	0	-103	7742.22
10/12/09 02:36:30	59.968	3788.824	350	-219.009995	16	367.5	10	0	-103	7742.55
10/12/09 02:36:32	59.965	3789.026	350	-219.009995	16	368	10	0	-103	7742.88
10/12/09 02:36:34	59.964	3789.167	350	-219.009995	16	368.5	10	0	-103	7743.21
10/12/09 02:36:36	59.97	3787.394	350	-205.338913	16	369	10	0	-103	7743.54
10/12/09 02:36:38	59.972	3785.69	350	-205.338913	16	369.5	10	0	-103	7743.87
10/12/09 02:36:40	59.967	3784.831	350	-205.338913	16	370	10	0	-103	7744.2
10/12/09 02:36:42	59.967	3785.01	350	-205.338913	16	370.5	10	0	-103	7744.53
10/12/09 02:36:44	59.969	3784.32	350	-205.338913	16	371	10	0	-103	7744.86
10/12/09 02:36:46	59.968	3782.809	350	-236.285355	16	371.5	10	0	-103	7745.19
10/12/09 02:36:48	59.969	3782.11	350	-236.285355	16	372	10	0	-103	7745.52
10/12/09 02:36:50	59.967	3779.352	350	-236.285355	16	372.5	10	0	-103	7745.85
10/12/09 02:36:52	59.967	3779.056	350	-236.285355	16	373	10	0	-103	7746.18
10/12/09 02:36:54	59.966	3778.633	350	-236.285355	16	373.5	10	0	-103	7746.51

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.006	0.006	
1	0	1	0.002	0.002	
1	0	1	-0.005	0.005	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:36:56	59.965	3779.212	350	-223.015732	16	374	10	0	-103	7746.84
10/12/09 02:36:58	59.971	3779.335	350	-223.015732	16	374.5	10	0	-103	7747.17
10/12/09 02:37:00	59.967	3776.429	350	-223.015732	16	375	10	0	-103	7747.5
10/12/09 02:37:02	59.965	3775.647	350	-223.015732	16	375.5	10	0	-103	7747.83
10/12/09 02:37:04	59.962	3776.597	350	-223.015732	16	376	10	0	-103	7748.16
10/12/09 02:37:06	59.964	3776.559	350	-223.015732	16	376.5	10	0	-103	7748.49
10/12/09 02:37:08	59.97	3776.023	350	-223.015732	16	377	10	0	-103	7748.82
10/12/09 02:37:10	59.967	3773.17	350	-223.015732	16	377.5	10	0	-103	7749.15
10/12/09 02:37:12	59.969	3771.73	350	-223.015732	16	378	10	0	-103	7749.48
10/12/09 02:37:14	59.968	3768.793	350	-223.015732	16	378.5	10	0	-103	7749.81
10/12/09 02:37:16	59.963	3768.503	350	-223.015732	16	379	10	0	-103	7750.14
10/12/09 02:37:18	59.965	3768.917	350	-223.015732	16	379.5	10	0	-103	7750.47
10/12/09 02:37:20	59.97	3767.366	350	-223.015732	16	380	10	0	-103	7750.8
10/12/09 02:37:22	59.973	3764.786	350	-223.015732	16	380.5	10	0	-103	7751.13
10/12/09 02:37:24	59.968	3760.295	350	-223.015732	16	381	10	0	-103	7751.46
10/12/09 02:37:26	59.965	3759.592	350	-223.015732	16	381.5	10	0	-103	7751.79
10/12/09 02:37:28	59.968	3761.894	350	-223.015732	16	382	10	0	-103	7752.12
10/12/09 02:37:30	59.969	3761.777	350	-223.015732	16	382.5	10	0	-103	7752.45
10/12/09 02:37:32	59.967	3760.583	350	-223.015732	16	383	10	0	-103	7752.78
10/12/09 02:37:34	59.964	3760.157	350	-223.015732	16	383.5	10	0	-103	7753.11
10/12/09 02:37:36	59.966	3759.781	350	-223.015732	16	384	10	0	-103	7753.44
10/12/09 02:37:38	59.979	3759.495	350	-223.015732	16	384.5	10	0	-103	7753.77
10/12/09 02:37:40	59.99	3757.773	350	-223.015732	16	385	10	0	-103	7754.1
10/12/09 02:37:42	59.983	3753.277	350	-223.015732	16	385.5	10	0	-103	7754.43
10/12/09 02:37:44	59.974	3753.087	350	-223.015732	16	386	10	0	-103	7754.76
10/12/09 02:37:46	59.967	3751.637	350	-223.015732	16	386.5	10	0	-103	7755.09
10/12/09 02:37:48	59.965	3753.751	350	-223.015732	16	387	10	0	-103	7755.42
10/12/09 02:37:50	59.962	3758.225	350	-223.015732	16	387.5	10	0	-103	7755.75
10/12/09 02:37:52	59.962	3759.25	350	-223.015732	16	388	10	0	-103	7756.08
10/12/09 02:37:54	59.961	3758.041	350	-223.015732	16	388.5	10	0	-103	7756.41
10/12/09 02:37:56	59.961	3760.965	350	-223.015732	16	389	10	0	-103	7756.74
10/12/09 02:37:58	59.96	3762.022	350	-223.015732	16	389.5	10	0	-103	7757.07
10/12/09 02:38:00	59.963	3763.822	350	-223.015732	16	390	10	0	-103	7757.4
10/12/09 02:38:02	59.959	3763.1	350	-223.015732	16	390.5	10	0	-103	7757.73
10/12/09 02:38:04	59.956	3763.858	350	-223.015732	16	391	10	0	-103	7758.06
10/12/09 02:38:06	59.951	3764.158	350	-223.015732	16	391.5	10	0	-103	7758.39
10/12/09 02:38:08	59.953	3766.127	350	-223.015732	16	392	10	0	-103	7758.72
10/12/09 02:38:10	59.954	3768.339	350	-223.015732	16	392.5	10	0	-103	7759.05
10/12/09 02:38:12	59.957	3767.972	350	-223.015732	16	393	10	0	-103	7759.38

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	0.006	0.006	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.006	0.006	
1	0	1	-0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.005	0.005	
1	0	1	0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.013	0.013	
1	0	1	0.011	0.011	
1	0	1	-0.007	0.007	
1	0	1	-0.009	0.009	
1	0	1	-0.007	0.007	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	-0.005	0.005	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:38:14	59.956	3767.438	350	-223.015732	16	393.5	10	0	-103	7759.71
10/12/09 02:38:16	59.961	3765.606	350	-223.015732	16	394	10	0	-103	7760.04
10/12/09 02:38:18	59.963	3762.688	350	-223.015732	16	394.5	10	0	-103	7760.37
10/12/09 02:38:20	59.961	3761.57	350	-223.015732	16	395	10	0	-103	7760.7
10/12/09 02:38:22	59.959	3761.92	350	-223.015732	16	395.5	10	0	-103	7761.03
10/12/09 02:38:24	59.963	3759.627	350	-223.015732	16	396	10	0	-103	7761.36
10/12/09 02:38:26	59.963	3758.522	350	-223.015732	16	396.5	10	0	-103	7761.69
10/12/09 02:38:28	59.965	3752.429	350	-223.015732	16	397	10	0	-103	7762.02
10/12/09 02:38:30	59.968	3750.102	350	-223.015732	16	397.5	10	0	-103	7762.35
10/12/09 02:38:32	59.968	3753.83	350	-223.015732	16	398	10	0	-103	7762.68
10/12/09 02:38:34	59.968	3753.51	350	-223.015732	16	398.5	10	0	-103	7763.01
10/12/09 02:38:36	59.97	3753.523	350	-223.015732	16	399	10	0	-103	7763.34
10/12/09 02:38:38	59.973	3752.741	350	-223.015732	16	399.5	10	0	-103	7763.67
10/12/09 02:38:40	59.971	3753.178	350	-223.015732	16	400	10	0	-103	7764
10/12/09 02:38:42	59.965	3752.729	350	-223.015732	16	400.5	10	0	-103	7764.33
10/12/09 02:38:44	59.967	3753.291	350	-223.015732	16	401	10	0	-103	7764.66
10/12/09 02:38:46	59.967	3752.872	350	-223.015732	16	401.5	10	0	-103	7764.99
10/12/09 02:38:48	59.972	3752.359	350	-223.015732	16	402	10	0	-103	7765.32
10/12/09 02:38:50	59.976	3749.398	350	-223.015732	16	402.5	10	0	-103	7765.65
10/12/09 02:38:52	59.975	3747.476	350	-223.015732	16	403	10	0	-103	7765.98
10/12/09 02:38:54	59.969	3740.37	350	-223.015732	16	403.5	10	0	-103	7766.31
10/12/09 02:38:56	59.973	3741.285	350	-223.015732	16	404	10	0	-103	7766.64
10/12/09 02:38:58	59.974	3746.651	350	-223.015732	16	404.5	10	0	-103	7766.97
10/12/09 02:39:00	59.978	3745.738	350	-223.015732	16	405	10	0	-103	7767.3
10/12/09 02:39:02	59.981	3743.351	350	-223.015732	16	405.5	10	0	-103	7767.63
10/12/09 02:39:04	59.981	3741.618	350	-223.015732	16	406	10	0	-103	7767.96
10/12/09 02:39:06	59.981	3740.306	350	-223.015732	16	406.5	10	0	-103	7768.29
10/12/09 02:39:08	59.982	3738.484	350	-223.015732	16	407	10	0	-103	7768.62
10/12/09 02:39:10	59.982	3738.901	350	-223.015732	16	407.5	10	0	-103	7768.95
10/12/09 02:39:12	59.984	3737.404	350	-223.015732	16	408	10	0	-103	7769.28
10/12/09 02:39:14	59.982	3737.273	350	-223.015732	16	408.5	10	0	-103	7769.61
10/12/09 02:39:16	59.981	3736.308	350	-223.015732	16	409	10	0	-103	7769.94
10/12/09 02:39:18	59.979	3736.272	350	-223.015732	16	409.5	10	0	-103	7770.27
10/12/09 02:39:20	59.98	3735.448	350	-223.015732	16	410	10	0	-103	7770.6
10/12/09 02:39:22	59.978	3735.65	350	-223.015732	16	410.5	10	0	-103	7770.93
10/12/09 02:39:24	59.978	3737.541	350	-223.015732	16	411	10	0	-103	7771.26
10/12/09 02:39:26	59.98	3738.012	350	-223.015732	16	411.5	10	0	-103	7771.59
10/12/09 02:39:28	59.981	3736.748	350	-223.015732	16	412	10	0	-103	7771.92
10/12/09 02:39:30	59.98	3736.693	350	-223.015732	16	412.5	10	0	-103	7772.25

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	0.005	0.005	
1	0	1	0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	0.004	0.004	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.006	0.006	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.005	0.005	
1	0	1	0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.006	0.006	
1	0	1	0.004	0.004	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:39:32	59.978	3736.067	350	-223.015732	16	413	10	0	-103	7772.58
10/12/09 02:39:34	59.976	3736.094	350	-223.015732	16	413.5	10	0	-103	7772.91
10/12/09 02:39:36	59.972	3736.575	350	-223.015732	16	414	10	0	-103	7773.24
10/12/09 02:39:38	59.971	3738.571	350	-223.015732	16	414.5	10	0	-103	7773.57
10/12/09 02:39:40	59.969	3738.875	350	-223.015732	16	415	10	0	-103	7773.9
10/12/09 02:39:42	59.974	3738.935	350	-223.015732	16	415.5	10	0	-103	7774.23
10/12/09 02:39:44	59.975	3738.647	350	-223.015732	16	416	10	0	-103	7774.56
10/12/09 02:39:46	59.976	3737.684	350	-223.015732	16	416.5	10	0	-103	7774.89
10/12/09 02:39:48	59.972	3737.382	350	-223.015732	16	417	10	0	-103	7775.22
10/12/09 02:39:50	59.969	3737.892	350	-223.015732	16	417.5	10	0	-103	7775.55
10/12/09 02:39:52	59.971	3740.017	350	-223.015732	16	418	10	0	-103	7775.88
10/12/09 02:39:54	59.974	3740.329	350	-223.015732	16	418.5	10	0	-103	7776.21
10/12/09 02:39:56	59.972	3742.053	350	-223.015732	16	419	10	0	-103	7776.54
10/12/09 02:39:58	59.972	3742.424	350	-223.015732	16	419.5	10	0	-103	7776.87
10/12/09 02:40:00	59.972	3742.524	350	-223.015732	16	420	10	0	-103	7777.2
10/12/09 02:40:02	59.977	3742.245	350	-223.015732	16	420.5	10	0	-103	7777.53
10/12/09 02:40:04	59.982	3741.723	350	-223.015732	16	421	10	0	-103	7777.86
10/12/09 02:40:06	59.978	3740.085	350	-223.015732	16	421.5	10	0	-103	7778.19
10/12/09 02:40:08	59.976	3740.629	350	-223.015732	16	422	10	0	-103	7778.52
10/12/09 02:40:10	59.973	3739.964	350	-223.015732	16	422.5	10	0	-103	7778.85
10/12/09 02:40:12	59.974	3740.775	350	-223.015732	16	423	10	0	-103	7779.18
10/12/09 02:40:14	59.977	3742.833	350	-223.015732	16	423.5	10	0	-103	7779.51
10/12/09 02:40:16	59.977	3741.268	350	-223.015732	16	424	10	0	-103	7779.84
10/12/09 02:40:18	59.978	3739.776	350	-223.015732	16	424.5	10	0	-103	7780.17
10/12/09 02:40:20	59.979	3738.966	350	-223.015732	16	425	10	0	-103	7780.5
10/12/09 02:40:22	59.981	3738.706	350	-223.015732	16	425.5	10	0	-103	7780.83
10/12/09 02:40:24	59.977	3738.879	350	-223.015732	16	426	10	0	-103	7781.16
10/12/09 02:40:26	59.974	3739.86	350	-223.015732	16	426.5	10	0	-103	7781.49
10/12/09 02:40:28	59.971	3738.102	350	-223.015732	16	427	10	0	-103	7781.82
10/12/09 02:40:30	59.971	3738.558	350	-223.015732	16	427.5	10	0	-103	7782.15
10/12/09 02:40:32	59.971	3743.507	350	-223.015732	16	428	10	0	-103	7782.48
10/12/09 02:40:34	59.972	3743.419	350	-223.015732	16	428.5	10	0	-103	7782.81
10/12/09 02:40:36	59.968	3745.251	350	-223.015732	16	429	10	0	-103	7783.14
10/12/09 02:40:38	59.966	3745.744	350	-223.015732	16	429.5	10	0	-103	7783.47
10/12/09 02:40:40	59.966	3747.34	350	-223.015732	16	430	10	0	-103	7783.8
10/12/09 02:40:42	59.971	3750.7	350	-223.015732	16	430.5	10	0	-103	7784.13
10/12/09 02:40:44	59.973	3749.75	350	-223.015732	16	431	10	0	-103	7784.46
10/12/09 02:40:46	59.972	3746.217	350	-223.015732	16	431.5	10	0	-103	7784.79
10/12/09 02:40:48	59.969	3744.683	350	-223.015732	16	432	10	0	-103	7785.12

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.005	0.005	
1	0	1	0.005	0.005	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.005	0.005	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:40:50	59.972	3743.745	350	-223.015732	16	432.5	10	0	-103	7785.45
10/12/09 02:40:52	59.974	3743.149	350	-223.015732	16	433	10	0	-103	7785.78
10/12/09 02:40:54	59.973	3740.299	350	-223.015732	16	433.5	10	0	-103	7786.11
10/12/09 02:40:56	59.97	3739.453	350	-223.015732	16	434	10	0	-103	7786.44
10/12/09 02:40:58	59.971	3733.376	350	-223.015732	16	434.5	10	0	-103	7786.77
10/12/09 02:41:00	59.974	3731.83	350	-223.015732	16	435	10	0	-103	7787.1
10/12/09 02:41:02	59.982	3737.583	350	-223.015732	16	435.5	10	0	-103	7787.43
10/12/09 02:41:04	59.985	3736.229	350	-223.015732	16	436	10	0	-103	7787.76
10/12/09 02:41:06	59.985	3734.897	350	-223.015732	16	436.5	10	0	-103	7788.09
10/12/09 02:41:08	59.985	3733.434	350	-223.015732	16	437	10	0	-103	7788.42
10/12/09 02:41:10	59.987	3733.115	350	-223.015732	16	437.5	10	0	-103	7788.75
10/12/09 02:41:12	59.989	3730.51	350	-223.015732	16	438	10	0	-103	7789.08
10/12/09 02:41:14	59.989	3729.18	350	-223.015732	16	438.5	10	0	-103	7789.41
10/12/09 02:41:16	59.986	3725.459	350	-223.015732	16	439	10	0	-103	7789.74
10/12/09 02:41:18	59.987	3724.785	350	-223.015732	16	439.5	10	0	-103	7790.07
10/12/09 02:41:20	59.99	3720.108	350	-223.015732	16	440	10	0	-103	7790.4
10/12/09 02:41:22	59.994	3720.938	350	-223.015732	16	440.5	10	0	-103	7790.73
10/12/09 02:41:24	59.996	3725.661	350	-223.015732	16	441	10	0	-103	7791.06
10/12/09 02:41:26	60.001	3725.677	350	-223.015732	16	441.5	10	0	-103	7791.39
10/12/09 02:41:28	60.003	3727.754	350	-223.015732	16	442	10	0	-103	7791.72
10/12/09 02:41:30	60.004	3727.825	350	-223.015732	16	442.5	10	0	-103	7792.05
10/12/09 02:41:32	60.006	3727.683	350	-223.015732	16	443	10	0	-103	7792.38
10/12/09 02:41:34	60.012	3727.231	350	-223.015732	16	443.5	10	0	-103	7792.71
10/12/09 02:41:36	60.014	3725.012	350	-223.015732	16	444	10	0	-103	7793.04
10/12/09 02:41:38	60.019	3726.446	350	-223.015732	16	444.5	10	0	-103	7793.37
10/12/09 02:41:40	60.021	3726.016	350	-223.015732	16	445	10	0	-103	7793.7
10/12/09 02:41:42	60.025	3719.123	350	-223.015732	16	445.5	10	0	-103	7794.03
10/12/09 02:41:44	60.026	3716.375	350	-223.015732	16	446	10	0	-103	7794.36
10/12/09 02:41:46	60.027	3717.333	350	-223.015732	16	446.5	10	0	-103	7794.69
10/12/09 02:41:48	60.029	3717.56	350	-223.015732	16	447	10	0	-103	7795.02
10/12/09 02:41:50	60.029	3717.142	350	-223.015732	16	447.5	10	0	-103	7795.35
10/12/09 02:41:52	60.037	3715.166	350	-223.015732	16	448	10	0	-103	7795.68
10/12/09 02:41:54	60.036	3713.632	350	-223.015732	16	448.5	10	0	-103	7796.01
10/12/09 02:41:56	60.037	3710.283	350	-223.015732	16	449	10	0	-103	7796.34
10/12/09 02:41:58	60.037	3710.158	350	-223.015732	16	449.5	10	0	-103	7796.67
10/12/09 02:42:00	60.036	3699.356	350	-223.015732	16	450	10	0	-103	7797
10/12/09 02:42:02	60.041	3698.591	350	-223.015732	16	450.5	10	0	-103	7797.33
10/12/09 02:42:04	60.043	3704.591	350	-223.015732	16	451	10	0	-103	7797.66
10/12/09 02:42:06	60.044	3703.275	350	-223.015732	16	451.5	10	0	-103	7797.99

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.008	0.008	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.004	0.004	
1	0	1	0.002	0.002	
1	1	1	0.005	0.005	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.006	0.006	
1	1	1	0.002	0.002	
1	1	1	0.005	0.005	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.008	0.008	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.005	0.005	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:42:08	60.043	3702.482	350	-223.015732	16	452	10	0	-103	7798.32
10/12/09 02:42:10	60.046	3701.316	350	-223.015732	16	452.5	10	0	-103	7798.65
10/12/09 02:42:12	60.048	3700.826	350	-223.015732	16	453	10	0	-103	7798.98
10/12/09 02:42:14	60.046	3699.529	350	-223.015732	16	453.5	10	0	-103	7799.31
10/12/09 02:42:16	60.046	3699.726	350	-223.015732	16	454	10	0	-103	7799.64
10/12/09 02:42:18	60.043	3690.1	350	-223.015732	16	454.5	10	0	-103	7799.97
10/12/09 02:42:20	60.043	3690.477	350	-223.015732	16	455	10	0	-103	7800.3
10/12/09 02:42:22	60.044	3696.865	350	-223.015732	16	455.5	10	0	-103	7800.63
10/12/09 02:42:24	60.043	3696.877	350	-223.015732	16	456	10	0	-103	7800.96
10/12/09 02:42:26	60.043	3696.182	350	-223.015732	16	456.5	10	0	-103	7801.29
10/12/09 02:42:28	60.045	3696.541	350	-223.015732	16	457	10	0	-103	7801.62
10/12/09 02:42:30	60.04	3696.968	350	-223.015732	16	457.5	10	0	-103	7801.95
10/12/09 02:42:32	60.041	3698.686	350	-223.015732	16	458	10	0	-103	7802.28
10/12/09 02:42:34	60.039	3699.631	350	-223.015732	16	458.5	10	0	-103	7802.61
10/12/09 02:42:36	60.039	3698.787	350	-223.015732	16	459	10	0	-103	7802.94
10/12/09 02:42:38	60.036	3699.712	350	-223.015732	16	459.5	10	0	-103	7803.27
10/12/09 02:42:40	60.038	3700.106	350	-223.015732	16	460	10	0	-103	7803.6
10/12/09 02:42:42	60.033	3699.968	350	-223.015732	16	460.5	10	0	-103	7803.93
10/12/09 02:42:44	60.034	3701.122	350	-223.015732	16	461	10	0	-103	7804.26
10/12/09 02:42:46	60.037	3701.865	350	-223.015732	16	461.5	10	0	-103	7804.59
10/12/09 02:42:48	60.037	3701.614	350	-223.015732	16	462	10	0	-103	7804.92
10/12/09 02:42:50	60.035	3701.998	350	-223.015732	16	462.5	10	0	-103	7805.25
10/12/09 02:42:52	60.03	3702.913	350	-223.015732	16	463	10	0	-103	7805.58
10/12/09 02:42:54	60.033	3703.909	350	-223.015732	16	463.5	10	0	-103	7805.91
10/12/09 02:42:56	60.036	3705.522	350	-223.015732	16	464	10	0	-103	7806.24
10/12/09 02:42:58	60.033	3704.967	350	-223.015732	16	464.5	10	0	-103	7806.57
10/12/09 02:43:00	60.034	3704.087	350	-223.015732	16	465	10	0	-103	7806.9
10/12/09 02:43:02	60.032	3702.771	350	-223.015732	16	465.5	10	0	-103	7807.23
10/12/09 02:43:04	60.032	3703.706	350	-223.015732	16	466	10	0	-103	7807.56
10/12/09 02:43:06	60.034	3704.905	350	-223.015732	16	466.5	10	0	-103	7807.89
10/12/09 02:43:08	60.033	3705.435	350	-223.015732	16	467	10	0	-103	7808.22
10/12/09 02:43:10	60.037	3704.36	350	-223.015732	16	467.5	10	0	-103	7808.55
10/12/09 02:43:12	60.035	3702.588	350	-223.015732	16	468	10	0	-103	7808.88
10/12/09 02:43:14	60.035	3702.204	350	-223.015732	16	468.5	10	0	-103	7809.21
10/12/09 02:43:16	60.036	3701.942	350	-223.015732	16	469	10	0	-103	7809.54
10/12/09 02:43:18	60.039	3702.25	350	-223.015732	16	469.5	10	0	-103	7809.87
10/12/09 02:43:20	60.037	3703.318	350	-223.015732	16	470	10	0	-103	7810.2
10/12/09 02:43:22	60.039	3702.457	350	-223.015732	16	470.5	10	0	-103	7810.53
10/12/09 02:43:24	60.036	3702.525	350	-223.015732	16	471	10	0	-103	7810.86

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	-0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	-0.005	0.005	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	-0.005	0.005	
1	1	1	0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.005	0.005	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	-0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:43:26	60.034	3703.269	350	-223.015732	16	471.5	10	0	-103	7811.19
10/12/09 02:43:28	60.038	3703.844	350	-223.015732	16	472	10	0	-103	7811.52
10/12/09 02:43:30	60.037	3702.865	350	-223.015732	16	472.5	10	0	-103	7811.85
10/12/09 02:43:32	60.037	3702.518	350	-223.015732	16	473	10	0	-103	7812.18
10/12/09 02:43:34	60.037	3702.28	350	-223.015732	16	473.5	10	0	-103	7812.51
10/12/09 02:43:36	60.038	3692.427	350	-223.015732	16	474	10	0	-103	7812.84
10/12/09 02:43:38	60.04	3692.178	350	-223.015732	16	474.5	10	0	-103	7813.17
10/12/09 02:43:40	60.043	3700.276	350	-223.015732	16	475	10	0	-103	7813.5
10/12/09 02:43:42	60.045	3698.755	350	-223.015732	16	475.5	10	0	-103	7813.83
10/12/09 02:43:44	60.045	3697.729	350	-223.015732	16	476	10	0	-103	7814.16
10/12/09 02:43:46	60.042	3696.916	350	-223.015732	16	476.5	10	0	-103	7814.49
10/12/09 02:43:48	60.043	3697.368	350	-223.015732	16	477	10	0	-103	7814.82
10/12/09 02:43:50	60.04	3697.346	350	-223.015732	16	477.5	10	0	-103	7815.15
10/12/09 02:43:52	60.044	3698.429	350	-223.015732	16	478	10	0	-103	7815.48
10/12/09 02:43:54	60.046	3694.763	350	-223.015732	16	478.5	10	0	-103	7815.81
10/12/09 02:43:56	60.042	3693.584	350	-223.015732	16	479	10	0	-103	7816.14
10/12/09 02:43:58	60.034	3693.241	350	-223.015732	16	479.5	10	0	-103	7816.47
10/12/09 02:44:00	60.039	3696.798	350	-223.015732	16	480	10	0	-103	7816.8
10/12/09 02:44:02	60.039	3699.364	350	-223.015732	16	480.5	10	0	-103	7817.13
10/12/09 02:44:04	60.036	3701.791	350	-223.015732	16	481	10	0	-103	7817.46
10/12/09 02:44:06	60.037	3700.708	350	-223.015732	16	481.5	10	0	-103	7817.79
10/12/09 02:44:08	60.034	3700.753	350	-223.015732	16	482	10	0	-103	7818.12
10/12/09 02:44:10	60.033	3702.148	350	-223.015732	16	482.5	10	0	-103	7818.45
10/12/09 02:44:12	60.032	3705.213	350	-223.015732	16	483	10	0	-103	7818.78
10/12/09 02:44:14	60.031	3707.521	350	-223.015732	16	483.5	10	0	-103	7819.11
10/12/09 02:44:16	60.033	3707.287	350	-223.015732	16	484	10	0	-103	7819.44
10/12/09 02:44:18	60.027	3706.988	350	-223.015732	16	484.5	10	0	-103	7819.77
10/12/09 02:44:20	60.031	3707.34	350	-223.015732	16	485	10	0	-103	7820.1
10/12/09 02:44:22	60.032	3707.917	350	-223.015732	16	485.5	10	0	-103	7820.43
10/12/09 02:44:24	60.031	3707.384	350	-223.015732	16	486	10	0	-103	7820.76
10/12/09 02:44:26	60.031	3706.857	350	-223.015732	16	486.5	10	0	-103	7821.09
10/12/09 02:44:28	60.033	3707.615	350	-223.015732	16	487	10	0	-103	7821.42
10/12/09 02:44:30	60.039	3706.823	350	-223.015732	16	487.5	10	0	-103	7821.75
10/12/09 02:44:32	60.039	3703.746	350	-223.015732	16	488	10	0	-103	7822.08
10/12/09 02:44:34	60.038	3701.582	350	-223.015732	16	488.5	10	0	-103	7822.41
10/12/09 02:44:36	60.037	3700.847	350	-223.015732	16	489	10	0	-103	7822.74
10/12/09 02:44:38	60.035	3701.208	350	-223.015732	16	489.5	10	0	-103	7823.07
10/12/09 02:44:40	60.037	3702.212	350	-223.015732	16	490	10	0	-103	7823.4
10/12/09 02:44:42	60.04	3701.686	350	-223.015732	16	490.5	10	0	-103	7823.73

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	-0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	-0.004	0.004	
1	1	1	-0.008	0.008	
1	1	1	0.005	0.005	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	-0.006	0.006	
1	1	1	0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.006	0.006	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:44:44	60.042	3700.397	350	-223.015732	16	491	10	0	-103	7824.06
10/12/09 02:44:46	60.035	3699.69	350	-223.015732	16	491.5	10	0	-103	7824.39
10/12/09 02:44:48	60.036	3700.366	350	-223.015732	16	492	10	0	-103	7824.72
10/12/09 02:44:50	60.04	3700.827	350	-223.015732	16	492.5	10	0	-103	7825.05
10/12/09 02:44:52	60.045	3700.662	350	-223.015732	16	493	10	0	-103	7825.38
10/12/09 02:44:54	60.045	3696.935	350	-223.015732	16	493.5	10	0	-103	7825.71
10/12/09 02:44:56	60.048	3695.688	350	-223.015732	16	494	10	0	-103	7826.04
10/12/09 02:44:58	60.042	3695.819	350	-223.015732	16	494.5	10	0	-103	7826.37
10/12/09 02:45:00	60.044	3693.824	350	-223.015732	16	495	10	0	-103	7826.7
10/12/09 02:45:02	60.044	3694.799	350	-223.015732	16	495.5	10	0	-103	7827.03
10/12/09 02:45:04	60.044	3696.897	350	-223.015732	16	496	10	0	-103	7827.36
10/12/09 02:45:06	60.041	3696.023	350	-223.015732	16	496.5	10	0	-103	7827.69
10/12/09 02:45:08	60.04	3697.502	350	-223.015732	16	497	10	0	-103	7828.02
10/12/09 02:45:10	60.04	3698.424	350	-223.015732	16	497.5	10	0	-103	7828.35
10/12/09 02:45:12	60.045	3699.427	350	-223.015732	16	498	10	0	-103	7828.68
10/12/09 02:45:14	60.044	3700.177	350	-223.015732	16	498.5	10	0	-103	7829.01
10/12/09 02:45:16	60.042	3699.806	350	-223.015732	16	499	10	0	-103	7829.34
10/12/09 02:45:18	60.039	3697.577	350	-223.015732	16	499.5	10	0	-103	7829.67
10/12/09 02:45:20	60.042	3697.681	350	-223.015732	16	500	10	0	-103	7830
10/12/09 02:45:22	60.042	3698.507	350	-223.015732	16	500.5	10	0	-103	7830.33
10/12/09 02:45:24	60.041	3698.359	350	-223.015732	16	501	10	0	-103	7830.66
10/12/09 02:45:26	60.038	3698.466	350	-223.015732	16	501.5	10	0	-103	7830.99
10/12/09 02:45:28	60.036	3699.077	350	-223.015732	16	502	10	0	-103	7831.32
10/12/09 02:45:30	60.037	3700.262	350	-223.015732	16	502.5	10	0	-103	7831.65
10/12/09 02:45:32	60.039	3701.592	350	-223.015732	16	503	10	0	-103	7831.98
10/12/09 02:45:34	60.038	3700.902	350	-223.015732	16	503.5	10	0	-103	7832.31
10/12/09 02:45:36	60.04	3700.143	350	-223.015732	16	504	10	0	-103	7832.64
10/12/09 02:45:38	60.039	3700.27	350	-223.015732	16	504.5	10	0	-103	7832.97
10/12/09 02:45:40	60.037	3701.139	350	-223.015732	16	505	10	0	-103	7833.3
10/12/09 02:45:42	60.038	3701.586	350	-223.015732	16	505.5	10	0	-103	7833.63
10/12/09 02:45:44	60.039	3700.264	350	-223.015732	16	506	10	0	-103	7833.96
10/12/09 02:45:46	60.04	3699.458	350	-223.015732	16	506.5	10	0	-103	7834.29
10/12/09 02:45:48	60.037	3699.721	350	-223.015732	16	507	10	0	-103	7834.62
10/12/09 02:45:50	60.037	3700.458	350	-223.015732	16	507.5	10	0	-103	7834.95
10/12/09 02:45:52	60.037	3699.505	350	-223.015732	16	508	10	0	-103	7835.28
10/12/09 02:45:54	60.039	3698.794	350	-223.015732	16	508.5	10	0	-103	7835.61
10/12/09 02:45:56	60.038	3699.216	350	-223.015732	16	509	10	0	-103	7835.94
10/12/09 02:45:58	60.036	3699.4	350	-223.015732	16	509.5	10	0	-103	7836.27
10/12/09 02:46:00	60.035	3700.661	350	-223.015732	16	510	10	0	-103	7836.6

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.002	0.002	
1	1	1	-0.007	0.007	
1	1	1	0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.005	0.005	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	-0.006	0.006	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.005	0.005	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:46:02	60.033	3702.173	350	-223.015732	16	510.5	10	0	-103	7836.93
10/12/09 02:46:04	60.031	3702.968	350	-223.015732	16	511	10	0	-103	7837.26
10/12/09 02:46:06	60.03	3705.195	350	-223.015732	16	511.5	10	0	-103	7837.59
10/12/09 02:46:08	60.032	3704.952	350	-223.015732	16	512	10	0	-103	7837.92
10/12/09 02:46:10	60.032	3705.775	350	-223.015732	16	512.5	10	0	-103	7838.25
10/12/09 02:46:12	60.037	3705.621	350	-223.015732	16	513	10	0	-103	7838.58
10/12/09 02:46:14	60.042	3703.744	350	-223.015732	16	513.5	10	0	-103	7838.91
10/12/09 02:46:16	60.041	3701.981	350	-223.015732	16	514	10	0	-103	7839.24
10/12/09 02:46:18	60.036	3700.756	350	-223.015732	16	514.5	10	0	-103	7839.57
10/12/09 02:46:20	60.031	3700.747	350	-223.015732	16	515	10	0	-103	7839.9
10/12/09 02:46:22	60.032	3702.213	350	-223.015732	16	515.5	10	0	-103	7840.23
10/12/09 02:46:24	60.031	3705.059	350	-223.015732	16	516	10	0	-103	7840.56
10/12/09 02:46:26	60.034	3705.514	350	-223.015732	16	516.5	10	0	-103	7840.89
10/12/09 02:46:28	60.034	3704.449	350	-223.015732	16	517	10	0	-103	7841.22
10/12/09 02:46:30	60.032	3703.831	350	-223.015732	16	517.5	10	0	-103	7841.55
10/12/09 02:46:32	60.038	3703.62	350	-223.015732	16	518	10	0	-103	7841.88
10/12/09 02:46:34	60.043	3702.795	350	-223.015732	16	518.5	10	0	-103	7842.21
10/12/09 02:46:36	60.044	3701.432	350	-223.015732	16	519	10	0	-103	7842.54
10/12/09 02:46:38	60.042	3697.38	350	-223.015732	16	519.5	10	0	-103	7842.87
10/12/09 02:46:40	60.045	3696.25	350	-223.015732	16	520	10	0	-103	7843.2
10/12/09 02:46:42	60.04	3696.302	350	-223.015732	16	520.5	10	0	-103	7843.53
10/12/09 02:46:44	60.04	3693.518	350	-223.015732	16	521	10	0	-103	7843.86
10/12/09 02:46:46	60.043	3693.577	350	-223.015732	16	521.5	10	0	-103	7844.19
10/12/09 02:46:48	60.043	3695.197	350	-223.015732	16	522	10	0	-103	7844.52
10/12/09 02:46:50	60.041	3695.186	350	-223.015732	16	522.5	10	0	-103	7844.85
10/12/09 02:46:52	60.04	3693.786	350	-223.015732	16	523	10	0	-103	7845.18
10/12/09 02:46:54	60.038	3694.753	350	-223.015732	16	523.5	10	0	-103	7845.51
10/12/09 02:46:56	60.043	3694.926	350	-223.015732	16	524	10	0	-103	7845.84
10/12/09 02:46:58	60.044	3694.938	350	-223.015732	16	524.5	10	0	-103	7846.17
10/12/09 02:47:00	60.042	3694.159	350	-223.015732	16	525	10	0	-103	7846.5
10/12/09 02:47:02	60.036	3691.33	350	-223.015732	16	525.5	10	0	-103	7846.83
10/12/09 02:47:04	60.043	3692.686	350	-223.015732	16	526	10	0	-103	7847.16
10/12/09 02:47:06	60.041	3693.238	350	-223.015732	16	526.5	10	0	-103	7847.49
10/12/09 02:47:08	60.042	3693.39	350	-223.015732	16	527	10	0	-103	7847.82
10/12/09 02:47:10	60.043	3692.357	350	-223.015732	16	527.5	10	0	-103	7848.15
10/12/09 02:47:12	60.043	3690.951	350	-223.015732	16	528	10	0	-103	7848.48
10/12/09 02:47:14	60.036	3690.836	350	-223.015732	16	528.5	10	0	-103	7848.81
10/12/09 02:47:16	60.039	3692.042	350	-223.015732	16	529	10	0	-103	7849.14
10/12/09 02:47:18	60.039	3693.114	350	-223.015732	16	529.5	10	0	-103	7849.47

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.005	0.005	
1	1	1	0.005	0.005	
1	1	1	-0.001	0.001	
1	1	1	-0.005	0.005	
1	1	1	-0.005	0.005	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.006	0.006	
1	1	1	0.005	0.005	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	-0.005	0.005	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.005	0.005	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.006	0.006	
1	1	1	0.007	0.007	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.007	0.007	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:47:20	60.037	3694.117	350	-223.015732	16	530	10	0	-103	7849.8
10/12/09 02:47:22	60.034	3695.258	350	-223.015732	16	530.5	10	0	-103	7850.13
10/12/09 02:47:24	60.035	3695.581	350	-223.015732	16	531	10	0	-103	7850.46
10/12/09 02:47:26	60.035	3695.949	350	-223.015732	16	531.5	10	0	-103	7850.79
10/12/09 02:47:28	60.035	3695.491	350	-223.015732	16	532	10	0	-103	7851.12
10/12/09 02:47:30	60.036	3696.305	350	-223.015732	16	532.5	10	0	-103	7851.45
10/12/09 02:47:32	60.03	3696.486	350	-223.015732	16	533	10	0	-103	7851.78
10/12/09 02:47:34	60.03	3697.336	350	-223.015732	16	533.5	10	0	-103	7852.11
10/12/09 02:47:36	60.03	3699.171	350	-223.015732	16	534	10	0	-103	7852.44
10/12/09 02:47:38	60.031	3699.357	350	-223.015732	16	534.5	10	0	-103	7852.77
10/12/09 02:47:40	60.031	3699.251	350	-223.015732	16	535	10	0	-103	7853.1
10/12/09 02:47:42	60.032	3699.117	350	-223.015732	16	535.5	10	0	-103	7853.43
10/12/09 02:47:44	60.031	3699.105	350	-223.015732	16	536	10	0	-103	7853.76
10/12/09 02:47:46	60.032	3699.126	350	-223.015732	16	536.5	10	0	-103	7854.09
10/12/09 02:47:48	60.032	3698.954	350	-223.015732	16	537	10	0	-103	7854.42
10/12/09 02:47:50	60.032	3698.136	350	-223.015732	16	537.5	10	0	-103	7854.75
10/12/09 02:47:52	60.033	3698.277	350	-223.015732	16	538	10	0	-103	7855.08
10/12/09 02:47:54	60.037	3697.412	350	-223.015732	16	538.5	10	0	-103	7855.41
10/12/09 02:47:56	60.04	3695.94	350	-223.015732	16	539	10	0	-103	7855.74
10/12/09 02:47:58	60.039	3693.736	350	-223.015732	16	539.5	10	0	-103	7856.07
10/12/09 02:48:00	60.042	3693.224	350	-223.015732	16	540	10	0	-103	7856.4
10/12/09 02:48:02	60.036	3691.759	350	-223.015732	16	540.5	10	0	-103	7856.73
10/12/09 02:48:04	60.039	3691.919	350	-223.015732	16	541	10	0	-103	7857.06
10/12/09 02:48:06	60.041	3692.798	350	-223.015732	16	541.5	10	0	-103	7857.39
10/12/09 02:48:08	60.04	3691.582	350	-223.015732	16	542	10	0	-103	7857.72
10/12/09 02:48:10	60.035	3692.374	350	-223.015732	16	542.5	10	0	-103	7858.05
10/12/09 02:48:12	60.036	3693.302	350	-223.015732	16	543	10	0	-103	7858.38
10/12/09 02:48:14	60.038	3694.71	350	-223.015732	16	543.5	10	0	-103	7858.71
10/12/09 02:48:16	60.037	3694.331	350	-223.015732	16	544	10	0	-103	7859.04
10/12/09 02:48:18	60.041	3693.815	350	-223.015732	16	544.5	10	0	-103	7859.37
10/12/09 02:48:20	60.04	3693.617	350	-223.015732	16	545	10	0	-103	7859.7
10/12/09 02:48:22	60.036	3694.324	350	-223.015732	16	545.5	10	0	-103	7860.03
10/12/09 02:48:24	60.033	3694.27	350	-223.015732	16	546	10	0	-103	7860.36
10/12/09 02:48:26	60.034	3694.66	350	-223.015732	16	546.5	10	0	-103	7860.69
10/12/09 02:48:28	60.038	3693.748	350	-223.015732	16	547	10	0	-103	7861.02
10/12/09 02:48:30	60.04	3692.532	350	-223.015732	16	547.5	10	0	-103	7861.35
10/12/09 02:48:32	60.041	3691.445	350	-223.015732	16	548	10	0	-103	7861.68
10/12/09 02:48:34	60.037	3691.012	350	-223.015732	16	548.5	10	0	-103	7862.01
10/12/09 02:48:36	60.037	3691.799	350	-223.015732	16	549	10	0	-103	7862.34

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.006	0.006	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	-0.006	0.006	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.005	0.005	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	-0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:48:38	60.036	3693.077	350	-223.015732	16	549.5	10	0	-103	7862.67
10/12/09 02:48:40	60.037	3693.727	350	-223.015732	16	550	10	0	-103	7863
10/12/09 02:48:42	60.038	3693.117	350	-223.015732	16	550.5	10	0	-103	7863.33
10/12/09 02:48:44	60.039	3692.641	350	-223.015732	16	551	10	0	-103	7863.66
10/12/09 02:48:46	60.038	3688.159	350	-223.015732	16	551.5	10	0	-103	7863.99
10/12/09 02:48:48	60.034	3689.02	350	-223.015732	16	552	10	0	-103	7864.32
10/12/09 02:48:50	60.033	3688.208	350	-223.015732	16	552.5	10	0	-103	7864.65
10/12/09 02:48:52	60.031	3690.092	350	-223.015732	16	553	10	0	-103	7864.98
10/12/09 02:48:54	60.034	3693.172	350	-223.015732	16	553.5	10	0	-103	7865.31
10/12/09 02:48:56	60.029	3693.321	350	-223.015732	16	554	10	0	-103	7865.64
10/12/09 02:48:58	60.029	3694.593	350	-223.015732	16	554.5	10	0	-103	7865.97
10/12/09 02:49:00	60.031	3695.225	350	-223.015732	16	555	10	0	-103	7866.3
10/12/09 02:49:02	60.03	3694.609	350	-223.015732	16	555.5	10	0	-103	7866.63
10/12/09 02:49:04	60.03	3693.412	350	-223.015732	16	556	10	0	-103	7866.96
10/12/09 02:49:06	60.026	3693.509	350	-223.015732	16	556.5	10	0	-103	7867.29
10/12/09 02:49:08	60.022	3696.026	350	-223.015732	16	557	10	0	-103	7867.62
10/12/09 02:49:10	60.021	3698.012	350	-223.015732	16	557.5	10	0	-103	7867.95
10/12/09 02:49:12	60.024	3699.062	350	-223.015732	16	558	10	0	-103	7868.28
10/12/09 02:49:14	60.023	3699.414	350	-223.015732	16	558.5	10	0	-103	7868.61
10/12/09 02:49:16	60.02	3698.935	350	-223.015732	16	559	10	0	-103	7868.94
10/12/09 02:49:18	60.021	3700.084	350	-223.015732	16	559.5	10	0	-103	7869.27
10/12/09 02:49:20	60.023	3700.544	350	-223.015732	16	560	10	0	-103	7869.6
10/12/09 02:49:22	60.025	3700.486	350	-223.015732	16	560.5	10	0	-103	7869.93
10/12/09 02:49:24	60.026	3698.596	350	-223.015732	16	561	10	0	-103	7870.26
10/12/09 02:49:26	60.026	3697.961	350	-223.015732	16	561.5	10	0	-103	7870.59
10/12/09 02:49:28	60.025	3699.914	350	-223.015732	16	562	10	0	-103	7870.92
10/12/09 02:49:30	60.024	3700.802	350	-223.015732	16	562.5	10	0	-103	7871.25
10/12/09 02:49:32	60.024	3701.301	350	-223.015732	16	563	10	0	-103	7871.58
10/12/09 02:49:34	60.025	3701.45	350	-223.015732	16	563.5	10	0	-103	7871.91
10/12/09 02:49:36	60.023	3701.349	350	-223.015732	16	564	10	0	-103	7872.24
10/12/09 02:49:38	60.023	3701.094	350	-223.015732	16	564.5	10	0	-103	7872.57
10/12/09 02:49:40	60.022	3701.702	350	-223.015732	16	565	10	0	-103	7872.9
10/12/09 02:49:42	60.026	3702.07	350	-223.015732	16	565.5	10	0	-103	7873.23
10/12/09 02:49:44	60.029	3701.965	350	-223.015732	16	566	10	0	-103	7873.56
10/12/09 02:49:46	60.026	3700.269	350	-223.015732	16	566.5	10	0	-103	7873.89
10/12/09 02:49:48	60.024	3700.241	350	-223.015732	16	567	10	0	-103	7874.22
10/12/09 02:49:50	60.021	3701.09	350	-223.015732	16	567.5	10	0	-103	7874.55
10/12/09 02:49:52	60.025	3701.268	350	-223.015732	16	568	10	0	-103	7874.88
10/12/09 02:49:54	60.025	3701.205	350	-223.015732	16	568.5	10	0	-103	7875.21

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	-0.005	0.005	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.004	0.004	
1	1	1	-0.004	0.004	
1	1	1	-0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:49:56	60.025	3700.587	350	-223.015732	16	569	10	0	-103	7875.54
10/12/09 02:49:58	60.023	3700.532	350	-223.015732	16	569.5	10	0	-103	7875.87
10/12/09 02:50:00	60.026	3700.177	350	-223.015732	16	570	10	0	-103	7876.2
10/12/09 02:50:02	60.024	3700.295	350	-223.015732	16	570.5	10	0	-103	7876.53
10/12/09 02:50:04	60.022	3700.277	350	-223.015732	16	571	10	0	-103	7876.86
10/12/09 02:50:06	60.023	3700.841	350	-223.015732	16	571.5	10	0	-103	7877.19
10/12/09 02:50:08	60.026	3700.863	350	-223.015732	16	572	10	0	-103	7877.52
10/12/09 02:50:10	60.025	3700.26	350	-223.015732	16	572.5	10	0	-103	7877.85
10/12/09 02:50:12	60.02	3700.052	350	-223.015732	16	573	10	0	-103	7878.18
10/12/09 02:50:14	60.02	3699.926	350	-223.015732	16	573.5	10	0	-103	7878.51
10/12/09 02:50:16	60.019	3700.965	350	-223.015732	16	574	10	0	-103	7878.84
10/12/09 02:50:18	60.015	3702.581	350	-223.015732	16	574.5	10	0	-103	7879.17
10/12/09 02:50:20	60.016	3703.516	350	-223.015732	16	575	10	0	-103	7879.5
10/12/09 02:50:22	60.017	3703.824	350	-223.015732	16	575.5	10	0	-103	7879.83
10/12/09 02:50:24	60.015	3703.672	350	-223.015732	16	576	10	0	-103	7880.16
10/12/09 02:50:26	60.015	3703.689	350	-223.015732	16	576.5	10	0	-103	7880.49
10/12/09 02:50:28	60.017	3703.003	350	-223.015732	16	577	10	0	-103	7880.82
10/12/09 02:50:30	60.017	3702.921	350	-223.015732	16	577.5	10	0	-103	7881.15
10/12/09 02:50:32	60.012	3703	350	-223.015732	16	578	10	0	-103	7881.48
10/12/09 02:50:34	60.01	3703.167	350	-223.015732	16	578.5	10	0	-103	7881.81
10/12/09 02:50:36	60.008	3703.918	350	-223.015732	16	579	10	0	-103	7882.14
10/12/09 02:50:38	60.002	3703.616	350	-223.015732	16	579.5	10	0	-103	7882.47
10/12/09 02:50:40	59.999	3703.775	350	-223.015732	16	580	10	0	-103	7882.8
10/12/09 02:50:42	59.999	3703.751	350	-223.015732	16	580.5	10	0	-103	7883.13
10/12/09 02:50:44	60.002	3701.534	350	-223.015732	16	581	10	0	-103	7883.46
10/12/09 02:50:46	60.003	3700.617	350	-223.015732	16	581.5	10	0	-103	7883.79
10/12/09 02:50:48	60.004	3700.88	350	-223.015732	16	582	10	0	-103	7884.12
10/12/09 02:50:50	60.001	3700.625	350	-223.015732	16	582.5	10	0	-103	7884.45
10/12/09 02:50:52	59.996	3701.389	350	-223.015732	16	583	10	0	-103	7884.78
10/12/09 02:50:54	59.993	3701.737	350	-223.015732	16	583.5	10	0	-103	7885.11
10/12/09 02:50:56	59.992	3700.671	350	-223.015732	16	584	10	0	-103	7885.44
10/12/09 02:50:58	59.989	3700.826	350	-223.015732	16	584.5	10	0	-103	7885.77
10/12/09 02:51:00	59.987	3700.977	350	-223.015732	16	585	10	0	-103	7886.1
10/12/09 02:51:02	59.985	3700.7	350	-223.015732	16	585.5	10	0	-103	7886.43
10/12/09 02:51:04	59.985	3699.854	350	-223.015732	16	586	10	0	-103	7886.76
10/12/09 02:51:06	59.986	3700.237	350	-223.015732	16	586.5	10	0	-103	7887.09
10/12/09 02:51:08	59.984	3700.342	350	-223.015732	16	587	10	0	-103	7887.42
10/12/09 02:51:10	59.981	3700.77	350	-223.015732	16	587.5	10	0	-103	7887.75
10/12/09 02:51:12	59.98	3700.789	350	-223.015732	16	588	10	0	-103	7888.08

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	-0.005	0.005	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.005	0.005	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.006	0.006	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.003	0.003	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:51:14	59.977	3701.625	350	-223.015732	16	588.5	10	0	-103	7888.41
10/12/09 02:51:16	59.975	3703.166	350	-223.015732	16	589	10	0	-103	7888.74
10/12/09 02:51:18	59.976	3704.187	350	-223.015732	16	589.5	10	0	-103	7889.07
10/12/09 02:51:20	59.972	3704.785	350	-223.015732	16	590	10	0	-103	7889.4
10/12/09 02:51:22	59.974	3705.811	350	-223.015732	16	590.5	10	0	-103	7889.73
10/12/09 02:51:24	59.977	3706.958	350	-223.015732	16	591	10	0	-103	7890.06
10/12/09 02:51:26	59.975	3706.688	350	-223.015732	16	591.5	10	0	-103	7890.39
10/12/09 02:51:28	59.973	3706.543	350	-223.015732	16	592	10	0	-103	7890.72
10/12/09 02:51:30	59.971	3706.257	350	-223.015732	16	592.5	10	0	-103	7891.05
10/12/09 02:51:32	59.971	3707.027	350	-223.015732	16	593	10	0	-103	7891.38
10/12/09 02:51:34	59.976	3710.118	350	-223.015732	16	593.5	10	0	-103	7891.71
10/12/09 02:51:36	59.979	3710.531	350	-223.015732	16	594	10	0	-103	7892.04
10/12/09 02:51:38	59.98	3708.701	350	-223.015732	16	594.5	10	0	-103	7892.37
10/12/09 02:51:40	59.979	3708.018	350	-223.015732	16	595	10	0	-103	7892.7
10/12/09 02:51:42	59.982	3706.942	350	-223.015732	16	595.5	10	0	-103	7893.03
10/12/09 02:51:44	59.982	3706.343	350	-223.015732	16	596	10	0	-103	7893.36
10/12/09 02:51:46	59.983	3706.125	350	-223.015732	16	596.5	10	0	-103	7893.69
10/12/09 02:51:48	59.981	3706.311	350	-223.015732	16	597	10	0	-103	7894.02
10/12/09 02:51:50	59.979	3706.119	350	-223.015732	16	597.5	10	0	-103	7894.35
10/12/09 02:51:52	59.978	3706.19	350	-223.015732	16	598	10	0	-103	7894.68
10/12/09 02:51:54	59.976	3707.721	350	-223.015732	16	598.5	10	0	-103	7895.01
10/12/09 02:51:56	59.978	3709.409	350	-223.015732	16	599	10	0	-103	7895.34
10/12/09 02:51:58	59.977	3708.971	350	-223.015732	16	599.5	10	0	-103	7895.67
10/12/09 02:52:00	59.976	3708.531	350	-223.015732	16	600	10	0	-103	7896
10/12/09 02:52:02	59.978	3708.071	350	-223.015732	16	600.5	10	0	-103	7896.33
10/12/09 02:52:04	59.975	3707.24	350	-223.015732	16	601	10	0	-103	7896.66
10/12/09 02:52:06	59.971	3709.213	350	-223.015732	16	601.5	10	0	-103	7896.99
10/12/09 02:52:08	59.97	3709.961	350	-223.015732	16	602	10	0	-103	7897.32
10/12/09 02:52:10	59.97	3711.75	350	-223.015732	16	602.5	10	0	-103	7897.65
10/12/09 02:52:12	59.971	3711.98	350	-223.015732	16	603	10	0	-103	7897.98
10/12/09 02:52:14	59.99	3710.695	350	-223.015732	16	603.5	10	0	-103	7898.31
10/12/09 02:52:16	59.998	3707.867	350	-223.015732	16	604	10	0	-103	7898.64
10/12/09 02:52:18	59.999	3704.912	350	-223.015732	16	604.5	10	0	-103	7898.97
10/12/09 02:52:20	59.999	3705.639	350	-223.015732	16	605	10	0	-103	7899.3
10/12/09 02:52:22	59.998	3703.787	350	-223.015732	16	605.5	10	0	-103	7899.63
10/12/09 02:52:24	59.999	3703.191	350	-223.015732	16	606	10	0	-103	7899.96
10/12/09 02:52:26	60.003	3702.071	350	-223.015732	16	606.5	10	0	-103	7900.29
10/12/09 02:52:28	60.005	3699.51	350	-223.015732	16	607	10	0	-103	7900.62
10/12/09 02:52:30	60.005	3698.658	350	-223.015732	16	607.5	10	0	-103	7900.95

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.019	0.019	
1	0	1	0.008	0.008	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:52:32	60.01	3698.137	350	-223.015732	16	608	10	0	-103	7901.28
10/12/09 02:52:34	60.013	3697.882	350	-223.015732	16	608.5	10	0	-103	7901.61
10/12/09 02:52:36	60.02	3698.668	350	-223.015732	16	609	10	0	-103	7901.94
10/12/09 02:52:38	60.022	3698.604	350	-223.015732	16	609.5	10	0	-103	7902.27
10/12/09 02:52:40	60.024	3697.868	350	-223.015732	16	610	10	0	-103	7902.6
10/12/09 02:52:42	60.025	3694.672	350	-223.015732	16	610.5	10	0	-103	7902.93
10/12/09 02:52:44	60.025	3693.912	350	-223.015732	16	611	10	0	-103	7903.26
10/12/09 02:52:46	60.024	3693.418	350	-223.015732	16	611.5	10	0	-103	7903.59
10/12/09 02:52:48	60.023	3688.301	350	-223.015732	16	612	10	0	-103	7903.92
10/12/09 02:52:50	60.029	3688.021	350	-223.015732	16	612.5	10	0	-103	7904.25
10/12/09 02:52:52	60.029	3689.143	350	-223.015732	16	613	10	0	-103	7904.58
10/12/09 02:52:54	60.029	3688.237	350	-223.015732	16	613.5	10	0	-103	7904.91
10/12/09 02:52:56	60.028	3687.878	350	-223.015732	16	614	10	0	-103	7905.24
10/12/09 02:52:58	60.028	3687.026	350	-223.015732	16	614.5	10	0	-103	7905.57
10/12/09 02:53:00	60.031	3686.683	350	-223.015732	16	615	10	0	-103	7905.9
10/12/09 02:53:02	60.032	3685.276	350	-223.015732	16	615.5	10	0	-103	7906.23
10/12/09 02:53:04	60.033	3685.576	350	-223.015732	16	616	10	0	-103	7906.56
10/12/09 02:53:06	60.031	3685.985	350	-223.015732	16	616.5	10	0	-103	7906.89
10/12/09 02:53:08	60.03	3686.418	350	-223.015732	16	617	10	0	-103	7907.22
10/12/09 02:53:10	60.022	3687.159	350	-223.015732	16	617.5	10	0	-103	7907.55
10/12/09 02:53:12	60.021	3687.873	350	-223.015732	16	618	10	0	-103	7907.88
10/12/09 02:53:14	60.019	3688.997	350	-223.015732	16	618.5	10	0	-103	7908.21
10/12/09 02:53:16	60.017	3690.426	350	-223.015732	16	619	10	0	-103	7908.54
10/12/09 02:53:18	60.017	3690.776	350	-223.015732	16	619.5	10	0	-103	7908.87
10/12/09 02:53:20	60.017	3692.715	350	-223.015732	16	620	10	0	-103	7909.2
10/12/09 02:53:22	60.016	3692.578	350	-223.015732	16	620.5	10	0	-103	7909.53
10/12/09 02:53:24	60.015	3692.462	350	-223.015732	16	621	10	0	-103	7909.86
10/12/09 02:53:26	60.015	3693.173	350	-223.015732	16	621.5	10	0	-103	7910.19
10/12/09 02:53:28	60.012	3693.249	350	-223.015732	16	622	10	0	-103	7910.52
10/12/09 02:53:30	60.009	3693.743	350	-223.015732	16	622.5	10	0	-103	7910.85
10/12/09 02:53:32	60.008	3695.124	350	-223.015732	16	623	10	0	-103	7911.18
10/12/09 02:53:34	60.008	3694.681	350	-223.015732	16	623.5	10	0	-103	7911.51
10/12/09 02:53:36	60.005	3694.741	350	-223.015732	16	624	10	0	-103	7911.84
10/12/09 02:53:38	60.005	3694.199	350	-223.015732	16	624.5	10	0	-103	7912.17
10/12/09 02:53:40	60.003	3693.75	350	-223.015732	16	625	10	0	-103	7912.5
10/12/09 02:53:42	59.999	3693.624	350	-223.015732	16	625.5	10	0	-103	7912.83
10/12/09 02:53:44	59.997	3692.806	350	-223.015732	16	626	10	0	-103	7913.16
10/12/09 02:53:46	59.999	3691.15	350	-223.015732	16	626.5	10	0	-103	7913.49
10/12/09 02:53:48	60	3691.407	350	-223.015732	16	627	10	0	-103	7913.82

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.005	0.005	
1	1	1	0.003	0.003	
1	1	1	0.007	0.007	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.006	0.006	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.008	0.008	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:53:50	59.998	3691.077	350	-223.015732	16	627.5	10	0	-103	7914.15
10/12/09 02:53:52	59.995	3690.588	350	-223.015732	16	628	10	0	-103	7914.48
10/12/09 02:53:54	59.994	3689.797	350	-223.015732	16	628.5	10	0	-103	7914.81
10/12/09 02:53:56	59.992	3688.483	350	-223.015732	16	629	10	0	-103	7915.14
10/12/09 02:53:58	59.993	3689.445	350	-223.015732	16	629.5	10	0	-103	7915.47
10/12/09 02:54:00	59.988	3689.553	350	-223.015732	16	630	10	0	-103	7915.8
10/12/09 02:54:02	59.985	3689.525	350	-223.015732	16	630.5	10	0	-103	7916.13
10/12/09 02:54:04	59.986	3689.736	350	-223.015732	16	631	10	0	-103	7916.46
10/12/09 02:54:06	59.988	3688.853	350	-223.015732	16	631.5	10	0	-103	7916.79
10/12/09 02:54:08	59.988	3688.24	350	-223.015732	16	632	10	0	-103	7917.12
10/12/09 02:54:10	59.985	3687.494	350	-223.015732	16	632.5	10	0	-103	7917.45
10/12/09 02:54:12	59.983	3687.475	350	-223.015732	16	633	10	0	-103	7917.78
10/12/09 02:54:14	59.983	3686.707	350	-223.015732	16	633.5	10	0	-103	7918.11
10/12/09 02:54:16	59.985	3685.66	350	-223.015732	16	634	10	0	-103	7918.44
10/12/09 02:54:18	59.986	3684.51	350	-223.015732	16	634.5	10	0	-103	7918.77
10/12/09 02:54:20	59.987	3684.333	350	-223.015732	16	635	10	0	-103	7919.1
10/12/09 02:54:22	59.99	3683.911	350	-223.015732	16	635.5	10	0	-103	7919.43
10/12/09 02:54:24	59.986	3683.735	350	-223.015732	16	636	10	0	-103	7919.76
10/12/09 02:54:26	59.985	3684.208	350	-223.015732	16	636.5	10	0	-103	7920.09
10/12/09 02:54:28	59.984	3683.811	350	-223.015732	16	637	10	0	-103	7920.42
10/12/09 02:54:30	59.983	3683.473	350	-223.015732	16	637.5	10	0	-103	7920.75
10/12/09 02:54:32	59.982	3684.258	350	-223.015732	16	638	10	0	-103	7921.08
10/12/09 02:54:34	59.982	3684.884	350	-223.015732	16	638.5	10	0	-103	7921.41
10/12/09 02:54:36	59.98	3685.092	350	-223.015732	16	639	10	0	-103	7921.74
10/12/09 02:54:38	59.978	3685.654	350	-223.015732	16	639.5	10	0	-103	7922.07
10/12/09 02:54:40	59.977	3685.087	350	-223.015732	16	640	10	0	-103	7922.4
10/12/09 02:54:42	59.975	3685.491	350	-223.015732	16	640.5	10	0	-103	7922.73
10/12/09 02:54:44	59.973	3685.196	350	-223.015732	16	641	10	0	-103	7923.06
10/12/09 02:54:46	59.975	3687.412	350	-223.015732	16	641.5	10	0	-103	7923.39
10/12/09 02:54:48	59.976	3688.417	350	-223.015732	16	642	10	0	-103	7923.72
10/12/09 02:54:50	59.976	3688.599	350	-223.015732	16	642.5	10	0	-103	7924.05
10/12/09 02:54:52	59.979	3687.848	350	-223.015732	16	643	10	0	-103	7924.38
10/12/09 02:54:54	59.982	3686.678	350	-223.015732	16	643.5	10	0	-103	7924.71
10/12/09 02:54:56	59.979	3685.782	350	-223.015732	16	644	10	0	-103	7925.04
10/12/09 02:54:58	59.979	3684.89	350	-223.015732	16	644.5	10	0	-103	7925.37
10/12/09 02:55:00	59.977	3685.143	350	-223.015732	16	645	10	0	-103	7925.7
10/12/09 02:55:02	59.977	3684.549	350	-223.015732	16	645.5	10	0	-103	7926.03
10/12/09 02:55:04	59.978	3684.093	350	-223.015732	16	646	10	0	-103	7926.36
10/12/09 02:55:06	59.978	3684.555	350	-223.015732	16	646.5	10	0	-103	7926.69

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:55:08	59.978	3682.814	350	-223.015732	16	647	10	0	-103	7927.02
10/12/09 02:55:10	59.979	3682.318	350	-223.015732	16	647.5	10	0	-103	7927.35
10/12/09 02:55:12	59.983	3682.366	350	-223.015732	16	648	10	0	-103	7927.68
10/12/09 02:55:14	59.981	3682.647	350	-223.015732	16	648.5	10	0	-103	7928.01
10/12/09 02:55:16	59.98	3682.855	350	-223.015732	16	649	10	0	-103	7928.34
10/12/09 02:55:18	59.978	3683.557	350	-223.015732	16	649.5	10	0	-103	7928.67
10/12/09 02:55:20	59.979	3684.052	350	-223.015732	16	650	10	0	-103	7929
10/12/09 02:55:22	59.978	3684.318	350	-223.015732	16	650.5	10	0	-103	7929.33
10/12/09 02:55:24	59.979	3686.049	350	-223.015732	16	651	10	0	-103	7929.66
10/12/09 02:55:26	59.983	3686.629	350	-223.015732	16	651.5	10	0	-103	7929.99
10/12/09 02:55:28	59.987	3685.286	350	-223.015732	16	652	10	0	-103	7930.32
10/12/09 02:55:30	59.99	3683.415	350	-223.015732	16	652.5	10	0	-103	7930.65
10/12/09 02:55:32	59.992	3682.416	350	-223.015732	16	653	10	0	-103	7930.98
10/12/09 02:55:34	59.993	3681.403	350	-223.015732	16	653.5	10	0	-103	7931.31
10/12/09 02:55:36	59.99	3679.012	350	-223.015732	16	654	10	0	-103	7931.64
10/12/09 02:55:38	59.988	3679.436	350	-223.015732	16	654.5	10	0	-103	7931.97
10/12/09 02:55:40	59.988	3671.761	350	-223.015732	16	655	10	0	-103	7932.3
10/12/09 02:55:42	59.99	3670.717	350	-223.015732	16	655.5	10	0	-103	7932.63
10/12/09 02:55:44	59.993	3670.159	350	-223.015732	16	656	10	0	-103	7932.96
10/12/09 02:55:46	59.994	3679	350	-223.015732	16	656.5	10	0	-103	7933.29
10/12/09 02:55:48	59.993	3680.176	350	-223.015732	16	657	10	0	-103	7933.62
10/12/09 02:55:50	59.994	3681.799	350	-223.015732	16	657.5	10	0	-103	7933.95
10/12/09 02:55:52	59.994	3682.7	350	-223.015732	16	658	10	0	-103	7934.28
10/12/09 02:55:54	59.993	3684.116	350	-223.015732	16	658.5	10	0	-103	7934.61
10/12/09 02:55:56	59.989	3685.03	350	-223.015732	16	659	10	0	-103	7934.94
10/12/09 02:55:58	59.984	3684.878	350	-223.015732	16	659.5	10	0	-103	7935.27
10/12/09 02:56:00	59.986	3684.165	350	-223.015732	16	660	10	0	-103	7935.6
10/12/09 02:56:02	59.985	3684.478	350	-223.015732	16	660.5	10	0	-103	7935.93
10/12/09 02:56:04	59.988	3685.584	350	-223.015732	16	661	10	0	-103	7936.26
10/12/09 02:56:06	59.987	3685.148	350	-223.015732	16	661.5	10	0	-103	7936.59
10/12/09 02:56:08	59.986	3684.587	350	-223.015732	16	662	10	0	-103	7936.92
10/12/09 02:56:10	59.987	3684.976	350	-223.015732	16	662.5	10	0	-103	7937.25
10/12/09 02:56:12	59.985	3683.674	350	-223.015732	16	663	10	0	-103	7937.58
10/12/09 02:56:14	59.982	3684.872	350	-223.015732	16	663.5	10	0	-103	7937.91
10/12/09 02:56:16	59.981	3684.245	350	-223.015732	16	664	10	0	-103	7938.24
10/12/09 02:56:18	59.982	3684.711	350	-223.015732	16	664.5	10	0	-103	7938.57
10/12/09 02:56:20	59.987	3685.589	350	-223.015732	16	665	10	0	-103	7938.9
10/12/09 02:56:22	59.992	3683.736	350	-223.015732	16	665.5	10	0	-103	7939.23
10/12/09 02:56:24	59.997	3682.579	350	-223.015732	16	666	10	0	-103	7939.56

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	-0.005	0.005	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.005	0.005	
1	0	1	0.005	0.005	
1	0	1	0.005	0.005	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:56:26	60	3682.234	350	-223.015732	16	666.5	10	0	-103	7939.89
10/12/09 02:56:28	60.003	3682.138	350	-223.015732	16	667	10	0	-103	7940.22
10/12/09 02:56:30	60.003	3682.224	350	-223.015732	16	667.5	10	0	-103	7940.55
10/12/09 02:56:32	60.003	3681.689	350	-223.015732	16	668	10	0	-103	7940.88
10/12/09 02:56:34	60.002	3681.458	350	-223.015732	16	668.5	10	0	-103	7941.21
10/12/09 02:56:36	60.003	3681.65	350	-223.015732	16	669	10	0	-103	7941.54
10/12/09 02:56:38	60.002	3681.013	350	-223.015732	16	669.5	10	0	-103	7941.87
10/12/09 02:56:40	60.003	3680.167	350	-223.015732	16	670	10	0	-103	7942.2
10/12/09 02:56:42	60.004	3679.943	350	-223.015732	16	670.5	10	0	-103	7942.53
10/12/09 02:56:44	60.005	3679.429	350	-223.015732	16	671	10	0	-103	7942.86
10/12/09 02:56:46	60.006	3679.669	350	-223.015732	16	671.5	10	0	-103	7943.19
10/12/09 02:56:48	60.009	3678.981	350	-223.015732	16	672	10	0	-103	7943.52
10/12/09 02:56:50	60.012	3678.267	350	-223.015732	16	672.5	10	0	-103	7943.85
10/12/09 02:56:52	60.017	3676.796	350	-223.015732	16	673	10	0	-103	7944.18
10/12/09 02:56:54	60.021	3676.81	350	-223.015732	16	673.5	10	0	-103	7944.51
10/12/09 02:56:56	60.022	3674.798	350	-223.015732	16	674	10	0	-103	7944.84
10/12/09 02:56:58	60.021	3673.906	350	-223.015732	16	674.5	10	0	-103	7945.17
10/12/09 02:57:00	60.02	3671.145	350	-223.015732	16	675	10	0	-103	7945.5
10/12/09 02:57:02	60.018	3670.51	350	-223.015732	16	675.5	10	0	-103	7945.83
10/12/09 02:57:04	60.021	3673.648	350	-223.015732	16	676	10	0	-103	7946.16
10/12/09 02:57:06	60.02	3673.684	350	-223.015732	16	676.5	10	0	-103	7946.49
10/12/09 02:57:08	60.02	3675.865	350	-223.015732	16	677	10	0	-103	7946.82
10/12/09 02:57:10	60.018	3676.676	350	-223.015732	16	677.5	10	0	-103	7947.15
10/12/09 02:57:12	60.018	3676.404	350	-223.015732	16	678	10	0	-103	7947.48
10/12/09 02:57:14	60.019	3676.437	350	-223.015732	16	678.5	10	0	-103	7947.81
10/12/09 02:57:16	60.019	3677.185	350	-223.015732	16	679	10	0	-103	7948.14
10/12/09 02:57:18	60.018	3677.659	350	-223.015732	16	679.5	10	0	-103	7948.47
10/12/09 02:57:20	60.017	3678.828	350	-223.015732	16	680	10	0	-103	7948.8
10/12/09 02:57:22	60.016	3679.289	350	-223.015732	16	680.5	10	0	-103	7949.13
10/12/09 02:57:24	60.016	3678.915	350	-223.015732	16	681	10	0	-103	7949.46
10/12/09 02:57:26	60.016	3679.276	350	-223.015732	16	681.5	10	0	-103	7949.79
10/12/09 02:57:28	60.015	3678.599	350	-223.015732	16	682	10	0	-103	7950.12
10/12/09 02:57:30	60.014	3678.367	350	-223.015732	16	682.5	10	0	-103	7950.45
10/12/09 02:57:32	60.014	3678.25	350	-223.015732	16	683	10	0	-103	7950.78
10/12/09 02:57:34	60.013	3678.589	350	-223.015732	16	683.5	10	0	-103	7951.11
10/12/09 02:57:36	60.013	3677.251	350	-223.015732	16	684	10	0	-103	7951.44
10/12/09 02:57:38	60.015	3675.698	350	-223.015732	16	684.5	10	0	-103	7951.77
10/12/09 02:57:40	60.017	3674.669	350	-223.015732	16	685	10	0	-103	7952.1
10/12/09 02:57:42	60.016	3674.87	350	-223.015732	16	685.5	10	0	-103	7952.43

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.005	0.005	
1	1	1	0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:57:44	60.019	3674.402	350	-223.015732	16	686	10	0	-103	7952.76
10/12/09 02:57:46	60.021	3674.546	350	-223.015732	16	686.5	10	0	-103	7953.09
10/12/09 02:57:48	60.021	3672.969	350	-223.015732	16	687	10	0	-103	7953.42
10/12/09 02:57:50	60.02	3671.914	350	-223.015732	16	687.5	10	0	-103	7953.75
10/12/09 02:57:52	60.022	3671.982	350	-223.015732	16	688	10	0	-103	7954.08
10/12/09 02:57:54	60.024	3670.946	350	-223.015732	16	688.5	10	0	-103	7954.41
10/12/09 02:57:56	60.026	3670.821	350	-223.015732	16	689	10	0	-103	7954.74
10/12/09 02:57:58	60.025	3671.06	350	-223.015732	16	689.5	10	0	-103	7955.07
10/12/09 02:58:00	60.026	3671.539	350	-223.015732	16	690	10	0	-103	7955.4
10/12/09 02:58:02	60.022	3673.794	350	-223.015732	16	690.5	10	0	-103	7955.73
10/12/09 02:58:04	60.021	3674.01	350	-223.015732	16	691	10	0	-103	7956.06
10/12/09 02:58:06	60.022	3675.102	350	-223.015732	16	691.5	10	0	-103	7956.39
10/12/09 02:58:08	60.024	3675.284	350	-223.015732	16	692	10	0	-103	7956.72
10/12/09 02:58:10	60.027	3676.051	350	-223.015732	16	692.5	10	0	-103	7957.05
10/12/09 02:58:12	60.029	3675.704	350	-223.015732	16	693	10	0	-103	7957.38
10/12/09 02:58:14	60.028	3672.583	350	-223.015732	16	693.5	10	0	-103	7957.71
10/12/09 02:58:16	60.028	3671.343	350	-223.015732	16	694	10	0	-103	7958.04
10/12/09 02:58:18	60.032	3670.232	350	-223.015732	16	694.5	10	0	-103	7958.37
10/12/09 02:58:20	60.035	3668.654	350	-223.015732	16	695	10	0	-103	7958.7
10/12/09 02:58:22	60.03	3668.767	350	-223.015732	16	695.5	10	0	-103	7959.03
10/12/09 02:58:24	60.028	3666.312	350	-223.015732	16	696	10	0	-103	7959.36
10/12/09 02:58:26	60.021	3667.322	350	-223.015732	16	696.5	10	0	-103	7959.69
10/12/09 02:58:28	60.021	3657.164	350	-223.015732	16	697	10	0	-103	7960.02
10/12/09 02:58:30	60.024	3657.714	350	-223.015732	16	697.5	10	0	-103	7960.35
10/12/09 02:58:32	60.025	3668.637	350	-223.015732	16	698	10	0	-103	7960.68
10/12/09 02:58:34	60.024	3669.309	350	-223.015732	16	698.5	10	0	-103	7961.01
10/12/09 02:58:36	60.022	3670.112	350	-223.015732	16	699	10	0	-103	7961.34
10/12/09 02:58:38	60.023	3670.735	350	-223.015732	16	699.5	10	0	-103	7961.67
10/12/09 02:58:40	60.021	3671.332	350	-223.015732	16	700	10	0	-103	7962
10/12/09 02:58:42	60.02	3672.095	350	-223.015732	16	700.5	10	0	-103	7962.33
10/12/09 02:58:44	60.02	3672.683	350	-223.015732	16	701	10	0	-103	7962.66
10/12/09 02:58:46	60.02	3673.833	350	-223.015732	16	701.5	10	0	-103	7962.99
10/12/09 02:58:48	60.02	3674.645	350	-223.015732	16	702	10	0	-103	7963.32
10/12/09 02:58:50	60.017	3675.641	350	-223.015732	16	702.5	10	0	-103	7963.65
10/12/09 02:58:52	60.014	3675.971	350	-223.015732	16	703	10	0	-103	7963.98
10/12/09 02:58:54	60.012	3677.009	350	-223.015732	16	703.5	10	0	-103	7964.31
10/12/09 02:58:56	60.01	3678.314	350	-223.015732	16	704	10	0	-103	7964.64
10/12/09 02:58:58	60.011	3679.393	350	-223.015732	16	704.5	10	0	-103	7964.97
10/12/09 02:59:00	60.01	3680.02	350	-223.015732	16	705	10	0	-103	7965.3

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	-0.005	0.005	
1	1	1	-0.002	0.002	
1	1	1	-0.007	0.007	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 02:59:02	60.01	3679.792	350	-223.015732	16	705.5	10	0	-103	7965.63
10/12/09 02:59:04	60.01	3679.597	350	-223.015732	16	706	10	0	-103	7965.96
10/12/09 02:59:06	60.012	3680.315	350	-223.015732	16	706.5	10	0	-103	7966.29
10/12/09 02:59:08	60.012	3680.11	350	-223.015732	16	707	10	0	-103	7966.62
10/12/09 02:59:10	60.013	3679.062	350	-223.015732	16	707.5	10	0	-103	7966.95
10/12/09 02:59:12	60.014	3679.127	350	-223.015732	16	708	10	0	-103	7967.28
10/12/09 02:59:14	60.013	3679.587	350	-223.015732	16	708.5	10	0	-103	7967.61
10/12/09 02:59:16	60.012	3679.637	350	-223.015732	16	709	10	0	-103	7967.94
10/12/09 02:59:18	60.011	3679.02	350	-223.015732	16	709.5	10	0	-103	7968.27
10/12/09 02:59:20	60.01	3678.418	350	-223.015732	16	710	10	0	-103	7968.6
10/12/09 02:59:22	60.008	3679.383	350	-223.015732	16	710.5	10	0	-103	7968.93
10/12/09 02:59:24	60.01	3679.681	350	-223.015732	16	711	10	0	-103	7969.26
10/12/09 02:59:26	60.011	3679.932	350	-223.015732	16	711.5	10	0	-103	7969.59
10/12/09 02:59:28	60.013	3679.138	350	-223.015732	16	712	10	0	-103	7969.92
10/12/09 02:59:30	60.016	3678.469	350	-223.015732	16	712.5	10	0	-103	7970.25
10/12/09 02:59:32	60.018	3678.499	350	-223.015732	16	713	10	0	-103	7970.58
10/12/09 02:59:34	60.019	3678.456	350	-223.015732	16	713.5	10	0	-103	7970.91
10/12/09 02:59:36	60.019	3677.615	350	-223.015732	16	714	10	0	-103	7971.24
10/12/09 02:59:38	60.019	3677.446	350	-223.015732	16	714.5	10	0	-103	7971.57
10/12/09 02:59:40	60.02	3677.431	350	-223.015732	16	715	10	0	-103	7971.9
10/12/09 02:59:42	60.02	3677.451	350	-223.015732	16	715.5	10	0	-103	7972.23
10/12/09 02:59:44	60.018	3677.315	350	-223.015732	16	716	10	0	-103	7972.56
10/12/09 02:59:46	60.018	3678.151	350	-223.015732	16	716.5	10	0	-103	7972.89
10/12/09 02:59:48	60.016	3678.362	350	-223.015732	16	717	10	0	-103	7973.22
10/12/09 02:59:50	60.016	3678.874	350	-223.015732	16	717.5	10	0	-103	7973.55
10/12/09 02:59:52	60.019	3680.771	350	-223.015732	16	718	10	0	-103	7973.88
10/12/09 02:59:54	60.023	3681.058	350	-223.015732	16	718.5	10	0	-103	7974.21
10/12/09 02:59:56	60.022	3680.353	350	-223.015732	16	719	10	0	-103	7974.54
10/12/09 02:59:58	60.018	3679.167	350	-223.015732	16	719.5	10	0	-103	7974.87
10/12/09 03:00:00	60.015	3679.553	350	-223.015732	16	720	10	0	-103	7975.2
10/12/09 03:00:02	60.016	3680.672	350	-223.015732	16	720.5	10	0	-103	7975.53
10/12/09 03:00:04	60.017	3682.73	350	-223.015732	16	721	10	0	-103	7975.86
10/12/09 03:00:06	60.015	3682.714	350	-223.015732	16	721.5	10	0	-103	7976.19
10/12/09 03:00:08	60.01	3681.915	350	-223.015732	16	722	10	0	-103	7976.52
10/12/09 03:00:10	60.004	3682.01	350	-223.015732	16	722.5	10	0	-103	7976.85
10/12/09 03:00:12	59.999	3682.483	350	-223.015732	16	723	10	0	-103	7977.18
10/12/09 03:00:14	59.995	3683.813	350	-223.015732	16	723.5	10	0	-103	7977.51
10/12/09 03:00:16	59.99	3685.306	350	-223.015732	16	724	10	0	-103	7977.84
10/12/09 03:00:18	59.982	3684.846	350	-223.015732	16	724.5	10	0	-103	7978.17

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	-0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.005	0.005	
1	1	1	-0.006	0.006	
1	0	1	-0.005	0.005	
1	0	1	-0.004	0.004	
1	0	1	-0.005	0.005	
1	0	1	-0.008	0.008	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:00:20	59.974	3684.643	350	-223.015732	16	725	10	0	-103	7978.5
10/12/09 03:00:22	59.97	3687.527	350	-223.015732	16	725.5	10	0	-103	7978.83
10/12/09 03:00:24	59.97	3689.404	350	-223.015732	16	726	10	0	-103	7979.16
10/12/09 03:00:26	59.968	3692.287	350	-223.015732	16	726.5	10	0	-103	7979.49
10/12/09 03:00:28	59.968	3692.966	350	-223.015732	16	727	10	0	-103	7979.82
10/12/09 03:00:30	59.968	3693.793	350	-223.015732	16	727.5	10	0	-103	7980.15
10/12/09 03:00:32	59.972	3694.397	350	-223.015732	16	728	10	0	-103	7980.48
10/12/09 03:00:34	59.967	3694.974	350	-223.015732	16	728.5	10	0	-103	7980.81
10/12/09 03:00:36	59.966	3697.407	350	-223.015732	16	729	10	0	-103	7981.14
10/12/09 03:00:38	59.964	3698.502	350	-223.015732	16	729.5	10	0	-103	7981.47
10/12/09 03:00:40	59.965	3698.617	350	-223.015732	16	730	10	0	-103	7981.8
10/12/09 03:00:42	59.966	3698.992	350	-223.015732	16	730.5	10	0	-103	7982.13
10/12/09 03:00:44	59.963	3699.85	350	-223.015732	16	731	10	0	-103	7982.46
10/12/09 03:00:46	59.963	3702.645	350	-223.015732	16	731.5	10	0	-103	7982.79
10/12/09 03:00:48	59.965	3701.989	350	-223.015732	16	732	10	0	-103	7983.12
10/12/09 03:00:50	59.968	3702.218	350	-223.015732	16	732.5	10	0	-103	7983.45
10/12/09 03:00:52	59.97	3704.023	350	-223.015732	16	733	10	0	-103	7983.78
10/12/09 03:00:54	59.97	3703.365	350	-223.015732	16	733.5	10	0	-103	7984.11
10/12/09 03:00:56	59.97	3702.988	350	-223.015732	16	734	10	0	-103	7984.44
10/12/09 03:00:58	59.973	3703.814	350	-223.015732	16	734.5	10	0	-103	7984.77
10/12/09 03:01:00	59.972	3704.899	350	-223.015732	16	735	10	0	-103	7985.1
10/12/09 03:01:02	59.976	3705.625	350	-223.015732	16	735.5	10	0	-103	7985.43
10/12/09 03:01:04	59.975	3704.293	350	-223.015732	16	736	10	0	-103	7985.76
10/12/09 03:01:06	59.975	3702.094	350	-223.015732	16	736.5	10	0	-103	7986.09
10/12/09 03:01:08	59.977	3701.944	350	-223.015732	16	737	10	0	-103	7986.42
10/12/09 03:01:10	59.976	3703.142	350	-223.015732	16	737.5	10	0	-103	7986.75
10/12/09 03:01:12	59.976	3704.669	350	-223.015732	16	738	10	0	-103	7987.08
10/12/09 03:01:14	59.974	3705.376	350	-223.015732	16	738.5	10	0	-103	7987.41
10/12/09 03:01:16	59.975	3705.662	350	-223.015732	16	739	10	0	-103	7987.74
10/12/09 03:01:18	59.974	3705.855	350	-223.015732	16	739.5	10	0	-103	7988.07
10/12/09 03:01:20	59.974	3706.776	350	-223.015732	16	740	10	0	-103	7988.4
10/12/09 03:01:22	59.976	3707.514	350	-223.015732	16	740.5	10	0	-103	7988.73
10/12/09 03:01:24	59.977	3706.928	350	-223.015732	16	741	10	0	-103	7989.06
10/12/09 03:01:26	59.979	3706.446	350	-223.015732	16	741.5	10	0	-103	7989.39
10/12/09 03:01:28	59.981	3706.335	350	-223.015732	16	742	10	0	-103	7989.72
10/12/09 03:01:30	59.983	3706.771	350	-223.015732	16	742.5	10	0	-103	7990.05
10/12/09 03:01:32	59.985	3705.943	350	-223.015732	16	743	10	0	-103	7990.38
10/12/09 03:01:34	59.983	3704.127	350	-223.015732	16	743.5	10	0	-103	7990.71
10/12/09 03:01:36	59.98	3704.777	350	-223.015732	16	744	10	0	-103	7991.04

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.008	0.008	
1	0	1	-0.004	0.004	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.004	0.004	
1	0	1	-0.005	0.005	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:01:38	59.979	3705.974	350	-223.015732	16	744.5	10	0	-103	7991.37
10/12/09 03:01:40	59.983	3705.968	350	-223.015732	16	745	10	0	-103	7991.7
10/12/09 03:01:42	59.987	3705.356	350	-223.015732	16	745.5	10	0	-103	7992.03
10/12/09 03:01:44	59.986	3704.683	350	-223.015732	16	746	10	0	-103	7992.36
10/12/09 03:01:46	59.984	3703.913	350	-223.015732	16	746.5	10	0	-103	7992.69
10/12/09 03:01:48	59.98	3704.361	350	-223.015732	16	747	10	0	-103	7993.02
10/12/09 03:01:50	59.982	3704.988	350	-223.015732	16	747.5	10	0	-103	7993.35
10/12/09 03:01:52	59.984	3705.05	350	-223.015732	16	748	10	0	-103	7993.68
10/12/09 03:01:54	59.985	3704.893	350	-223.015732	16	748.5	10	0	-103	7994.01
10/12/09 03:01:56	59.987	3703.741	350	-223.015732	16	749	10	0	-103	7994.34
10/12/09 03:01:58	59.989	3701.831	350	-223.015732	16	749.5	10	0	-103	7994.67
10/12/09 03:02:00	59.992	3701.795	350	-223.015732	16	750	10	0	-103	7995
10/12/09 03:02:02	59.996	3700.07	350	-223.015732	16	750.5	10	0	-103	7995.33
10/12/09 03:02:04	59.999	3701.308	350	-223.015732	16	751	10	0	-103	7995.66
10/12/09 03:02:06	59.997	3700.429	350	-223.015732	16	751.5	10	0	-103	7995.99
10/12/09 03:02:08	59.997	3700.913	350	-223.015732	16	752	10	0	-103	7996.32
10/12/09 03:02:10	59.997	3700.541	350	-223.015732	16	752.5	10	0	-103	7996.65
10/12/09 03:02:12	59.997	3699.927	350	-223.015732	16	753	10	0	-103	7996.98
10/12/09 03:02:14	59.996	3700.858	350	-223.015732	16	753.5	10	0	-103	7997.31
10/12/09 03:02:16	59.997	3700.549	350	-223.015732	16	754	10	0	-103	7997.64
10/12/09 03:02:18	59.996	3700.614	350	-223.015732	16	754.5	10	0	-103	7997.97
10/12/09 03:02:20	59.998	3700.224	350	-223.015732	16	755	10	0	-103	7998.3
10/12/09 03:02:22	60.003	3699.5	350	-223.015732	16	755.5	10	0	-103	7998.63
10/12/09 03:02:24	60.009	3698.032	350	-223.015732	16	756	10	0	-103	7998.96
10/12/09 03:02:26	60.01	3697.96	350	-223.015732	16	756.5	10	0	-103	7999.29
10/12/09 03:02:28	60.008	3699.409	350	-223.015732	16	757	10	0	-103	7999.62
10/12/09 03:02:30	60.005	3699.241	350	-223.015732	16	757.5	10	0	-103	7999.95
10/12/09 03:02:32	60.004	3700.738	350	-223.015732	16	758	10	0	-103	8000.28
10/12/09 03:02:34	60.006	3701.11	350	-223.015732	16	758.5	10	0	-103	8000.61
10/12/09 03:02:36	60.003	3701.238	350	-223.015732	16	759	10	0	-103	8000.94
10/12/09 03:02:38	60.001	3699.998	350	-223.015732	16	759.5	10	0	-103	8001.27
10/12/09 03:02:40	60.002	3700.22	350	-223.015732	16	760	10	0	-103	8001.6
10/12/09 03:02:42	60.004	3701.823	350	-223.015732	16	760.5	10	0	-103	8001.93
10/12/09 03:02:44	60.007	3702.554	350	-223.015732	16	761	10	0	-103	8002.26
10/12/09 03:02:46	60.007	3702.276	350	-223.015732	16	761.5	10	0	-103	8002.59
10/12/09 03:02:48	60.008	3701.026	350	-223.015732	16	762	10	0	-103	8002.92
10/12/09 03:02:50	60.008	3701.923	350	-223.015732	16	762.5	10	0	-103	8003.25
10/12/09 03:02:52	60.006	3702.943	350	-223.015732	16	763	10	0	-103	8003.58
10/12/09 03:02:54	60.006	3704.093	350	-223.015732	16	763.5	10	0	-103	8003.91

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.002	0.002	
1	1	1	0.005	0.005	
1	1	1	0.006	0.006	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:02:56	60.006	3703.96	350	-223.015732	16	764	10	0	-103	8004.24
10/12/09 03:02:58	60.005	3703.819	350	-223.015732	16	764.5	10	0	-103	8004.57
10/12/09 03:03:00	60	3704.455	350	-223.015732	16	765	10	0	-103	8004.9
10/12/09 03:03:02	59.999	3704.346	350	-223.015732	16	765.5	10	0	-103	8005.23
10/12/09 03:03:04	60	3705.329	350	-223.015732	16	766	10	0	-103	8005.56
10/12/09 03:03:06	60	3704.93	350	-223.015732	16	766.5	10	0	-103	8005.89
10/12/09 03:03:08	60.004	3704.405	350	-223.015732	16	767	10	0	-103	8006.22
10/12/09 03:03:10	60.008	3703.675	350	-223.015732	16	767.5	10	0	-103	8006.55
10/12/09 03:03:12	60.013	3702.748	350	-223.015732	16	768	10	0	-103	8006.88
10/12/09 03:03:14	60.015	3702.669	350	-223.015732	16	768.5	10	0	-103	8007.21
10/12/09 03:03:16	60.015	3703.017	350	-223.015732	16	769	10	0	-103	8007.54
10/12/09 03:03:18	60.012	3703.416	350	-223.015732	16	769.5	10	0	-103	8007.87
10/12/09 03:03:20	60.009	3703.297	350	-223.015732	16	770	10	0	-103	8008.2
10/12/09 03:03:22	60.005	3705.189	350	-223.015732	16	770.5	10	0	-103	8008.53
10/12/09 03:03:24	60.008	3705.279	350	-223.015732	16	771	10	0	-103	8008.86
10/12/09 03:03:26	60.011	3704.646	350	-223.015732	16	771.5	10	0	-103	8009.19
10/12/09 03:03:28	60.011	3704.051	350	-223.015732	16	772	10	0	-103	8009.52
10/12/09 03:03:30	60.013	3703.438	350	-223.015732	16	772.5	10	0	-103	8009.85
10/12/09 03:03:32	60.016	3704.255	350	-223.015732	16	773	10	0	-103	8010.18
10/12/09 03:03:34	60.018	3703.708	350	-223.015732	16	773.5	10	0	-103	8010.51
10/12/09 03:03:36	60.018	3703.83	350	-223.015732	16	774	10	0	-103	8010.84
10/12/09 03:03:38	60.019	3704.524	350	-223.015732	16	774.5	10	0	-103	8011.17
10/12/09 03:03:40	60.018	3704.139	350	-223.015732	16	775	10	0	-103	8011.5
10/12/09 03:03:42	60.013	3704.27	350	-223.015732	16	775.5	10	0	-103	8011.83
10/12/09 03:03:44	60.011	3705.429	350	-223.015732	16	776	10	0	-103	8012.16
10/12/09 03:03:46	60.009	3705.942	350	-223.015732	16	776.5	10	0	-103	8012.49
10/12/09 03:03:48	60.009	3705.54	350	-223.015732	16	777	10	0	-103	8012.82
10/12/09 03:03:50	60.008	3705.634	350	-223.015732	16	777.5	10	0	-103	8013.15
10/12/09 03:03:52	60.009	3705.749	350	-223.015732	16	778	10	0	-103	8013.48
10/12/09 03:03:54	60.011	3707.267	350	-223.015732	16	778.5	10	0	-103	8013.81
10/12/09 03:03:56	60.015	3706.945	350	-223.015732	16	779	10	0	-103	8014.14
10/12/09 03:03:58	60.02	3706.63	350	-223.015732	16	779.5	10	0	-103	8014.47
10/12/09 03:04:00	60.021	3705.655	350	-223.015732	16	780	10	0	-103	8014.8
10/12/09 03:04:02	60.018	3703.895	350	-223.015732	16	780.5	10	0	-103	8015.13
10/12/09 03:04:04	60.017	3704.224	350	-223.015732	16	781	10	0	-103	8015.46
10/12/09 03:04:06	60.019	3703.887	350	-223.015732	16	781.5	10	0	-103	8015.79
10/12/09 03:04:08	60.019	3704.648	350	-223.015732	16	782	10	0	-103	8016.12
10/12/09 03:04:10	60.021	3704.795	350	-223.015732	16	782.5	10	0	-103	8016.45
10/12/09 03:04:12	60.022	3704.167	350	-223.015732	16	783	10	0	-103	8016.78

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	0	1	-0.005	0.005	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	1	1	0.004	0.004	
1	1	1	0.004	0.004	
1	1	1	0.005	0.005	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.005	0.005	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.005	0.005	
1	1	1	0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:04:14	60.025	3702.764	350	-223.015732	16	783.5	10	0	-103	8017.11
10/12/09 03:04:16	60.027	3702.008	350	-223.015732	16	784	10	0	-103	8017.44
10/12/09 03:04:18	60.03	3700.36	350	-223.015732	16	784.5	10	0	-103	8017.77
10/12/09 03:04:20	60.027	3701.063	350	-223.015732	16	785	10	0	-103	8018.1
10/12/09 03:04:22	60.023	3700.34	350	-223.015732	16	785.5	10	0	-103	8018.43
10/12/09 03:04:24	60.021	3699.369	350	-223.015732	16	786	10	0	-103	8018.76
10/12/09 03:04:26	60.023	3701.568	350	-223.015732	16	786.5	10	0	-103	8019.09
10/12/09 03:04:28	60.023	3702.959	350	-223.015732	16	787	10	0	-103	8019.42
10/12/09 03:04:30	60.02	3704.25	350	-223.015732	16	787.5	10	0	-103	8019.75
10/12/09 03:04:32	60.024	3703.621	350	-223.015732	16	788	10	0	-103	8020.08
10/12/09 03:04:34	60.024	3703.374	350	-223.015732	16	788.5	10	0	-103	8020.41
10/12/09 03:04:36	60.022	3703.036	350	-223.015732	16	789	10	0	-103	8020.74
10/12/09 03:04:38	60.022	3703.931	350	-223.015732	16	789.5	10	0	-103	8021.07
10/12/09 03:04:40	60.024	3704.947	350	-223.015732	16	790	10	0	-103	8021.4
10/12/09 03:04:42	60.025	3704.208	350	-223.015732	16	790.5	10	0	-103	8021.73
10/12/09 03:04:44	60.023	3703.541	350	-223.015732	16	791	10	0	-103	8022.06
10/12/09 03:04:46	60.024	3703.16	350	-223.015732	16	791.5	10	0	-103	8022.39
10/12/09 03:04:48	60.02	3703.397	350	-223.015732	16	792	10	0	-103	8022.72
10/12/09 03:04:50	60.018	3704.376	350	-223.015732	16	792.5	10	0	-103	8023.05
10/12/09 03:04:52	60.013	3705.441	350	-223.015732	16	793	10	0	-103	8023.38
10/12/09 03:04:54	60.008	3706.995	350	-223.015732	16	793.5	10	0	-103	8023.71
10/12/09 03:04:56	60.012	3710.072	350	-223.015732	16	794	10	0	-103	8024.04
10/12/09 03:04:58	60.017	3707.971	350	-223.015732	16	794.5	10	0	-103	8024.37
10/12/09 03:05:00	60.019	3707.767	350	-223.015732	16	795	10	0	-103	8024.7
10/12/09 03:05:02	60.019	3707.609	350	-223.015732	16	795.5	10	0	-103	8025.03
10/12/09 03:05:04	60.015	3708.831	350	-223.015732	16	796	10	0	-103	8025.36
10/12/09 03:05:06	60.016	3709.465	350	-223.015732	16	796.5	10	0	-103	8025.69
10/12/09 03:05:08	60.015	3709.813	350	-223.015732	16	797	10	0	-103	8026.02
10/12/09 03:05:10	60.016	3709.817	350	-223.015732	16	797.5	10	0	-103	8026.35
10/12/09 03:05:12	60.014	3709.99	350	-223.015732	16	798	10	0	-103	8026.68
10/12/09 03:05:14	60.016	3709.094	350	-223.015732	16	798.5	10	0	-103	8027.01
10/12/09 03:05:16	60.018	3709.642	350	-223.015732	16	799	10	0	-103	8027.34
10/12/09 03:05:18	60.019	3709.812	350	-223.015732	16	799.5	10	0	-103	8027.67
10/12/09 03:05:20	60.016	3709.933	350	-223.015732	16	800	10	0	-103	8028
10/12/09 03:05:22	60.014	3710.677	350	-223.015732	16	800.5	10	0	-103	8028.33
10/12/09 03:05:24	60.014	3710.591	350	-223.015732	16	801	10	0	-103	8028.66
10/12/09 03:05:26	60.018	3709.354	350	-223.015732	16	801.5	10	0	-103	8028.99
10/12/09 03:05:28	60.022	3707.696	350	-223.015732	16	802	10	0	-103	8029.32
10/12/09 03:05:30	60.023	3707.38	350	-223.015732	16	802.5	10	0	-103	8029.65

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.004	0.004	
1	1	1	-0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.002	0.002	
1	1	1	-0.005	0.005	
1	1	1	-0.005	0.005	
1	1	1	0.004	0.004	
1	1	1	0.005	0.005	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.004	0.004	
1	1	1	0.004	0.004	
1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 03:05:32	60.024	3707.12	350	-223.015732	16	803	10	0	-103	8029.98	1	1	1	0.001	0.001	
10/12/09 03:05:34	60.026	3706.99	350	-223.015732	16	803.5	10	0	-103	8030.31	1	1	1	0.002	0.002	
10/12/09 03:05:36	60.026	3705.848	350	-223.015732	16	804	10	0	-103	8030.64	1	1	1	0.000	0.000	
10/12/09 03:05:38	60.024	3704.185	350	-223.015732	16	804.5	10	0	-103	8030.97	1	1	1	-0.002	0.002	
10/12/09 03:05:40	60.022	3704.406	350	-223.015732	16	805	10	0	-103	8031.3	1	1	1	-0.002	0.002	
10/12/09 03:05:42	60.02	3704.963	350	-223.015732	16	805.5	10	0	-103	8031.63	1	1	1	-0.002	0.002	
10/12/09 03:05:44	60.019	3706.567	350	-223.015732	16	806	10	0	-103	8031.96	1	1	1	-0.001	0.001	
10/12/09 03:05:46	60.022	3705.516	350	-223.015732	16	806.5	10	0	-103	8032.29	1	1	1	0.003	0.003	
10/12/09 03:05:48	60.025	3704.869	350	-223.015732	16	807	10	0	-103	8032.62	1	1	1	0.003	0.003	
10/12/09 03:05:50	60.028	3704.428	350	-223.015732	16	807.5	10	0	-103	8032.95	1	1	1	0.003	0.003	
10/12/09 03:05:52	60.03	3704.773	350	-223.015732	16	808	10	0	-103	8033.28	1	1	1	0.002	0.002	
10/12/09 03:05:54	60.031	3703.532	350	-223.015732	16	808.5	10	0	-103	8033.61	1	1	1	0.001	0.001	
10/12/09 03:05:56	60.029	3702.686	350	-223.015732	16	809	10	0	-103	8033.94	1	1	1	-0.002	0.002	
10/12/09 03:05:58	60.026	3702.093	350	-223.015732	16	809.5	10	0	-103	8034.27	1	1	1	-0.003	0.003	
10/12/09 03:06:00	60.026	3703.169	350	-223.015732	16	810	10	0	-103	8034.6	1	1	1	0.000	0.000	
10/12/09 03:06:02	60.029	3703.676	350	-223.015732	16	810.5	10	0	-103	8034.93	1	1	1	0.003	0.003	
10/12/09 03:06:04	60.03	3701.52	350	-223.015732	16	811	10	0	-103	8035.26	1	1	1	0.001	0.001	
10/12/09 03:06:06	60.033	3700.106	350	-223.015732	16	811.5	10	0	-103	8035.59	1	1	1	0.003	0.003	
10/12/09 03:06:08	60.03	3698.222	350	-223.015732	16	812	10	0	-103	8035.92	1	1	1	-0.003	0.003	
10/12/09 03:06:10	60.022	3698.009	350	-223.015732	16	812.5	10	0	-103	8036.25	1	1	1	-0.008	0.008	
10/12/09 03:06:12	60.016	3700.28	350	-223.015732	16	813	10	0	-103	8036.58	1	1	1	-0.006	0.006	
10/12/09 03:06:14	60.019	3703.192	350	-223.015732	16	813.5	10	0	-103	8036.91	1	1	1	0.003	0.003	
10/12/09 03:06:16	60.03	3703.815	350	-223.015732	16	814	10	0	-103	8037.24	1	1	1	0.011	0.011	
10/12/09 03:06:18	60.028	3701.863	350	-223.015732	16	814.5	10	0	-103	8037.57	1	1	1	-0.002	0.002	
10/12/09 03:06:20	60.021	3699.956	350	-223.015732	16	815	10	0	-103	8037.9	1	1	1	-0.007	0.007	
10/12/09 03:06:22	60.015	3700.816	350	-223.015732	16	815.5	10	0	-103	8038.23	1	1	1	-0.006	0.006	
10/12/09 03:06:24	60.015	3703.802	350	-223.015732	16	816	10	0	-103	8038.56	1	1	1	0.000	0.000	
10/12/09 03:06:26	60.012	3706.943	350	-223.015732	16	816.5	10	0	-103	8038.89	1	1	1	-0.003	0.003	
10/12/09 03:06:28	60.011	3708.527	350	-223.015732	16	817	10	0	-103	8039.22	1	1	1	-0.001	0.001	
10/12/09 03:06:30	60.014	3707.49	350	-223.015732	16	817.5	10	0	-103	8039.55	1	1	1	0.003	0.003	
10/12/09 03:06:32	60.013	3707.647	350	-223.015732	16	818	10	0	-103	8039.88	1	1	1	-0.001	0.001	
10/12/09 03:06:34	60.014	3706.991	350	-223.015732	16	818.5	10	0	-103	8040.21	1	1	1	0.001	0.001	
10/12/09 03:06:36	60.016	3707.495	350	-223.015732	16	819	10	0	-103	8040.54	1	1	1	0.002	0.002	
10/12/09 03:06:38	60.016	3705.584	350	-223.015732	16	819.5	10	0	-103	8040.87	1	1	1	0.000	0.000	
10/12/09 03:06:40	60.015	3705.398	350	-223.015732	16	820	10	0	-103	8041.2	1	1	1	-0.001	0.001	
10/12/09 03:06:42	60.013	3707.12	350	-223.015732	16	820.5	10	0	-103	8041.53	1	1	1	-0.002	0.002	
10/12/09 03:06:44	60.007	3709.144	350	-223.015732	16	821	10	0	-103	8041.86	1	1	1	-0.006	0.006	
10/12/09 03:06:46	59.997	3708.99	350	-223.015732	16	821.5	10	0	-103	8042.19	1	0	1	-0.010	0.010	
10/12/09 03:06:48	59.994	3708.291	350	-223.015732	16	822	10	0	-103	8042.52	1	0	1	-0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:06:50	59.993	3706.193	350	-223.015732	16	822.5	10	0	-103	8042.85
10/12/09 03:06:52	59.99	3707.304	350	-223.015732	16	823	10	0	-103	8043.18
10/12/09 03:06:54	59.993	3707.903	350	-223.015732	16	823.5	10	0	-103	8043.51
10/12/09 03:06:56	59.994	3706.76	350	-223.015732	16	824	10	0	-103	8043.84
10/12/09 03:06:58	59.993	3706.921	350	-223.015732	16	824.5	10	0	-103	8044.17
10/12/09 03:07:00	59.994	3706.683	350	-223.015732	16	825	10	0	-103	8044.5
10/12/09 03:07:02	59.993	3706.888	350	-223.015732	16	825.5	10	0	-103	8044.83
10/12/09 03:07:04	59.996	3704.934	350	-223.015732	16	826	10	0	-103	8045.16
10/12/09 03:07:06	59.988	3705.678	350	-223.015732	16	826.5	10	0	-103	8045.49
10/12/09 03:07:08	59.985	3706.481	350	-223.015732	16	827	10	0	-103	8045.82
10/12/09 03:07:10	59.983	3707.071	350	-223.015732	16	827.5	10	0	-103	8046.15
10/12/09 03:07:12	59.982	3706.696	350	-223.015732	16	828	10	0	-103	8046.48
10/12/09 03:07:14	59.98	3707.479	350	-223.015732	16	828.5	10	0	-103	8046.81
10/12/09 03:07:16	59.977	3708.246	350	-223.015732	16	829	10	0	-103	8047.14
10/12/09 03:07:18	59.981	3709.436	350	-223.015732	16	829.5	10	0	-103	8047.47
10/12/09 03:07:20	59.982	3710.419	350	-223.015732	16	830	10	0	-103	8047.8
10/12/09 03:07:22	59.978	3710.134	350	-223.015732	16	830.5	10	0	-103	8048.13
10/12/09 03:07:24	59.98	3708.708	350	-223.015732	16	831	10	0	-103	8048.46
10/12/09 03:07:26	59.98	3710.024	350	-223.015732	16	831.5	10	0	-103	8048.79
10/12/09 03:07:28	59.977	3709.192	350	-223.015732	16	832	10	0	-103	8049.12
10/12/09 03:07:30	59.98	3708.335	350	-223.015732	16	832.5	10	0	-103	8049.45
10/12/09 03:07:32	59.983	3709.399	350	-223.015732	16	833	10	0	-103	8049.78
10/12/09 03:07:34	59.984	3707.911	350	-223.015732	16	833.5	10	0	-103	8050.11
10/12/09 03:07:36	59.981	3709.004	350	-223.015732	16	834	10	0	-103	8050.44
10/12/09 03:07:38	59.981	3707.638	350	-223.015732	16	834.5	10	0	-103	8050.77
10/12/09 03:07:40	59.98	3709.689	350	-223.015732	16	835	10	0	-103	8051.1
10/12/09 03:07:42	59.981	3708.945	350	-223.015732	16	835.5	10	0	-103	8051.43
10/12/09 03:07:44	59.981	3706.541	350	-223.015732	16	836	10	0	-103	8051.76
10/12/09 03:07:46	59.981	3711.256	350	-223.015732	16	836.5	10	0	-103	8052.09
10/12/09 03:07:48	59.98	3711.362	350	-223.015732	16	837	10	0	-103	8052.42
10/12/09 03:07:50	59.978	3712.303	350	-223.015732	16	837.5	10	0	-103	8052.75
10/12/09 03:07:52	59.978	3712.012	350	-223.015732	16	838	10	0	-103	8053.08
10/12/09 03:07:54	59.979	3711.703	350	-223.015732	16	838.5	10	0	-103	8053.41
10/12/09 03:07:56	59.978	3712.093	350	-223.015732	16	839	10	0	-103	8053.74
10/12/09 03:07:58	59.976	3713.992	350	-223.015732	16				-103	8054.07
10/12/09 03:08:00	59.976	3714.612	350	-223.015732	16				-103	8054.4
10/12/09 03:08:02	59.975	3715.083	350	-223.015732	16				-103	8054.73
10/12/09 03:08:04	59.976	3715.323	350	-223.015732	16				-103	8055.06
10/12/09 03:08:06	59.975	3714.794	350	-223.015732	16				-103	8055.39

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	-0.008	0.008	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	0.004	0.004	
1	0	1	0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:08:08	59.979	3714.717	350	-223.015732	16				-103	8055.72
10/12/09 03:08:10	59.978	3715.161	350	-223.015732	16				-103	8056.05
10/12/09 03:08:12	59.975	3715.001	350	-223.015732	16				-103	8056.38
10/12/09 03:08:14	59.976	3713.996	350	-223.015732	16				-103	8056.71
10/12/09 03:08:16	59.981	3714.063	350	-223.015732	16				-103	8057.04
10/12/09 03:08:18	59.977	3714.335	350	-223.015732	16				-103	8057.37
10/12/09 03:08:20	59.975	3715.631	350	-223.015732	16				-103	8057.7
10/12/09 03:08:22	59.976	3715.688	350	-223.015732	16				-103	8058.03
10/12/09 03:08:24	59.979	3715.567	350	-223.015732	16				-103	8058.36
10/12/09 03:08:26	59.98	3715.725	350	-223.015732	16				-103	8058.69
10/12/09 03:08:28	59.979	3714.848	350	-223.015732	16				-103	8059.02
10/12/09 03:08:30	59.978	3713.142	350	-223.015732	16				-103	8059.35
10/12/09 03:08:32	59.979	3713.358	350	-223.015732	16				-103	8059.68
10/12/09 03:08:34	59.982	3712.275	350	-223.015732	16				-103	8060.01
10/12/09 03:08:36	59.983	3712.619	350	-223.015732	16				-103	8060.34
10/12/09 03:08:38	59.987	3712.153	350	-223.015732	16				-103	8060.67
10/12/09 03:08:40	59.988	3710.05	350	-223.015732	16				-103	8061
10/12/09 03:08:42	59.984	3709.082	350	-223.015732	16				-103	8061.33
10/12/09 03:08:44	59.98	3710.472	350	-223.015732	16				-103	8061.66
10/12/09 03:08:46	59.979	3710.624	350	-223.015732	16				-103	8061.99
10/12/09 03:08:48	59.98	3710.946	350	-223.015732	16				-103	8062.32
10/12/09 03:08:50	59.979	3710.2	350	-223.015732	16				-103	8062.65
10/12/09 03:08:52	59.978	3710.475	350	-223.015732	16				-103	8062.98
10/12/09 03:08:54	59.975	3709.462	350	-223.015732	16				-103	8063.31
10/12/09 03:08:56	59.979	3710.803	350	-223.015732	16				-103	8063.64
10/12/09 03:08:58	59.982	3709.286	350	-223.015732	16				-103	8063.97
10/12/09 03:09:00	59.983	3710.573	350	-223.015732	16				-103	8064.3
10/12/09 03:09:02	59.983	3709.525	350	-223.015732	16				-103	8064.63
10/12/09 03:09:04	59.985	3708.371	350	-223.015732	16				-103	8064.96
10/12/09 03:09:06	59.99	3708.527	350	-223.015732	16				-103	8065.29
10/12/09 03:09:08	59.987	3706.512	350	-223.015732	16				-103	8065.62
10/12/09 03:09:10	59.984	3707.49	350	-223.015732	16				-103	8065.95
10/12/09 03:09:12	59.976	3708.962	350	-223.015732	16				-103	8066.28
10/12/09 03:09:14	59.979	3709.894	350	-223.015732	16				-103	8066.61
10/12/09 03:09:16	59.985	3712.303	350	-223.015732	16				-103	8066.94
10/12/09 03:09:18	59.983	3711.35	350	-223.015732	16				-103	8067.27
10/12/09 03:09:20	59.979	3711.627	350	-223.015732	16				-103	8067.6
10/12/09 03:09:22	59.981	3712.076	350	-223.015732	16				-103	8067.93
10/12/09 03:09:24	59.978	3712.393	350	-223.015732	16				-103	8068.26

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.005	0.005	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.008	0.008	
1	0	1	0.003	0.003	
1	0	1	0.006	0.006	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	0.002	0.002	
1	0	1	-0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:09:26	59.975	3712.999	350	-223.015732	16				-103	8068.59
10/12/09 03:09:28	59.978	3713.51	350	-223.015732	16				-103	8068.92
10/12/09 03:09:30	59.989	3716.626	350	-223.015732	16				-103	8069.25
10/12/09 03:09:32	59.999	3715.443	350	-223.015732	16				-103	8069.58
10/12/09 03:09:34	59.994	3712.092	350	-223.015732	16				-103	8069.91
10/12/09 03:09:36	59.989	3713.906	350	-223.015732	16				-103	8070.24
10/12/09 03:09:38	59.986	3714.894	350	-223.015732	16				-103	8070.57
10/12/09 03:09:40	59.984	3714.953	350	-223.015732	16				-103	8070.9
10/12/09 03:09:42	59.983	3716.122	350	-223.015732	16				-103	8071.23
10/12/09 03:09:44	59.982	3716.308	350	-223.015732	16				-103	8071.56
10/12/09 03:09:46	59.98	3715.438	350	-223.015732	16				-103	8071.89
10/12/09 03:09:48	59.99	3714.764	350	-223.015732	16				-103	8072.22
10/12/09 03:09:50	59.995	3714.714	350	-223.015732	16				-103	8072.55
10/12/09 03:09:52	59.995	3715.068	350	-223.015732	16				-103	8072.88
10/12/09 03:09:54	59.99	3715.927	350	-223.015732	16				-103	8073.21
10/12/09 03:09:56	59.989	3715.791	350	-223.015732	16				-103	8073.54
10/12/09 03:09:58	59.991	3716.285	350	-223.015732	16				-103	8073.87
10/12/09 03:10:00	59.996	3715.324	350	-223.015732	16				-103	8074.2
10/12/09 03:10:02	60	3714.46	350	-223.015732	16				-103	8074.53
10/12/09 03:10:04	60.002	3711.708	350	-223.015732	16				-103	8074.86
10/12/09 03:10:06	60.004	3712.698	350	-223.015732	16				-103	8075.19
10/12/09 03:10:08	60.004	3712.851	350	-223.015732	16				-103	8075.52
10/12/09 03:10:10	60.002	3713.362	350	-223.015732	16				-103	8075.85
10/12/09 03:10:12	59.999	3716.641	350	-223.015732	16				-103	8076.18
10/12/09 03:10:14	59.998	3718.292	350	-223.015732	16				-103	8076.51
10/12/09 03:10:16	59.995	3719.079	350	-223.015732	16				-103	8076.84
10/12/09 03:10:18	59.996	3718.233	350	-223.015732	16				-103	8077.17
10/12/09 03:10:20	60.001	3717.815	350	-223.015732	16				-103	8077.5
10/12/09 03:10:22	60.002	3717.889	350	-223.015732	16				-103	8077.83
10/12/09 03:10:24	60.001	3718.56	350	-223.015732	16				-103	8078.16
10/12/09 03:10:26	60.003	3718.195	350	-223.015732	16				-103	8078.49
10/12/09 03:10:28	60.005	3719.021	350	-223.015732	16				-103	8078.82
10/12/09 03:10:30	60.004	3718.821	350	-223.015732	16				-103	8079.15
10/12/09 03:10:32	60.004	3719.897	350	-223.015732	16				-103	8079.48
10/12/09 03:10:34	60.004	3719.299	350	-223.015732	16				-103	8079.81
10/12/09 03:10:36	60.006	3719.643	350	-223.015732	16				-103	8080.14
10/12/09 03:10:38	60.003	3719.527	350	-223.015732	16				-103	8080.47
10/12/09 03:10:40	60.005	3719.731	350	-223.015732	16				-103	8080.8
10/12/09 03:10:42	60.006	3720.279	350	-223.015732	16				-103	8081.13

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.011	0.011	
1	0	1	0.010	0.010	
1	0	1	-0.005	0.005	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.010	0.010	
1	0	1	0.005	0.005	
1	0	1	0.000	0.000	
1	0	1	-0.005	0.005	
1	0	1	-0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	0.001	0.001	
1	1	1	0.005	0.005	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:10:44	60.009	3718.58	350	-223.015732	16				-103	8081.46
10/12/09 03:10:46	60.009	3718.976	350	-223.015732	16				-103	8081.79
10/12/09 03:10:48	60.01	3718.982	350	-223.015732	16				-103	8082.12
10/12/09 03:10:50	60.009	3720.034	350	-223.015732	16				-103	8082.45
10/12/09 03:10:52	60.013	3720.609	350	-223.015732	16				-103	8082.78
10/12/09 03:10:54	60.015	3720.811	350	-223.015732	16				-103	8083.11
10/12/09 03:10:56	60.014	3721.239	350	-223.015732	16				-103	8083.44
10/12/09 03:10:58	60.009	3720.38	350	-223.015732	16				-103	8083.77
10/12/09 03:11:00	60.009	3719.447	350	-223.015732	16				-103	8084.1
10/12/09 03:11:02	60.008	3720.807	350	-223.015732	16				-103	8084.43
10/12/09 03:11:04	60.011	3721.272	350	-223.015732	16				-103	8084.76
10/12/09 03:11:06	60.01	3720.592	350	-223.015732	16				-103	8085.09
10/12/09 03:11:08	60.009	3721.245	350	-223.015732	16				-103	8085.42
10/12/09 03:11:10	60.013	3721.594	350	-223.015732	16				-103	8085.75
10/12/09 03:11:12	60.013	3722.176	350	-223.015732	16				-103	8086.08
10/12/09 03:11:14	60.014	3721.999	350	-223.015732	16				-103	8086.41
10/12/09 03:11:16	60.014	3721.646	350	-223.015732	16				-103	8086.74
10/12/09 03:11:18	60.012	3721.678	350	-223.015732	16				-103	8087.07
10/12/09 03:11:20	60.01	3720.86	350	-223.015732	16				-103	8087.4
10/12/09 03:11:22	60.011	3721.645	350	-223.015732	16				-103	8087.73
10/12/09 03:11:24	60.007	3723.816	350	-223.015732	16				-103	8088.06
10/12/09 03:11:26	60.003	3725.07	350	-223.015732	16				-103	8088.39
10/12/09 03:11:28	60.001	3724.656	350	-223.015732	16				-103	8088.72
10/12/09 03:11:30	60	3724.869	350	-223.015732	16				-103	8089.05
10/12/09 03:11:32	59.998	3724.661	350	-223.015732	16				-103	8089.38
10/12/09 03:11:34	59.998	3723.696	350	-223.015732	16				-103	8089.71
10/12/09 03:11:36	59.999	3723.58	350	-223.015732	16				-103	8090.04
10/12/09 03:11:38	60.002	3723.405	350	-223.015732	16				-103	8090.37
10/12/09 03:11:40	60.003	3721.879	350	-223.015732	16				-103	8090.7
10/12/09 03:11:42	60.003	3722.401	350	-223.015732	16				-103	8091.03
10/12/09 03:11:44	59.999	3722.906	350	-223.015732	16				-103	8091.36
10/12/09 03:11:46	59.998	3724.142	350	-223.015732	16				-103	8091.69
10/12/09 03:11:48	60.001	3723.65	350	-223.015732	16				-103	8092.02
10/12/09 03:11:50	59.995	3723.201	350	-223.015732	16				-103	8092.35
10/12/09 03:11:52	59.989	3723.639	350	-223.015732	16				-103	8092.68
10/12/09 03:11:54	59.987	3723.881	350	-223.015732	16				-103	8093.01
10/12/09 03:11:56	59.988	3724.654	350	-223.015732	16				-103	8093.34
10/12/09 03:11:58	59.988	3725.361	350	-223.015732	16				-103	8093.67
10/12/09 03:12:00	59.99	3724.944	350	-223.015732	16				-103	8094

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.005	0.005	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.004	0.004	
1	1	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	1	1	0.003	0.003	
1	0	1	-0.006	0.006	
1	0	1	-0.006	0.006	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:12:02	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:04	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:06	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:08	60.0005	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:10	59.998	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:12	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:14	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:16	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:18	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:20	59.995	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:22	59.994	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:24	59.993	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:26	59.992	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:28	59.991	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:30	59.99	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:32	59.991	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:34	59.992	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:36	59.993	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:38	59.994	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:40	59.995	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:42	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:44	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:46	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:48	59.9965	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:50	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:52	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:54	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:56	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:12:58	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:00	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:02	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:04	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:06	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:08	60.004	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:10	60.007	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:12	60.009	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:14	60.011	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:16	60.0085	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:18	60.006	3724.944	350	-223.015732	16				-103	8094

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	0.009	0.009	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:13:20	60.007	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:22	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:24	60.01	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:26	60.012	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:28	60.012	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:30	60.012	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:32	60.01	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:34	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:36	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:38	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:40	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:42	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:44	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:46	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:48	60.007	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:50	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:52	60.005	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:54	60.004	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:56	60.004	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:13:58	60.004	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:00	60.0025	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:02	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:04	59.9995	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:06	59.998	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:08	59.9965	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:10	59.995	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:12	59.995	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:14	59.995	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:16	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:18	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:20	59.995	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:22	59.993	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:24	59.9925	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:26	59.992	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:28	59.9905	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:30	59.989	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:32	59.99	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:34	59.991	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:36	59.989	3724.944	350	-223.015732	16				-103	8094

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:14:38	59.987	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:40	59.9875	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:42	59.988	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:44	59.988	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:46	59.988	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:48	59.987	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:50	59.986	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:52	59.9855	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:54	59.985	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:56	59.9845	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:14:58	59.984	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:00	59.984	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:02	59.984	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:04	59.985	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:06	59.986	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:08	59.987	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:10	59.988	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:12	59.992	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:14	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:16	59.9975	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:18	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:20	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:22	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:24	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:26	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:28	60.0055	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:30	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:32	60.01	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:34	60.012	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:36	60.0105	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:38	60.009	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:40	60.01	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:42	60.011	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:44	60.012	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:46	60.013	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:48	60.013	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:50	60.013	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:52	60.0145	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:54	60.016	3724.944	350	-223.015732	16				-103	8094

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:15:56	60.0155	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:58	60.015	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:15:59	60.014	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:01	60.013	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:03	60.012	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:05	60.011	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:07	60.0105	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:09	60.01	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:11	60.008	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:13	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:15	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:17	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:19	60.0045	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:21	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:23	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:25	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:27	60.0035	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:29	60.004	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:31	60.0025	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:33	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:35	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:37	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:39	59.9965	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:41	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:43	59.9965	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:45	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:47	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:49	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:51	59.998	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:53	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:55	59.9985	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:57	59.998	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:59	59.9985	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:01	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:03	59.998	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:05	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:07	59.9985	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:09	60	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:11	60.001	3724.944	350	-223.015732	16				-103	8094

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:17:13	60.002	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:15	60.0015	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:17	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:19	60.0035	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:21	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:23	60.0055	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:25	60.005	3724.944	350	-223.015732	16				-103	8094

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26	t(0)			
473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
307	05:34	Event Length mm:ss			
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Balancing Authority Name: MyBA

MyBA_091012_0227_FRS_Form2.9.xlsm

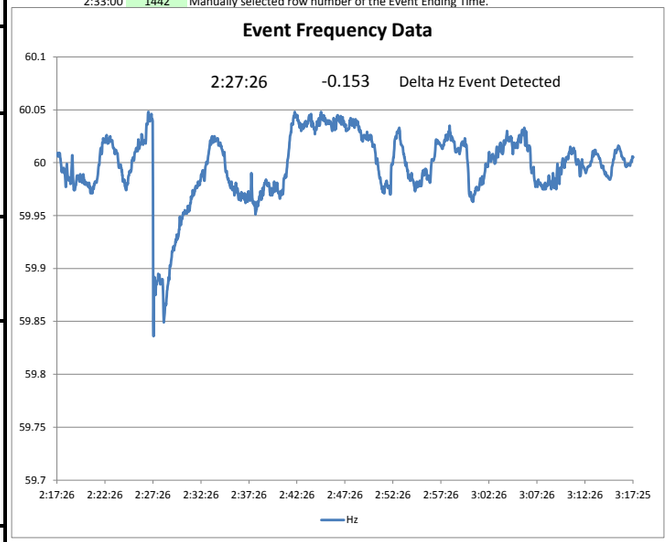
Interconnection Prevailing UFLS First Step Relay trip point 59.500 Hz

Interconnection High Relay trip point 60.500 Hz

Note: See "Instruction" tab for more detailed instructions.

	Auto	**Event Detection**	Auto
2:27:26	1245	Manually selected row number of the Event Starting Time.	Manual
2:33:00	1442	Manually selected row number of the Event Ending Time.	

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



09/10/12 Date yymmdd

2:27 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_091012_0227_FRS_Form2.9.xlsm

Date:	Monday, October 12, 2009		
Time of T(0)	2:27:26		
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:00		
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.042	Hz	
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.889	Hz	
Pre to Post Perturbation Delta Frequency Actual	-0.153	Hz	
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.73	MW	
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	3788.35	MW	
Pre to Post Perturbation Interchange Delta MW Actual	157.63	MW	
Initial Performance Ramp Magnitude Adjustment	-15.40	MW	
EPFR Pre-Perturbation Average	-43.39	MW	
EPFR Post-Perturbation Average	114.21	MW	
EPFR Delta	157.60	MW	

Balancing Authority	MyBA	
Grid Nominal Frequency	60.000	Hz
Droop Setting	5.00%	3.00000 Hz
Deadband Setting	0.000	Hz
Hz Span	3.00000	Hz
TC (frequency response filter constant)	0.350	Time Constant for delayed delivery of PFR during Sustained Measure

A Point	2:27:24	
FPointA	60.03900146	2:27:24
A Value	60.04212523	
C Value	59.83599854	
Delta FC		

EPFR = Expected Primary Frequency Response — EPFR(Final) 142.20 MW

MW Response in right direction for frequency delta — Yes

Low Hz	Delta Hz Event
3764.66	Actual Interchange MW Average during frequency recovery period
3804.23	Target Interchange MW Average during frequency recovery period
3719.84	Interchange Average Ramp MW during frequency recovery period
3640.68	Actual MW @ T(-4)
103.04	Starting and Ending Difference in Interchange MW during frequency recovery period (indicates ramp direction during recovery period)
0:05:34	Event Duration (h:mm:ss)
No	Target MW Average minus MW @ T(-4) less than zero
163.55	Interchange Target Relative Average Change - MW (Low Frequency Event)
123.97	Interchange Actual Relative Average Change - MW (Low Frequency Event)
No	Interchange Actual Average minus MW @ T(-4) less than zero
Yes	Interchange Average MW minus MW @ T(-4) greater than zero
Yes	Interchange Target MW Average minus MW @ T(-4) greater than zero
60.52	Interchange Target Relative Average Change - MW (High Frequency Event)
20.94	Interchange Actual Relative Average Change - MW (High Frequency Event)
Up	Ramp Direction during frequency recovery period

Initial Response P.U. Performance 1.109 P.U. — 0.758 P.U. Sustained Response P.U. Performance

T	Frequency Hz	Interchange MW	Value B 20 to 52 sec Average Frequency	Average MW	Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW
[illegible]													

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-"

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

T		Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW
T-72 sec	2:26:14	60.027	3671.19	350.00	157.63	0.00	10.00	15.00	-103.00	7640.91	-27.810
T-70 sec	2:26:16	60.026	3668.61	350.00	155.53	0.00	10.00	15.00	-103.00	7641.24	-26.781
T-68 sec	2:26:18	60.026	3665.23	350.00	155.53	0.00	10.00	15.00	-103.00	7641.57	-26.781
T-66 sec	2:26:20	60.022	3664.50	350.00	155.53	0.00	10.00	15.00	-103.00	7641.90	-22.659
T-64 sec	2:26:22	60.019	3666.06	350.00	155.53	0.00	10.00	15.00	-103.00	7642.23	-19.571
T-62 sec	2:26:24	60.017	3666.82	350.00	155.53	0.00	10.00	15.00	-103.00	7642.56	-17.508
T-60 sec	2:26:26	60.019	3666.79	350.00	160.45	0.00	10.00	15.00	-103.00	7642.89	-19.571
T-58 sec	2:26:28	60.020	3670.45	350.00	160.45	0.00	10.00	15.00	-103.00	7643.22	-20.600
T-56 sec	2:26:30	60.019	3670.27	350.00	160.45	0.00	10.00	15.00	-103.00	7643.55	-19.571
T-54 sec	2:26:32	60.021	3671.67	350.00	160.45	0.00	10.00	15.00	-103.00	7643.88	-21.630
T-52 sec	2:26:34	60.021	3672.49	350.00	160.45	0.00	10.00	15.00	-103.00	7644.21	-21.630
T-50 sec	2:26:36	60.021	3672.69	350.00	163.96	0.00	10.00	15.00	-103.00	7644.54	-21.630
T-48 sec	2:26:38	60.019	3672.86	350.00	163.96	0.00	10.00	15.00	-103.00	7644.87	-19.571
T-46 sec	2:26:40	60.018	3672.16	350.00	163.96	0.00	10.00	15.00	-103.00	7645.20	-18.542
T-44 sec	2:26:42	60.022	3671.41	350.00	163.96	0.00	10.00	15.00	-103.00	7645.53	-22.659
T-42 sec	2:26:44	60.031	3669.98	350.00	163.96	0.00	10.00	15.00	-103.00	7645.86	-31.928
T-40 sec	2:26:46	60.037	3666.47	350.00	166.07	0.00	10.00	15.00	-103.00	7646.19	-38.109
T-38 sec	2:26:48	60.037	3663.76	350.00	166.07	0.00	10.00	15.00	-103.00	7646.52	-38.109
T-36 sec	2:26:50	60.036	3661.60	350.00	166.07	0.00	10.00	15.00	-103.00	7646.85	-37.079
T-34 sec	2:26:52	60.037	3660.67	350.00	166.07	0.00	10.00	15.00	-103.00	7647.18	-38.109
T-32 sec	2:26:54	60.046	3651.49	350.00	166.07	0.00	10.00	15.00	-103.00	7647.51	-47.381
T-30 sec	2:26:56	60.048	3649.19	350.00	163.77	0.00	10.00	15.00	-103.00	7647.84	-49.440
T-28 sec	2:26:58	60.048	3650.03	350.00	163.77	0.00	10.00	15.00	-103.00	7648.17	-49.440
T-26 sec	2:27:00	60.043	3648.25	350.00	163.77	0.00	10.00	15.00	-103.00	7648.50	-44.289
T-24 sec	2:27:02	60.041	3649.51	350.00	163.77	0.00	10.00	15.00	-103.00	7648.83	-42.230
T-22 sec	2:27:04	60.041	3654.29	350.00	163.77	0.00	10.00	15.00	-103.00	7649.16	-42.230
T-20 sec	2:27:06	60.041	3655.01	350.00	165.10	0.00	10.00	15.00	-103.00	7649.49	-42.230
T-18 sec	2:27:08	60.039	3651.87	350.00	165.10	0.00	10.00	15.00	-103.00	7649.82	-40.172
T-16 sec	2:27:10	60.041	3651.06	350.00	165.10	0.00	10.00	15.00	-103.00	7650.15	-42.230
T-14 sec	2:27:12	60.043	3649.19	350.00	165.10	0.00	10.00	15.00	-103.00	7650.48	-44.289
T-12 sec	2:27:14	60.045	3648.24	350.00	165.10	0.00	10.00	15.00	-103.00	7650.81	-46.348
T-10 sec	2:27:16	60.046	3645.39	350.00	165.48	0.00	10.00	15.00	-103.00	7651.14	-47.381
T-08 sec	2:27:18	60.041	3644.63	350.00	165.48	0.00	10.00	15.00	-103.00	7651.47	-42.230
T-06 sec	2:27:20	60.041	3645.45	350.00	165.48	0.00	10.00	15.00	-103.00	7651.80	-42.230
T-04 sec	2:27:22	60.041	3640.68	350.00	165.48	0.00	10.00	15.00	-103.00	7652.13	-42.230
T-02 sec	2:27:24	60.039	3641.19	350.00	165.48	0.00	10.00	15.00	-103.00	7652.46	-40.172
T+0 sec	2:27:26	59.978	3659.46	350.00	206.46	0.00	10.00	15.00	-103.00	7652.79	22.659
T+02 sec	2:27:28	59.852	3696.36	350.00	206.46	0.00	10.00	0.00	-103.00	7616.00	152.439
T+04 sec	2:27:30	59.836	3734.90	335.00	206.46	0.00	10.00	0.00	-103.00	7626.00	168.922
T+06 sec	2:27:32	59.869	3734.67	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	134.931
T+08 sec	2:27:34	59.869	3734.67	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	134.931
T+10 sec	2:27:36	59.892	3737.16	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	111.242
T+12 sec	2:27:38	59.891	3761.25	335.00	211.26	0.00	10.00	0.00	-103.00	7632.00	112.271
T+14 sec	2:27:40	59.880	3766.11	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	123.599
T+16 sec	2:27:42	59.876	3766.19	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	127.721
T+18 sec	2:27:44	59.875	3768.88	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	128.750
T+20 sec	2:27:46	59.883	3769.93	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	120.511
T+22 sec	2:27:48	59.887	3780.62	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	116.389
T+24 sec	2:27:50	59.886	3781.59	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	117.418
T+26 sec	2:27:52	59.885	3782.50	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	118.452
T+28 sec	2:27:54	59.887	3784.96	335.00	214.35	2.00	10.00	0.00	-103.00	7632.00	116.389
T+30 sec	2:27:56	59.888	3784.73	335.00	214.35	3.00	10.00	0.00	-103.00	7632.00	115.359
T+32 sec	2:27:58	59.890	3784.42	335.00	212.17	4.00	10.00	0.00	-103.00	7632.00	113.301
T+34 sec	2:28:00	59.895	3788.07	335.00	212.17	5.00	10.00	0.00	-103.00	7632.00	108.150
T+36 sec	2:28:02	59.894	3788.33	335.00	212.17	6.00	10.00	0.00	-103.00	7632.00	109.179
T+38 sec	2:28:04	59.893	3788.87	335.00	212.17	7.00	10.00	0.00	-103.00	7632.00	110.208
T+40 sec	2:28:06	59.894	3788.47	335.00	212.17	8.00	10.00	0.00	-103.00	7632.00	109.179
T+42 sec	2:28:08	59.894	3792.28	335.00	215.60	9.00	10.00	0.00	-103.00	7632.00	109.179
T+44 sec	2:28:10	59.891	3793.07	335.00	215.60	10.00	10.00	0.00	-103.00	7632.00	112.271
T+46 sec	2:28:12	59.890	3794.37	335.00	215.60	11.00	10.00	0.00	-103.00	7632.00	113.301
T+48 sec	2:28:14	59.885	3799.43	335.00	215.60	12.00	10.00	0.00	-103.00	7632.00	118.452
T+50 sec	2:28:16	59.885	3800.43	335.00	215.60	13.00	10.00	0.00	-103.00	7632.00	118.452
T+52 sec	2:28:18	59.888	3799.96	335.00	218.33	14.00	10.00	0.00	-103.00	7632.00	115.359
T+54 sec	2:28:20	59.887	3803.63	335.00	218.33	15.00	10.00	0.00	-103.00	7632.00	116.389
T+56 sec	2:28:22	59.888	3802.93	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	115.359
T+58 sec	2:28:24	59.888	3802.95	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	115.359
T+60 sec	2:28:26	59.890	3804.39	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	113.301
T+62 sec	2:28:28	59.889	3805.50	335.00	217.38	16.00	10.00	0.00	-103.00	7632.00	114.330
T+64 sec	2:28:30	59.882	3805.62	335.00	217.38	16.00	10.00	0.00	-103.00	7632.00	121.540
T+66 sec	2:28:32	59.873	3809.24	335.00	217.38	16.00	10.00	0.00	-103.00	7631.00	130.809
T+68 sec	2:28:34	59.857	3811.50	335.00	217.38	16.00	10.00	0.00	-103.00	7625.00	147.292
T+70 sec	2:28:36	59.849	3814.86	335.00	217.38	16.00	10.00	0.00	-103.00	7623.00	155.531
T+72 sec	2:28:38	59.852	3815.89	335.00	214.83	16.00	10.00	0.00	-103.00	7621.00	152.439
T+74 sec	2:28:40	59.858	3825.64	335.00	214.83	16.00	10.00	0.00	-103.00	7623.00	146.258
T+76 sec	2:28:42	59.863	3826.05	335.00	214.83	16.00	10.00	0.00	-103.00	7625.00	141.111
T+78 sec	2:28:44	59.866	3826.00	335.00	214.83	16.00	10.00	0.00	-103.00	7627.00	138.019
T+80 sec	2:28:46	59.865	3827.52	335.00	214.83	16.00	10.00	0.00	-103.00	7628.00	139.048
T+82 sec	2:28:48	59.867	3826.75	335.00	227.66	16.00	10.00	0.00	-103.00	7628.00	136.989
T+84 sec	2:28:50	59.866	3826.78	335.00	227.66	16.00	10.00	0.00	-103.00	7629.00	138.019
T+86 sec	2:28:52	59.871	3826.45	335.00	227.66	16.00	10.00	0.00	-103.00	7630.00	132.872
T+88 sec	2:28:54	59.874	3825.71	335.00	227.66	16.00	10.00	0.00	-103.00	7631.00	129.779
T+90 sec	2:28:56	59.879	3823.83	335.00	227.66	16.00	10.00	0.00	-103.00	7635.00	124.628
T+92 sec	2:28:58	59.880	3822.51	335.00	225.02	16.00	10.00	0.00	-103.00	7638.00	123.599
T+94 sec	2:29:00	59.883	3819.08	335.00	225.02	16.00	10.00	0.00	-103.00	7639.00	120.511
T+96 sec	2:29:02	59.886	3818.06	335.00	225.02	16.00	10.00	0.00	-103.00	7642.00	117.418
T+98 sec	2:29:04	59.890	3816.81	335.00	225.02	16.00	10.00	0.00	-103.00	7644.00	113.301
T+100 sec	2:29:06	59.892	3815.01	335.00	225.02	16.00	10.00	0.00	-103.00	7645.00	111.242
T+102 sec	2:29:08	59.889	3813.78	335.00	228.37	16.00	10.00	0.00	-103.00	7647.00	114.330
T+104 sec	2:29:10	59.893	3811.84	335.00	228.37	16.00	10.00	0.00	-103.00	7648.00	110.208
T+106 sec	2:29:12	59.899	3809.65	335.00	228.37	16.00	10.00	0.00	-103.00	7649.00	104.032
T+108 sec	2:29:14	59.903	3806.97	335.00	228.37	16.00	10.00	0.00	-103.00	7650.00	99.910
T+110 sec	2:29:16	59.902	3805.59	335.00	228.37	16.00	10.00	0.00	-103.00	7651.00	100.940
T+112 sec	2:29:18	59.902	3804.19	335.00	234.08	16.00	10.00	0.00	-103.00	7652.00	100.940
T+114 sec	2:29:20	59.904	3796.08	335.00	234.08	16.00	10.00	0.00	-103.00	7653.00	98.881
T+116 sec	2:29:22	59.907	3793.98	335.00	234.08	16.00	10.00	0.00	-103.00	7654.00	95.788
T+118 sec	2:29:24	59.911	3792.17	335.00	234.08	16.00	10.00	0.00	-103.00	7655.00	91.671
T+120 sec	2:29:26	59.916	3791.50	335.00	234.08	16.00	10.00	0.00	-103.00	7655.00	86.520
T+122 sec	2:29:28	59.916	3789.53	335.00	228.80	16.00	10.00	0.00	-103.00	7656.00	86.520
T+124 sec	2:29:30	59.917	3788.13	335.00	228.80	16.00	10.00	0.00	-103.00	7656.00	85.490
T+126 sec	2:29:32	59.918	3784.56	335.00	228.80	16.00	10.00	0.00	-103.00	7657.00	84.461
T+128 sec	2:29:34	59.920	3783.03	335.00	228.80	16.00	10.00	0.00	-103.00	7657.00	82.402
T+130 sec	2:29:36	59.921	3781.70	335.00	228.80	16.00	10.00	0.00	-103.00	7658.00	81.369
T+132 sec	2:29:38	59.920	3776.36	335.00	229.47	16.00	10.00	0.00	-103.00	7658.00	82.402
T+134 sec	2:29:40	59.917	3775.64	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	85.490
T+136 sec	2:29:42	59.920	3774.60	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	82.402
T+138 sec	2:29:44	59.921	3773.33	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	81.369
T+140 sec	2:29:46	59.923	3773.96	335.00	229.47	16.00	10.00	0.00	-103.00	7660.00	79.310
T+142 sec	2:29:48	59.926	3772.72	335.00	228.98	16.00	10.00	0.00	-103.00	7660.00	76.221
T+144 sec	2:29:50	59.925	3771.67	335.00	228.98	16.00	10.00	0.00	-103.00	7661.00	77.251
T+146 sec	2:29:52	59.928	3769.63	335.00	228.98	16.00	10.00	0.00	-103.00	7661.00	74.159
T+148 sec	2:29:54	59.927	3768.71	335.00	228.98	16.00	10.00	0.00	-103.00	7662.00	75.192
T+150 sec	2:29:56	59.932	3767.64	335.00	228.98	16.00	10.00	0.00	-103.00	7662.00	70.041

Date:	Monday, October 12, 2009	
Time of T(0)	2:27:26	
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:00	
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.042	Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.889	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.153	Hz
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.73	MW
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	3803.35	MW
Pre to Post Perturbation Interchange Delta MW Actual	157.63	MW
EPFR Pre-Perturbation Average	-43.39	MW
EPFR Post-Perturbation Average	114.21	MW
EPFR Unadjusted	157.60	MW
EPFR Adjusted	198.04	MW
Pre JOU Dynamic Schedules MW	350.00	MW
Pre Non-Conforming Load MW	165.34	MW
Pre Pumped Hydro MW	0.00	MW
Pre Transferred Frequency Response MW	-4.21	MW
Pre Contingent BA Lost Generation MW	15.00	MW
Sum of Pre Perturbation Adjustments	526.12	MW
Post JOU Dynamic Schedules MW	335.00	MW
Post Non-Conforming Load MW	214.13	MW
Post Pumped Hydro MW	6.35	MW
Post Transferred Frequency Response MW	11.09	MW
Post Contingent BA Lost Generation MW	0.00	MW
Sum of Post Perturbation Adjustments	566.57	MW
Net Total Adjustments MW	40.45	MW

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-103.00	MW/0.1 Hz
Post-Perturbation Bias Setting	-103.00	MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	-43.39	MW
EPFR for Bias Setting Post-Perturbation Average	114.21	MW
EPFR for Bias Setting Delta	157.60	MW
Primary Frequency Response Delivery % of Bias	100.02%	
Pre-Perturbation BA Load	7651.3	MW
Post-Perturbation BA Load	7632.0	MW
Pre to Post Perturbation BA Load Change	-19.305	MW
Load Dampening Frequency Response	-12.617	MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	12.25%	
Average Bias Setting when Hz is greater than +/-0.036 Hz	-103.00	MW/0.1 Hz

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

			Actual Primary Freq Response MW	Un-adjusted P.U. Performance	JOU Dynamic Schedules Adjustment	Non-Conforming Load Adjustment	Pumped Hydro Adjustment	Transferred Frequency Response Adjustment	Contingent BA Lost Generation Adjustment	Adjusted P.U. Performance
Frequency @ T(+46)	59.890	Hz								
Frequency @ T(+76)	59.863	Hz								
Frequency @ T(+106)	59.899	Hz								
Frequency @ T(+136)	59.920	Hz								
Frequency @ T(+166)	59.937	Hz								
EPFR @ T(+46)	113.30	MW	158.51	1.399	-15.00	50.26	11.00	15.21	-15.00	0.856
EPFR @ T(+76)	141.11	MW	182.41	1.293	-15.00	49.49	16.00	17.91	-15.00	0.808
EPFR @ T(+106)	104.03	MW	164.54	1.582	-15.00	63.03	16.00	14.31	-15.00	0.829
EPFR @ T(+136)	82.40	MW	129.49	1.571	-15.00	64.13	16.00	12.21	-15.00	0.633
EPFR @ T(+166)	64.89	MW	119.99	1.849	-15.00	63.75	16.00	10.51	-15.00	0.689

20 to 52 second Average Period Evaluation

Initial P.U. Performance for FRO 1.000 P.U.

Initial P.U. Performance Adjusted for FRO 0.744 P.U.

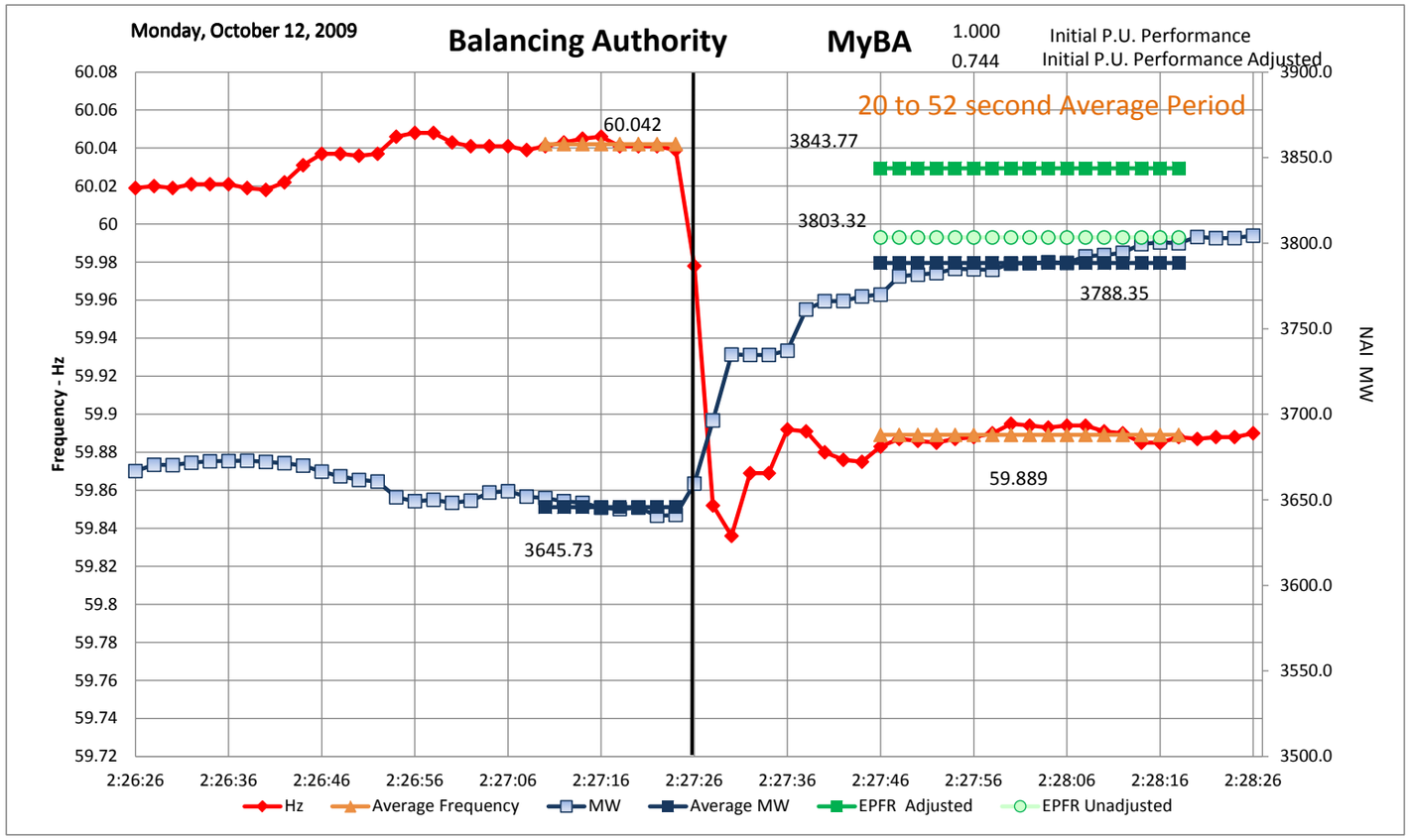
T		Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected Net Actual Interchange MW	Actual Primary Freq Response MW	Actual Primary Freq Response Beta MW/0.1 Hz		
T-72 sec	2:26:14														0.0270	
T-70 sec	2:26:16														0.0260	
T-68 sec	2:26:18														0.0260	
T-66 sec	2:26:20														0.0220	
T-64 sec	2:26:22														0.0190	
T-62 sec	2:26:24														0.0170	
T-60 sec	2:26:26														0.0190	
T-58 sec	2:26:28														0.0200	
T-56 sec	2:26:30														0.0190	
T-54 sec	2:26:32														0.0210	
T-52 sec	2:26:34														0.0210	
T-50 sec	2:26:36														0.0210	
T-48 sec	2:26:38														0.0190	
T-46 sec	2:26:40														0.0180	
T-44 sec	2:26:42														0.0220	
T-42 sec	2:26:44														0.0310	
T-40 sec	2:26:46														0.0370	-103
T-38 sec	2:26:48														0.0370	-103
T-36 sec	2:26:50														0.0360	
T-34 sec	2:26:52														0.0370	-103
T-32 sec	2:26:54														0.0460	-103
T-30 sec	2:26:56														0.0480	-103
T-28 sec	2:26:58														0.0480	-103
T-26 sec	2:27:00														0.0430	-103
T-24 sec	2:27:02														0.0410	-103
T-22 sec	2:27:04														0.0410	-103
T-20 sec	2:27:06														0.0410	-103
T-18 sec	2:27:08														0.0390	-103
T-16 sec	2:27:10	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0410	-103
T-14 sec	2:27:12	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0430	-103
T-12 sec	2:27:14	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0450	-103
T-10 sec	2:27:16	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0460	-103
T-08 sec	2:27:18	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0410	-103
T-06 sec	2:27:20	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0410	-103
T-04 sec	2:27:22	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0410	-103
T-02 sec	2:27:24	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0390	-103
T+0 sec	2:27:26														0.0220	
T+02 sec	2:27:28												51.252	-26.96	0.1480	-103
T+04 sec	2:27:30												89.794	-43.56	0.1640	-103
T+06 sec	2:27:32												89.563	-51.73	0.1310	-103
T+08 sec	2:27:34												89.563	-51.73	0.1310	-103
T+10 sec	2:27:36												92.047	-61.31	0.1080	-103
T+12 sec	2:27:38												116.139	-76.85	0.1090	-103
T+14 sec	2:27:40												121.003	-74.64	0.1200	-103
T+16 sec	2:27:42												121.084	-72.89	0.1240	-103
T+18 sec	2:27:44												123.767	-74.06	0.1250	-103
T+20 sec	2:27:46	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	124.815	-78.44	0.1170	-103
T+22 sec	2:27:48	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	135.511	-87.36	0.1130	-103
T+24 sec	2:27:50	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	136.482	-87.42	0.1140	-103
T+26 sec	2:27:52	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	137.389	-87.44	0.1150	-103
T+28 sec	2:27:54	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.852	-90.15	0.1130	-103
T+30 sec	2:27:56	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.620	-90.59	0.1120	-103
T+32 sec	2:27:58	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.309	-91.57	0.1100	-103
T+34 sec	2:28:00	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	142.962	-97.17	0.1050	-103
T+36 sec	2:28:02	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.218	-96.69	0.1060	-103
T+38 sec	2:28:04	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.758	-96.40	0.1070	-103
T+40 sec	2:28:06	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.362	-96.78	0.1060	-103
T+42 sec	2:28:08	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	147.166	-99.35	0.1060	-103
T+44 sec	2:28:10	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	147.964	-97.91	0.1090	-103
T+46 sec	2:28:12	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	149.264	-98.12	0.1100	-103
T+48 sec	2:28:14	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	154.318	-98.21	0.1150	-103
T+50 sec	2:28:16	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	155.317	-98.85	0.1150	-103
T+52 sec	2:28:18	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	154.849	-100.47	0.1120	-103
T+54 sec	2:28:20												158.515	-102.19	0.1130	-103
T+56 sec	2:28:22												157.815	-102.39	0.1120	-103
T+58 sec	2:28:24												157.841	-102.41	0.1120	-103
T+60 sec	2:28:26												159.278	-104.70	0.1100	-103
T+62 sec	2:28:28												160.386	-104.74	0.1110	-103
T+64 sec	2:28:30												160.507	-100.24	0.1180	-103
T+66 sec	2:28:32												164.127	-97.05	0.1270	-103
T+68 sec	2:28:34												166.393	-89.88	0.1430	-103
T+70 sec	2:28:36												169.752	-87.90	0.1510	-103
T+72 sec	2:28:38												170.779	-89.82	0.1480	-103
T+74 sec	2:28:40												180.532	-98.05	0.1420	-103
T+76 sec	2:28:42												180.943	-101.01	0.1370	-103
T+78 sec	2:28:44												180.892	-102.71	0.1340	-103
T+80 sec	2:28:46												182.414	-102.99	0.1350	-103
T+82 sec	2:28:48												181.643	-103.72	0.1330	-103
T+84 sec	2:28:50												181.673	-103.15	0.1340	-103
T+86 sec	2:28:52												181.344	-105.97	0.1290	-103
T+88 sec	2:28:54												180.603	-107.42	0.1260	-103
T+90 sec	2:28:56												178.716	-109.56	0.1210	-103
T+92 sec	2:28:58												177.395	-109.42	0.1200	-103
T+94 sec	2:29:00												173.971	-109.33	0.1170	-103
T+96 sec	2:29:02												172.945	-110.77	0.1140	-103
T+98 sec	2:29:04												171.705	-112.87	0.1100	-103
T+100 sec	2:29:06												169.900	-113.17	0.1080	-103
T+102 sec	2:29:08												168.673	-110.15	0.1110	-103
T+104 sec	2:29:10												166.728	-111.81	0.1070	-103
T+106 sec	2:29:12												164.542	-114.96	0.1010	-103
T+108 sec	2:29:14												161.862	-116.34	0.0970	-103
T+110 sec	2:29:16												160.483	-114.53	0.0980	-103
T+112 sec	2:29:18												159.078	-113.53	0.0980	-103
T+114 sec	2:29:20												150.968	-109.30	0.0960	-103
T+116 sec	2:29:22												148.865	-110.17	0.0930	-103
T+118 sec	2:29:24												147.059	-112.15	0.0890	-103
T+120 sec	2:29:26												146.392	-116.07	0.0840	-103
T+122 sec	2:29:28												144.424	-114.51	0.0840	-103
T+124 sec	2:29:30												143.022	-114.30	0.0830	-103
T+126 sec	2:29:32												139.453	-112.35	0.0820	-103
T+128 sec	2:29:34												137.918	-112.93	0.0800	-103
T+130 sec	2:29:36												136.591	-112.77	0.0790	-103
T+132 sec	2:29:38												131.248	-107.47	0.0800	-103
T+134 sec	2:29:40												130.525	-104.32	0.0830	-103
T+136 sec	2:29:42												129.494	-106.03	0.0800	-103
T+138 sec	2:29:44												128.224	-105.86	0.0790	-103
T+140 sec	2:29:46												128.848	-108.16	0.0770	-103
T+142 sec	2:29:48												127.612	-109.89	0.0740	-103
T+144 sec	2:29:50												126.560	-108.05	0.0750	-103
T+146 sec	2:29:52												124.520	-109.11	0.0720	-103
T+148 sec	2:29:54												123.597	-107.36	0.0730	-103
T+150 sec	2:29:56												122.533	-111.27	0.0680	-103

T+152 sec	2:29:58	59.927	3767.021	3090	75.192	74.573	0.617	3804.700	3789.719	3814.735	3714.908	3691.772
T+154 sec	2:30:00	59.928	3767.408	3090	74.159	74.428	0.617	3805.172	3789.433	3814.612	3715.525	3692.080
T+156 sec	2:30:02	59.931	3766.788	3090	71.070	73.253	0.617	3804.614	3789.147	3814.485	3716.142	3692.389
T+158 sec	2:30:04	59.929	3766.259	3090	73.129	73.210	0.617	3805.187	3788.861	3814.369	3716.759	3692.697
T+160 sec	2:30:06	59.931	3765.672	3090	71.070	72.461	0.617	3805.055	3788.574	3814.254	3717.376	3693.006
T+162 sec	2:30:08	59.933	3766.123	3090	69.011	71.254	0.617	3804.465	3788.301	3814.135	3717.993	3693.314
T+164 sec	2:30:10	59.937	3764.243	3090	64.890	69.026	0.617	3802.855	3788.011	3813.999	3718.610	3693.623
T+166 sec	2:30:12	59.937	3765.105	3090	64.890	67.578	0.617	3802.024	3787.738	3813.856	3719.227	3693.931
T+168 sec	2:30:14	59.945	3762.935	3090	56.650	63.754	0.617	3798.816	3787.446	3813.679	3719.844	3694.240
T+170 sec	2:30:16	59.949	3758.387	3090	52.529	59.825	0.617	3795.504	3787.108	3813.468	3720.461	3694.548
T+172 sec	2:30:18	59.947	3753.922	3090	54.591	57.993	0.617	3794.290	3786.727	3813.248	3721.078	3694.857
T+174 sec	2:30:20	59.942	3749.867	3090	59.739	58.604	0.617	3795.518	3786.308	3813.046	3721.695	3695.165
T+176 sec	2:30:22	59.941	3746.889	3090	60.768	59.361	0.617	3796.892	3785.865	3812.865	3722.312	3695.474
T+178 sec	2:30:24	59.942	3747.875	3090	59.739	59.493	0.617	3797.641	3785.443	3812.695	3722.929	3695.782
T+180 sec	2:30:26	59.945	3749.593	3090	56.650	58.498	0.617	3797.263	3785.049	3812.526	3723.546	3696.090
	2:30:28	59.948	3748.661	3090	53.558	56.769	0.617	3796.151	3784.654	3812.348	3724.163	3696.399
	2:30:30	59.947	3746.706	3090	54.591	56.007	0.617	3796.005	3784.245	3812.172	3724.780	3696.707
	2:30:32	59.949	3749.077	3090	52.529	54.790	0.617	3795.405	3783.871	3811.994	3725.397	3697.016
	2:30:34	59.951	3742.741	3090	50.470	53.278	0.617	3794.510	3783.438	3811.810	3726.014	3697.324
	2:30:36	59.952	3740.259	3090	49.440	51.935	0.617	3793.784	3782.989	3811.622	3726.631	3697.633
	2:30:38	59.953	3736.139	3090	48.411	50.701	0.617	3793.167	3782.506	3811.432	3727.248	3697.941
	2:30:40	59.951	3731.382	3090	50.470	50.620	0.617	3793.703	3781.984	3811.251	3727.865	3698.250
	2:30:42	59.952	3727.838	3090	49.440	50.207	0.617	3793.907	3781.437	3811.076	3728.482	3698.558
	2:30:44	59.952	3725.952	3090	49.440	49.939	0.617	3794.256	3780.882	3810.907	3729.099	3698.867
	2:30:46	59.952	3722.649	3090	49.440	49.764	0.617	3794.698	3780.306	3810.747	3729.715	3699.175
	2:30:48	59.955	3720.578	3090	46.348	48.569	0.617	3794.120	3779.720	3810.584	3730.332	3699.484
	2:30:50	59.952	3717.996	3090	49.440	48.874	0.617	3795.042	3779.121	3810.433	3730.949	3699.792
	2:30:52	59.954	3718.142	3090	47.381	48.351	0.617	3795.136	3778.534	3810.286	3731.566	3700.101
	2:30:54	59.952	3715.753	3090	49.440	48.733	0.617	3796.135	3777.937	3810.151	3732.183	3700.409
	2:30:56	59.953	3713.694	3090	48.411	48.620	0.617	3796.639	3777.330	3810.024	3732.800	3700.718
	2:30:58	59.953	3713.484	3090	48.411	48.547	0.617	3797.183	3776.734	3809.904	3733.417	3701.026
	2:31:00	59.952	3710.848	3090	49.440	48.860	0.617	3798.112	3776.124	3809.795	3734.034	3701.335
	2:31:02	59.954	3710.810	3090	47.381	48.342	0.617	3798.212	3775.525	3809.688	3734.651	3701.643
	2:31:04	59.954	3712.092	3090	47.381	48.006	0.617	3798.493	3774.948	3809.586	3735.268	3701.952
	2:31:06	59.959	3714.623	3090	42.230	45.985	0.617	3797.088	3774.404	3809.474	3735.885	3702.260
	2:31:08	59.957	3715.130	3090	44.289	45.391	0.617	3797.112	3773.875	3809.364	3736.502	3702.569
	2:31:10	59.956	3716.168	3090	45.319	45.366	0.617	3797.704	3773.364	3809.260	3737.119	3702.877
	2:31:12	59.954	3716.461	3090	47.381	46.071	0.617	3799.026	3772.865	3809.171	3737.736	3703.186
	2:31:14	59.956	3716.980	3090	45.319	45.808	0.617	3799.380	3772.379	3809.085	3738.353	3703.494
	2:31:16	59.955	3717.759	3090	46.348	45.997	0.617	3800.186	3771.908	3809.009	3738.970	3703.803
	2:31:18	59.958	3722.361	3090	43.260	45.039	0.617	3799.845	3771.485	3808.930	3739.587	3704.111
	2:31:20	59.961	3721.973	3090	40.172	43.335	0.617	3798.758	3771.065	3808.844	3740.204	3704.420
	2:31:22	59.962	3722.658	3090	39.138	41.866	0.617	3797.906	3770.659	3808.752	3740.821	3704.728
	2:31:24	59.962	3722.267	3090	39.138	40.911	0.617	3797.568	3770.255	3808.659	3741.438	3705.037
	2:31:26	59.968	3722.278	3090	32.962	38.129	0.617	3795.403	3769.859	3808.549	3742.055	3705.345
	2:31:28	59.966	3721.787	3090	35.020	37.041	0.617	3794.931	3769.465	3808.438	3742.672	3705.654
	2:31:30	59.966	3723.091	3090	35.020	36.334	0.617	3794.841	3769.088	3808.327	3743.289	3705.962
	2:31:32	59.968	3723.984	3090	32.962	35.153	0.617	3794.278	3768.724	3808.214	3743.906	3706.271
	2:31:34	59.97	3723.435	3090	30.899	33.664	0.617	3793.406	3768.362	3808.096	3744.523	3706.579
	2:31:36	59.974	3723.893	3090	26.781	31.255	0.617	3791.614	3768.009	3807.965	3745.140	3706.888
	2:31:38	59.97	3725.403	3090	30.899	31.130	0.617	3792.106	3767.673	3807.840	3745.757	3707.196
	2:31:40	59.969	3727.121	3090	31.928	31.410	0.617	3793.002	3767.357	3807.724	3746.374	3707.504
	2:31:42	59.969	3728.053	3090	31.928	31.591	0.617	3793.800	3767.052	3807.616	3746.991	3707.813
	2:31:44	59.97	3731.130	3090	30.899	31.349	0.617	3794.175	3766.776	3807.513	3747.608	3708.121
	2:31:46	59.971	3732.530	3090	29.869	30.831	0.617	3794.274	3766.514	3807.412	3748.225	3708.430
	2:31:48	59.973	3733.327	3090	27.810	29.774	0.617	3793.834	3766.263	3807.309	3748.842	3708.738
	2:31:50	59.973	3736.535	3090	27.810	29.087	0.617	3793.764	3766.039	3807.207	3749.459	3709.047
	2:31:52	59.976	3736.907	3090	24.718	27.558	0.617	3792.852	3765.822	3807.100	3750.076	3709.355
	2:31:54	59.978	3736.822	3090	22.659	25.843	0.617	3791.754	3765.607	3806.986	3750.693	3709.664
	2:31:56	59.978	3738.699	3090	22.659	24.729	0.617	3791.257	3765.409	3806.870	3751.310	3709.972
	2:31:58	59.976	3739.944	3090	24.718	24.725	0.617	3791.870	3765.223	3806.761	3751.927	3710.281
	2:32:00	59.978	3740.877	3090	22.659	24.002	0.617	3791.764	3765.047	3806.652	3752.543	3710.589
	2:32:02	59.976	3741.794	3090	24.718	24.253	0.617	3792.632	3764.880	3806.551	3753.160	3710.898
	2:32:04	59.978	3745.234	3090	22.659	23.695	0.617	3792.691	3764.739	3806.452	3753.777	3711.206
	2:32:06	59.977	3746.608	3090	23.689	23.693	0.617	3793.306	3764.611	3806.359	3754.394	3711.515
	2:32:08	59.98	3748.300	3090	20.600	22.611	0.617	3792.840	3764.496	3806.264	3755.011	3711.823
	2:32:10	59.982	3750.716	3090	18.542	21.186	0.617	3792.033	3764.399	3806.164	3755.628	3712.132
	2:32:12	59.981	3751.558	3090	19.571	20.621	0.617	3792.085	3764.310	3806.067	3756.245	3712.440
	2:32:14	59.98	3752.748	3090	20.600	20.614	0.617	3792.695	3764.230	3805.974	3756.862	3712.749
	2:32:16	59.979	3755.599	3090	21.630	20.969	0.617	3793.667	3764.171	3805.890	3757.479	3713.057
	2:32:18	59.98	3756.407	3090	20.600	20.840	0.617	3794.155	3764.119	3805.810	3758.096	3713.366
	2:32:20	59.979	3756.975	3090	21.630	21.117	0.617	3795.048	3764.070	3805.738	3758.713	3713.674
	2:32:22	59.983	3760.405	3090	17.508	19.854	0.617	3794.402	3764.046	3805.662	3759.330	3713.983
	2:32:24	59.983	3760.982	3090	17.508	19.033	0.617	3794.199	3764.025	3805.585	3759.947	3714.291
	2:32:26	59.984	3761.407	3090	16.479	18.139	0.617	3793.922	3764.008	3805.508	3760.564	3714.600
	2:32:28	59.988	3762.737	3090	12.361	16.117	0.617	3792.516	3764.000	3805.422	3761.181	3714.908
	2:32:30	59.989	3763.212	3090	11.332	14.442	0.617	3791.459	3763.994	3805.331	3761.798	3715.217
	2:32:32	59.987	3764.958	3090	13.391	14.074	0.617	3791.708	3764.001	3805.243	3762.415	3715.525
	2:32:34	59.987	3766.085	3090	13.391	13.835	0.617	3792.085	3764.014	3805.158	3763.032	3715.834
	2:32:36	59.991	3766.433	3090	9.269	12.237	0.617	3791.104	3764.030	3805.068	3763.649	3716.142
	2:32:38	59.993	3767.251	3090	7.210	10.477	0.617	3789.962	3764.050	3804.971	3764.266	3716.451
	2:32:40	59.992	3767.792	3090	8.239	9.694	0.617	3789.796	3764.074	3804.875	3764.883	3716.759
	2:32:42	59.991	3768.634	3090	9.269	9.545	0.617	3790.264	3764.102	3804.784	3765.500	3717.068
	2:32:44	59.989	3771.146	3090	11.332	10.170	0.617	3791.506	3764.146	3804.701	3766.117	3717.376
	2:32:46	59.986	3772.445	3090	14.420	11.658	0.617	3793.610	3764.198	3804.632	3766.734	3717.685
	2:32:48	59.983	3773.695	3090	17.508	13.705	0.617	3796.275	3764.257	3804.580	3767.351	3717.993
	2:32:50	59.983	3774.668	3090	17.508	15.036	0.617	3798.223	3764.321	3804.541	3767.968	3718.302
	2:32:52	59.988	3775.841	3090	12.361	14.100	0.617	3797.903	3764.391	3804.501	3768.585	3718.610
	2:32:54	59.993	3775.363	3090	7.210	11.689	0.617	3796.109	3764.457	3804.450	3769.202	3718.918
	2:32:56	59.996	3774.866	3090	4.122	9.040	0.617	3794.077	3764.520	3804.387	3769.819	3719.227
	2:32:58	59.998	3775.492	3090	2.059	6.597	0.617	3792.251	3764.586	3804.315	3770.436	3719.535
	2:33:00	59.999	3776.420	3090	1.029	4.648	0.617	3790.919	3764.656	3804.235	3771.053	3719.844
	2:33:02	60.001	3778.554	3090	-1.029	2.661	0.000	3788.932	3764.738	3804.144	3771.053	3720.149
	2:33:04	59.999	3779.692	3090	1.029	2.090	0.000	3788.361	3764.826	3804.051	3771.053	3720.450
	2:33:06	59.999	3781.256	3090	1.029	1.719	0.000	3787.990	3764.922	3803.958	3771.053	3720.748
	2:33:08	59.999	3780.595	3090	1.029	1.478	0.000	3787.749	3765.014	3803.863	3771.053	3721.042
	2:33:10	60.002	3783.092	3090	-2.059	0.240	0.000	3786.511	3765.118	3803.763	3771.053	3721.333
	2:33:12	60.005	3783.896	3090	-5.151	-1.647	0.000	3784.624	3765.226	3803.653	3771.053	3721.620
	2:33:14	60.007	3784.421	3090	-7.210	-3.594	0.000	3782.677	3765.336	3803.533	3771.053	3721.904
	2:33:16	60.008	3785.768	3090	-8.239	-5.220	0.000	3781.051	3765.452	3803.405	3771.053	3722.185
	2:33:18	60.011	3785.463	3090	-11.332	-7.359	0.000	3778.912	3765.565	3803.267	3771.053	3722.463
	2:33:20	60.014	3786.850	3090	-14.420	-9.830	0.000	3776.441	3765.684	3803.116	3771.053	3722.737
	2:33:22	60.017	3786.304	3090	-17.508	-12.518	0.000	3773.754	3765.800	3802.952	3771.053	3723.009
	2:33:24	60.019	3787.259	3090	-19.571	-14.986	0.000	3771.285	3765.919	3802.776	3771.053	3723.277
	2:33:26	60.021	3787.516	3090	-21.630	-17.312	0.000	3768.960	3766.038	3802.590	3771.053	3723.542
	2:33:28	60.017	3787.955	3090	-17.508	-17.380	0.000	3768.891	3766.159	3802.404	3771.053	3723.805
	2:33:30	60.017	3788.030	3090	-17.508	-17.425	0.000	3768.846	3766.278	3802.221	3771.053	3724.064
	2:33:32	60.019	3788.607	3090	-19.571	-18.176	0.000	3768.095	3766.399	3802.036	3771.053	3724.321
	2:33:34	60.023	3789.216	3090	-23.689	-20.106	0.000	3766.166	3766.523	3801.842	3771.053	3724.575
	2:33:36	60.024	3787.537	3090	-24.718	-21.720	0.000	3764.551	3766.636	3801.641	3771.053	3724.826
	2:33:38	60.025	3785.842	3090	-25.752	-23.131	0.000	3763.140	3766.738	3801.435	3771.053	3725.075
	2:33:40	60.021	3786.077	3090	-21.630	-22.606	0.000	3763.666	3766.841	3801.234	3771.053	3725.321
	2:33:42	60.019	3787.930	3090	-19.571	-21.544	0.000	3764.728	3766.953	3801.041	3771.053	3725.564
	2:33:44	60.024	3788.760	3090	-24.718	-22.655	0.000	3763.617	3767.068	3800.844	3771.053	3725.805
	2:33:46	60.024	3786.875	3090	-24.718	-23.377	0.000	3762.894	3767.171	3800.646	3771.053	3726.043
	2:33:48	60.021	3786.550	3090	-21.630	-22.765	0.000	3763.506	3767.272	3800.452	3771.053	3726.279
	2:33:50	60.02	3787.358	3090	-20.600	-22.008	0.000	3764.264	3767.376	3800.265	3771.053	3726.512
	2:33:52	60.025	3785.018	3090	-25.752	-23.318	0.000	3762.953	3767.467	3800.072	3771.053	3726.743
	2:33:54	60.024	3785.614	3090	-24.718	-23.808	0.000	3762.463	3767.560	3799.879	3771.053	3726.971
	2:33:56	60.02	3785.949	3090	-20.600	-22.685	0.000	3763.586	3767.654	3799.694	3771.053	3727.197
	2:33:58	60.02	3785.804	3090	-20.600	-21.956	0.000	3764.316	3767.746	3799.515	3771.053	3727.421
	2:34:00	60.022	3786.864	3090	-22.659	-22.202	0.000	3764.069	3767.843	3799.336	3771.053	3727.642
	2:34:02	60.022	3786.877	3090	-22.659	-22.362	0.000	3763.909	3767.938	3799.158	3771.053	3727.861
	2:34:04	60.022	3785.254	3090	-22.659	-22.466	0.000	3763.805	3768.025	3798.981	3771.053	3728.079
	2:34:06	60.021	3785.726	3090	-21.630	-22.173	0.000	3764.098	3768.113	3798.807	3771.053	3728.293
	2:34:08	60.021	3786.347	3090	-21.630	-21.983	0.000	3764.288	3768.203	3798.636	3771.053	3728.506
	2:34:10	60.023	3785.821	3090	-23.689	-22.580	0.000	3763.691	3768.290	3798.464	3771.053	3728.717
	2:34:12	60.023	3785.798	3090	-23.689	-22.968	0.000	3763.303	3768.376	3798.292	3771.053	3728.925
	2:34:14	60.022	3786.284	3090	-22.659	-22.860	0.000	3763.411	3768.463	3798.122	3771.053	3729.132
	2:34:16	60.019	3786.939	3090	-19.571	-21.709	0.000	3764.562	3768.553	3797.959	3771.053	3729.336
	2:34:18	60.016	3787.627	3090	-16.479	-19.878	0.000	3766.393	3768.645	3797.806	3771.053	3729.539
	2:34:20	60.018	3789.444	3090	-18.542	-19.411	0.000	3766.861	3768.745	3797.658	3771.053	3729.739
	2:34:22	60.018	3789.673	3090	-18.542	-19.106	0.000	3767.165	3768.845	3797.512	3771.053	3729.938
	2:34:24	60.018	3789.404	3090	-18.542	-18.909	0.000	3767.363	3768.943	3797.368	3771.053	3730.135
	2:34:26	60.019	3788.479	3090	-19.571	-19.141	0.000	3767.131	3769.036	3797.225	3771.053	3730.330
	2:34:28	60.019	3789.183	3090	-19.571	-19.291	0.000	3766.980	3769.131	3797.082	3771.053	3730.523
	2:34:30	60.016	3789.369	3090	-16.479	-18.307	0.000	3767.964	3769.226	3796.945	3771.053	3730.714
	2:34:32	60.015	3789.005	3090	-15.449	-17.307	0.000	3768.964	3769.318	3796.815	3771.053	3730.903
	2:34:34	60.016	3788.665	3090	-16.479	-17.017	0.000	3769.254	3769.408	3796.686	3771.053	3731.091
	2:34:36	60.014	3788.933	3090	-14.420	-16.108	0.000	3770.163	3769.499	3796.564	3771.053	3731.277
	2:34:38	60.013	3790.667	3090	-13.391	-15.157	0.000	3771.114	3769.596	3796.446	3771.053	3731.461
	2:34:40	60.012	3790.805	3090	-12.361	-14.178	0.000	3772.093	3769.693	3796.335	3771.053	3731.643
	2:34:42	60.012	3790.411	3090	-12.361	-13.542	0.000	3772.729	3769.788	3796.227	3771.053	3731.824
	2:34:44	60.01	3789.769	3090	-10.298	-12.407	0.000	3773.864	3769.879	3796.125	3771.053	3732.003
	2:34:46	60.007	3791.540	3090	-7.210	-10.588	0.000	3775.683	3769.977	3796.033	3771.053	3732.181
	2:34:48	60.007	3792.945	3090	-7.210	-9.406	0.000	3776.866	3770.080	3795.946	3771.053	3732.356
	2:34:50	60.009	3791.027	3090	-9.269	-9.358	0.000	3776.913	3770.174	3795.861	3771.053	3732.531
	2:34:52	60.009	3791.443	3090	-9.269	-9.327	0.000	3776.945	3770.269	3795.777	3771.053	3732.704
	2:34:54	60.01	3791.426	3090	-10.298	-9.667	0.000	3776.605	3770.363	3795.691	3771.053	3732.875
	2:34:56	60.003	3790.603	3090	-3.088	-7.364	0.000	3778.907	3770.453	3795.617	3771.053	3733.044
	2:34:58	59.999	3790.457	3090	1.029	-4.426	0.000	3781.845	3770.541	3795.556	3771.053	3733.213
	2:35:00	59.995	3790.216	3090	5.151	-1.074	0.000	3785.197	3770.627	3795.511	3771.053	3733.379
	2:35:02	59.992	3789.585	3090	8.239	2.185	0.000	3788.457	3770.710	3795.480	3771.053	3733.545
	2:35:04	59.991	3788.457	3090	9.269	4.665	0.000	3790.936	3770.787	3795.460	3771.053	3733.708

T+152 sec	2:29:58	59.927	3767.02	335.00	219.98	16.00	10.00	0.00	-103.00	7663.00	75.192	T+152 sec	2:29:58
T+154 sec	2:30:00	59.928	3767.41	335.00	219.98	16.00	10.00	0.00	-103.00	7663.00	74.159	T+154 sec	2:30:00
T+156 sec	2:30:02	59.931	3766.79	335.00	219.98	16.00	10.00	0.00	-103.00	7664.00	71.070	T+156 sec	2:30:02
T+158 sec	2:30:04	59.929	3766.26	335.00	219.98	16.00	10.00	0.00	-103.00	7664.00	73.129	T+158 sec	2:30:04
T+160 sec	2:30:06	59.931	3765.67	335.00	219.98	16.00	10.00	0.00	-103.00	7665.00	71.070	T+160 sec	2:30:06
T+162 sec	2:30:08	59.933	3766.12	335.00	229.09	16.00	10.00	0.00	-103.00	7666.00	69.011	T+162 sec	2:30:08
T+164 sec	2:30:10	59.937	3764.24	335.00	229.09	16.00	10.00	0.00	-103.00	7666.00	64.890	T+164 sec	2:30:10
T+166 sec	2:30:12	59.937	3765.10	335.00	229.09	16.00	10.00	0.00	-103.00	7667.00	64.890	T+166 sec	2:30:12
T+168 sec	2:30:14	59.945	3762.94	335.00	229.09	16.00	10.00	0.00	-103.00	7668.00	56.650	T+168 sec	2:30:14
T+170 sec	2:30:16	59.949	3758.39	335.00	229.09	16.00	10.00	0.00	-103.00	7668.00	52.529	T+170 sec	2:30:16
T+172 sec	2:30:18	59.947	3753.92	335.00	229.66	16.00	10.00	0.00	-103.00	7669.00	54.591	T+172 sec	2:30:18
T+174 sec	2:30:20	59.942	3749.87	335.00	229.66	16.00	10.00	0.00	-103.00	7669.00	59.739	T+174 sec	2:30:20
T+176 sec	2:30:22	59.941	3746.89	335.00	229.66	16.00	10.00	0.00	-103.00	7670.00	60.768	T+176 sec	2:30:22
T+178 sec	2:30:24	59.942	3747.88	335.00	229.66	16.00	10.00	0.00	-103.00	7670.00	59.739	T+178 sec	2:30:24
T+180 sec	2:30:26	59.945	3749.59	335.00	229.66	16.00	10.00	0.00	-103.00	7671.00	56.650	T+180 sec	2:30:26
	2:30:28	59.948	3748.66	335.00	229.23	16.00	10.00	0.00	-103.00	7671.00	53.558		
	2:30:30	59.947	3746.71	335.00	229.23	16.00	10.00	0.00	-103.00	7672.00	54.591		
	2:30:32	59.949	3749.08	335.00	229.23	16.00	10.00	0.00	-103.00	7673.00	52.529		
	2:30:34	59.951	3742.74	335.00	229.23	16.00	10.00	0.00	-103.00	7673.00	50.470		
	2:30:36	59.952	3740.26	350.00	229.23	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:38	59.953	3736.14	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	48.411		
	2:30:40	59.951	3731.38	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	50.470		
	2:30:42	59.952	3727.84	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:44	59.952	3725.95	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:46	59.952	3722.65	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:48	59.955	3720.58	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	46.348		
	2:30:50	59.952	3718.00	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:52	59.954	3718.14	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	47.381		
	2:30:54	59.952	3715.75	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:56	59.953	3713.69	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	48.411		
	2:30:58	59.953	3713.48	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	48.411		
	2:31:00	59.952	3710.85	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:31:02	59.954	3710.81	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	47.381		
	2:31:04	59.954	3712.09	350.00	213.54	16.00	10.00	0.00	-103.00	7674.00	47.381		
	2:31:06	59.959	3714.62	350.00	213.54	16.00	10.00	0.00	-103.00	7675.00	42.230		
	2:31:08	59.957	3715.13	350.00	225.65	16.00	10.00	0.00	-103.00	7676.00	44.289		
	2:31:10	59.956	3716.17	350.00	225.65	16.00	10.00	0.00	-103.00	7677.00	45.319		
	2:31:12	59.954	3716.46	350.00	225.65	16.00	10.00	0.00	-103.00	7678.00	47.381		
	2:31:14	59.956	3716.98	350.00	225.65	16.00	10.00	0.00	-103.00	7679.00	45.319		
	2:31:16	59.955	3717.76	350.00	225.65	16.00	10.00	0.00	-103.00	7680.00	46.348		
	2:31:18	59.958	3722.36	350.00	212.57	16.00	10.00	0.00	-103.00	7681.00	43.260		
	2:31:20	59.961	3721.97	350.00	212.57	16.00	10.00	0.00	-103.00	7682.00	40.172		
	2:31:22	59.962	3722.66	350.00	212.57	16.00	10.00	0.00	-103.00	7684.00	39.138		
	2:31:24	59.962	3722.27	350.00	212.57	16.00	10.00	0.00	-103.00	7685.00	39.138		
	2:31:26	59.968	3722.28	350.00	212.57	16.00	10.00	0.00	-103.00	7687.00	32.962		
	2:31:28	59.966	3721.79	350.00	219.90	16.00	10.00	0.00	-103.00	7689.00	35.020		
	2:31:30	59.966	3723.09	350.00	219.90	16.00	10.00	0.00	-103.00	7690.00	35.020		
	2:31:32	59.968	3723.98	350.00	219.90	16.00	10.00	0.00	-103.00	7692.00	32.962		
	2:31:34	59.970	3723.43	350.00	219.90	16.00	10.00	0.00	-103.00	7692.00	30.899		
	2:31:36	59.974	3723.89	350.00	219.90	16.00	10.00	0.00	-103.00	7693.00	26.781		
	2:31:38	59.970	3725.40	350.00	231.18	16.00	10.00	0.00	-103.00	7693.00	30.899		
	2:31:40	59.969	3727.12	350.00	231.18	16.00	10.00	0.00	-103.00	7694.00	31.928		
	2:31:42	59.969	3728.05	350.00	231.18	16.00	10.00	0.00	-103.00	7694.00	31.928		
	2:31:44	59.970	3731.13	350.00	231.18	16.00	10.00	0.00	-103.00	7695.00	30.899		
	2:31:46	59.971	3732.53	350.00	231.18	16.00	10.00	0.00	-103.00	7695.00	29.869		
	2:31:48	59.973	3733.33	350.00	226.63	16.00	10.00	0.00	-103.00	7695.00	27.810		
	2:31:50	59.973	3736.54	350.00	226.63	16.00	10.00	0.00	-103.00	7696.00	27.810		
	2:31:52	59.976	3736.91	350.00	226.63	16.00	10.00	0.00	-103.00	7696.00	24.718		
	2:31:54	59.978	3736.82	350.00	226.63	16.00	10.00	0.00	-103.00	7697.00	22.659		
	2:31:56	59.978	3738.70	350.00	226.63	16.00	10.00	0.00	-103.00	7697.00	22.659		
	2:31:58	59.976	3739.94	350.00	227.26	16.00	10.00	0.00	-103.00	7697.00	24.718		
	2:32:00	59.978	3740.88	350.00	227.26	16.00	10.00	0.00	-103.00	7698.00	22.659		
	2:32:02	59.976	3741.79	350.00	227.26	16.00	10.00	0.00	-103.00	7698.00	24.718		
	2:32:04	59.978	3745.23	350.00	227.26	16.00	10.00	0.00	-103.00	7698.33	22.659		
	2:32:06	59.977	3746.61	350.00	227.26	16.00	10.00	0.00	-103.00	7698.66	23.689		
	2:32:08	59.980	3748.30	350.00	229.29	16.00	10.00	0.00	-103.00	7698.99	20.600		
	2:32:10	59.982	3750.72	350.00	229.29	16.00	10.00	0.00	-103.00	7699.32	18.542		
	2:32:12	59.981	3751.56	350.00	229.29	16.00	10.00	0.00	-103.00	7699.65	19.571		
	2:32:14	59.980	3752.75	350.00	229.29	16.00	10.00	0.00	-103.00	7699.98	20.600		
	2:32:16	59.979	3755.60	350.00	229.29	16.00	10.00	0.00	-103.00	7700.31	21.630		
	2:32:18	59.980	3756.41	350.00	221.46	16.00	10.00	0.00	-103.00	7700.64	20.600		
	2:32:20	59.979	3756.98	350.00	221.46	16.00	10.00	0.00	-103.00	7700.97	21.630		
	2:32:22	59.983	3760.41	350.00	221.46	16.00	10.00	0.00	-103.00	7701.30	17.508		
	2:32:24	59.983	3760.98	350.00	221.46	16.00	10.00	0.00	-103.00	7701.63	17.508		
	2:32:26	59.984	3761.41	350.00	221.46	16.00	10.00	0.00	-103.00	7701.96	16.479		
	2:32:28	59.988	3762.74	350.00	241.27	16.00	10.00	0.00	-103.00	7702.29	12.361		
	2:32:30	59.989	3763.21	350.00	241.27	16.00	10.00	0.00	-103.00	7702.62	11.332		
	2:32:32	59.987	3764.96	350.00	241.27	16.00	10.00	0.00	-103.00	7702.95	13.391		
	2:32:34	59.987	3766.09	350.00	241.27	16.00	10.00	0.00	-103.00	7703.28	13.391		
	2:32:36	59.991	3766.43	350.00	241.27	16.00	10.00	0.00	-103.00	7703.61	9.269		
	2:32:38	59.993	3767.25	350.00	243.07	16.00	10.00	0.00	-103.00	7703.94	7.210		
	2:32:40	59.992	3767.79	350.00	243.07	16.00	10.00	0.00	-103.00	7704.27	8.239		
	2:32:42	59.991	3768.63	350.00	243.07	16.00	10.00	0.00	-103.00	7704.60	9.269		
	2:32:44	59.989	3771.15	350.00	243.07	16.00	10.00	0.00	-103.00	7704.93	11.332		
	2:32:46	59.986	3772.44	350.00	243.07	16.00	10.00	0.00	-103.00	7705.26	14.420		
	2:32:48	59.983	3773.69	350.00	241.67	16.00	10.00	0.00	-103.00	7705.59	17.508		
	2:32:50	59.983	3774.67	350.00	241.67	16.00	10.00	0.00	-103.00	7705.92	17.508		
	2:32:52	59.988	3775.84	350.00	241.67	16.00	10.00	0.00	-103.00	7706.25	12.361		
	2:32:54	59.993	3775.36	350.00	241.67	16.00	10.00	0.00	-103.00	7706.58	7.210		
	2:32:56	59.996	3774.87	350.00	241.67	16.00	10.00	0.00	-103.00	7706.91	4.122		
	2:32:58	59.998	3775.49	350.00	228.15	16.00	10.00	0.00	-103.00	7707.24	2.059		
	2:33:00	59.999	3776.42	350.00	228.15	16.00	10.00	0.00	-103.00	7707.57	1.029		
	2:33:02	60.001	3778.55	350.00	228.15	16.00	10.00	0.00	-103.00	7707.90	-1.029		
	2:33:04	59.999	3779.69	350.00	228.15	16.00	10.00	0.00	-103.00	7708.23	1.029		
	2:33:06	59.999	3781.26	350.00	228.15	16.00	10.00	0.00	-103.00	7708.56	1.029		
	2:33:08	59.999	3780.59	350.00	235.13	16.00	10.00	0.00	-103.00	7708.89	1.029		
	2:33:10	60.002	3783.09	350.00	235.13	16.00	10.00	0.00	-103.00	7709.22	-2.059		
	2:33:12	60.005	3783.90	350.00	235.13	16.00	10.00	0.00	-103.00	7709.55	-5.151		
	2:33:14	60.007	3784.42	350.00	235.13	16.00	10.00	0.00	-103.00	7709.88	-7.210		
	2:33:16	60.008	3785.77	350.00	235.13	16.00	10.00	0.00	-103.00	7710.21	-8.239		
	2:33:18	60.011	3785.46	350.00	246.43	16.00	10.00	0.00	-103.00	7710.54	-11.332		
	2:33:20	60.014	3786.85	350.00	246.43	16.00	10.00	0.00	-103.00	7710.87	-14.420		
	2:33:22	60.017	3786.30	350.00	246.43	16.00	10.00	0.00	-103.00	7711.20	-17.508		
	2:33:24	60.019	3787.26	350.00	246.43	16.00	10.00	0.00	-103.00	7711.53	-19.571		
	2:33:26	60.021	3787.52	350.00	246.43	16.00	10.00	0.00	-103.00	7711.86	-21.630		
	2:33:28	60.017	3787.96	350.00	236.55	16.00	10.00	0.00	-103.00	7712.19	-17.508		
	2:33:30	60.017	3788.03	350.00	236.55	16.00	10.00	0.00	-103.00	7712.52	-17.508		
	2:33:32	60.019	3788.61	350.00	236.55	16.00	10.00	0.00	-103.00	7712.85	-19.571		
	2:33:34	60.023	3789.22	350.00	236.55	16.00	10.00	0.00	-103.00	7713.18	-23.689		
	2:33:36	60.024	3787.54	350.00	236.55	16.00	10.00	0.00	-103.00	7713.51	-24.718		
	2:33:38	60.025	3785.84	350.00	230.30	16.00	10.00	0.00	-103.00	7713.84	-25.752		
	2:33:40	60.021	3786.08	350.00	230.30	16.00	10.00	0.00	-103.00	7714.17	-21.630		
	2:33:42	60.019	3787.93	350.00	230.30	16.00	10.00	0.00	-103.00	7714.50	-19.571		
	2:33:44	60.024	3788.76	350.00	230.30	16.00	10.00	0.00	-103.00	7714.83	-24.718		
	2:33:46	60.024	3786.87	350.00	230.30	16.00	10.00	0.00	-103.00	7715.16	-24.718		
	2:33:48	60.021	3786.55	350.00	231.18	16.00	10.00	0.00	-103.00	7715.49	-21.630		
	2:33:50	60.020	3787.36	350.00	231.18	16.00	10.00	0.00	-103.00	7715.82	-20.600		
	2:33:52	60.025	3785.02	350.00	231.18	16.00	10.00	0.00	-103.00	7716.15	-25.752		
	2:33:54	60.024	3785.61	350.00	231.18	16.00	10.00	0.00	-103.00	7716.48	-24.718		
	2:33:56	60.020	3785.95	350.00	231.18	16.00	10.00	0.00	-103.00	7716.81	-20.600		
	2:33:58	60.020	3785.80	350.00	225.62	16.00	10.00	0.00	-103.00	7717.14	-20.600		
	2:34:00	60.022	3786.86	350.00	225.62	16.00	10.00	0.00	-103.00	7717.47	-22.659		
	2:34:02	60.022	3786.88	350.00	225.62	16.00	10.00	0.00	-103.00	7717.80	-22.659		
	2:34:04	60.022	3785.25	350.00	225.62	16.00	10.00	0.00	-103.00	7718.13	-22.659		
	2:34:06	60.021	3785.73	350.00	225.62	16.00	10.00	0.00	-103.00	7718.46	-21.630		
	2:34:08	60.021	3786.35	350.00	230.73	16.00	10.00	0.00	-103.00	7718.79	-21.630		
	2:34:10	60.023	3785.82	350.00	230.73	16.00	10.00	0.00	-103.00	7719.12	-23.689		
	2:34:12	60.023	3785.80	350.00	230.73	16.00	10.00	0.00	-103.00	7719.45	-23.689		
	2:34:14	60.022	3786.28	350.00	230.73	16.00	10.00	0.00	-103.00	7719.78	-22.659		
	2:34:16	60.019	3786.94	350.00	230.73	16.00	10.00	0.00	-103.00	7720.11	-19.571		
	2:34:18	60.016	3787.63	350.00	234.85	16.00	10.00	0.00	-103.00	7720.44	-16.479		
	2:34:20	60.018	3789.44	350.00	234.85	16.00	10.00	0.00	-103.00	7720.77	-18.542		
	2:34:22	60.018	3789.67	350.00	234.85	16.00	10.00	0.00	-103.00	7721.10	-18.542		
	2:34:24	60.018	3789.40	350.00	234.85	16.00	10.00	0.00	-103.00	7721.43	-18.542		
	2:34:26	60.019	3788.48	350.00	234.85	16.00	10.00	0.00	-103.00	7721.76	-19.571		
	2:34:28	60.019	3789.18	350.00	228.96	16.00	10.00	0.00	-103.00	7722.09	-19.571		
	2:34:30	60.016	3789.37	350.00	228.96	16.00	10.00	0.00	-103.00	7722.42	-16.479		
	2:34:32	60.015	3789.00	350.00	228.96	16.00	10.00	0.00	-103.00	7722.75	-15.449		
	2:34:34	60.016	3788.66	350.00	228.96	16.00	10.00	0.00	-103.00	7723.08	-16.479		
	2:34:36	60.014	3788.93	350.00	228.96	16.00	10.00	0.00	-103.00	7723.41	-14.420		
	2:34:38	60.013	3790.67	350.00	231.18	16.00	10.00	0.00	-103.00	7723.74	-13.391		
	2:34:40	60.012	3790.81	350.00	231.18	16.00	10.00	0.00	-103.00	7724.07	-12.361		
	2:34:42	60.012	3790.41	350.00	231.18	16.00	10.00	0.00	-103.00	7724.40	-12.361		
	2:34:44	60.010	3789.77	350.00	231.18	16.00	10.00	0.00	-103.00	7724.73	-10.298		
	2:34:46	60.007	3791.54	350.00	231.18	16.00	10.00	0.00	-103.00	7725.06	-7.210		
	2:34:48	60.007	3792.95	350.00	236.49	16.00	10.00	0.00	-103.00	7725.39	-7.210		
	2:34:50	60.009	3791.03	350.00	236.49	16.00	10.00	0.00	-103.00	7725.72	-9.269		
	2:34:52	60.009	3791.44	350.00	236.49	16.00	10.00	0.00	-103.00	7726.05	-9.269		
	2:34:54	60.010	3791.43	350.00	236.49	16.00	10.00	0.00	-103.00	7726.38	-10.298		
	2:34:56	60.003	3790.60	350.00	236.49	16.00	10.00	0.00	-103.00	7726.71	-3.088		
	2:34:58	59.999	3790.46	350.00	245.04	16.00	10.00	0.00	-103.00	7727.04	1.029		
	2:35:00	59.995	3790.22	350.00	245.04	16.00	10.00	0.00	-103.00	7727.37	5.151		
	2:35:02	59.992	3789.58	350.00	245.04	16.00	10.00	0.00	-103.00	7727.70	8.239		
	2:35:04	59.991	3788.46	350.00	245.04	16.00	10.00	0.00	-103.00	7728.03	9.269		

121.911	-105.89	0.0730	-103
122.298	-107.16	0.0720	-103
121.678	-109.50	0.0690	-103
121.149	-107.09	0.0710	-103
120.562	-108.49	0.0690	-103
121.012	-110.89	0.0670	-103
119.133	-113.32	0.0630	-103
119.995	-114.15	0.0630	-103
117.825	-121.31	0.0550	-103
113.277	-121.64	0.0510	-103
108.812	-114.39	0.0530	-103
104.757	-104.63	0.0580	-103
101.779	-100.65	0.0590	-103
102.765	-102.64	0.0580	-103
104.483	-107.58	0.0550	-103
103.551	-110.02	0.0520	-103
101.596	-106.80	0.0530	-103
103.967	-111.64	0.0510	-103
97.631	-107.14	0.0490	-103
95.149	-105.57	0.0480	-103
91.029	-102.14	0.0470	-103
86.272	-94.67	0.0490	-103
82.728	-91.79	0.0480	-103
80.842	-89.70	0.0480	-103
77.539	-86.03	0.0480	-103
75.468	-86.62	0.0450	-103
72.886	-80.87	0.0480	-103
73.032	-82.87	0.0460	-103
70.643	-78.38	0.0480	-103
68.584	-76.95	0.0470	-103
68.374	-76.72	0.0470	-103
65.738	-72.94	0.0480	-103
65.700	-74.55	0.0460	-103
66.982	-76.01	0.0460	-103
69.512	-83.62	0.0410	-103
70.020	-82.26	0.0430	-103
71.058	-82.51	0.0440	-103
71.351	-80.96	0.0460	-103
71.870	-83.45	0.0440	-103
72.649	-83.39	0.0450	-103
77.251	-91.83	0.0420	-103
76.863	-94.74	0.0390	-103
77.548	-96.79	0.0380	-103
77.157	-96.30	0.0380	-103
77.168	-104.10	0.0320	
76.677	-100.72	0.0340	
77.981	-102.44	0.0340	
78.874	-106.40	0.0320	
78.324	-108.60	0.0300	
78.783	-115.64	0.0260	
80.293	-111.33	0.0300	
82.011	-112.15	0.0310	
82.943	-113.43	0.0310	
86.020	-119.27	0.0300	
87.420	-122.91	0.0290	
88.217	-127.62	0.0270	
91.425	-132.26	0.0270	
91.797	-138.83	0.0240	
91.712	-143.02	0.0220	
93.589	-145.95	0.0220	
94.834	-143.42	0.0240	
95.767	-149.35	0.0220	
96.684	-146.22	0.0240	
100.124	-156.14	0.0220	
101.498	-155.85	0.0230	
103.190	-166.10	0.0200	
105.606	-175.64	0.0180	
106.448	-174.14	0.0190	
107.637	-173.26	0.0200	
110.489	-175.03	0.0210	
111.297	-179.15	0.0200	
111.865	-177.21	0.0210	
115.295	-195.01	0.0170	
115.872	-195.98	0.0170	
116.297	-200.08	0.0160	
117.627	-217.32	0.0120	
118.102	-222.30	0.0110	
119.847	-217.41	0.0130	
120.975	-219.45	0.0130	
121.323	-237.31	0.0090	
122.141	-248.63	0.0070	
122.682	-244.75	0.0080	
123.523	-241.61	0.0090	
126.036	-237.24	0.0110	
127.335	-226.88	0.0140	
128.585	-217.48	0.0170	
129.558	-219.13	0.0170	
130.731	-241.53	0.0120	
130.253	-265.15	0.0070	
129.756	-281.30	0.0040	
130.382	-295.49	0.0020	
131.310	-304.49	0.0010	
132.827		0.0010	
133.965		0.0010	
135.529		0.0010	
134.868		0.0010	
137.365		0.0020	
138.168		0.0050	
138.694		0.0070	
140.041		0.0080	
139.736		0.0110	
141.123		0.0140	
140.577		0.0170	
141.532		0.0190	
141.789		0.0210	
142.228		0.0170	
142.303		0.0170	
142.880		0.0190	
143.489		0.0230	
141.810		0.0240	
140.115		0.0250	
140.350		0.0210	
142.203		0.0190	
143.033		0.0240	
141.148		0.0240	
140.823		0.0210	
141.631		0.0200	
139.291		0.0250	
139.887		0.0240	
140.222		0.0200	
140.077		0.0200	
141.137		0.0220	
141.150		0.0220	
139.527		0.0220	
139.999		0.0210	
140.620		0.0210	
140.094		0.0230	
140.071		0.0230	
140.557		0.0220	
141.212		0.0190	
141.900		0.0160	
143.717		0.0180	
143.946		0.0180	
143.677		0.0180	
142.752		0.0190	
143.456		0.0190	
143.642		0.0160	
143.278		0.0150	
142.938		0.0160	
143.206		0.0140	
144.940		0.0130	
145.078		0.0120	
144.684		0.0120	
144.042		0.0100	
145.813		0.0070	
147.218		0.0070	
145.300		0.0090	
145.716		0.0090	
145.699		0.0100	
144.876		0.0030	
144.730		0.0010	
144.489		0.0050	
143.858		0.0080	
142.730		0.0090	

2:40:14	59.974	3740.775	3090	26.781	25.819	0.000	3812.090	3768.633	3803.318	3771.053	3748.782	2:40:14	59.974	3740.78	350.00	223.02	16.00	10.00	0.00	-103.00	7779.18	26.781	95.048	0.0260	
2:40:16	59.977	3742.833	3090	23.689	25.073	0.000	3811.345	3768.566	3803.339	3771.053	3748.840	2:40:16	59.977	3742.83	350.00	223.02	16.00	10.00	0.00	-103.00	7779.51	23.689	97.105	0.0230	
2:40:18	59.977	3741.268	3090	23.689	24.589	0.000	3810.860	3768.495	3803.358	3771.053	3748.898	2:40:18	59.977	3741.27	350.00	223.02	16.00	10.00	0.00	-103.00	7779.84	23.689	95.541	0.0230	
2:40:20	59.978	3739.776	3090	22.659	23.913	0.000	3810.185	3768.421	3803.376	3771.053	3748.955	2:40:20	59.978	3739.78	350.00	223.02	16.00	10.00	0.00	-103.00	7780.17	22.659	94.049	0.0220	
2:40:22	59.979	3738.966	3090	21.630	23.114	0.000	3809.385	3768.346	3803.391	3771.053	3749.012	2:40:22	59.979	3738.97	350.00	223.02	16.00	10.00	0.00	-103.00	7780.50	21.630	93.239	0.0210	
2:40:24	59.981	3738.706	3090	19.571	21.874	0.000	3808.145	3768.270	3803.403	3771.053	3749.068	2:40:24	59.981	3738.71	350.00	223.02	16.00	10.00	0.00	-103.00	7780.83	19.571	92.979	0.0190	
2:40:26	59.977	3738.879	3090	23.689	22.509	0.000	3808.780	3768.194	3803.417	3771.053	3749.125	2:40:26	59.977	3738.88	350.00	223.02	16.00	10.00	0.00	-103.00	7781.16	23.689	93.152	0.0230	
2:40:28	59.974	3739.860	3090	26.781	24.004	0.000	3810.276	3768.122	3803.435	3771.053	3749.181	2:40:28	59.974	3739.86	350.00	223.02	16.00	10.00	0.00	-103.00	7781.49	26.781	94.133	0.0260	
2:40:30	59.971	3738.102	3090	29.869	26.057	0.000	3812.328	3768.046	3803.457	3771.053	3749.237	2:40:30	59.971	3738.10	350.00	223.02	16.00	10.00	0.00	-103.00	7781.82	29.869	92.375	0.0290	
2:40:32	59.971	3738.558	3090	29.869	27.391	0.000	3813.663	3767.971	3803.483	3771.053	3749.292	2:40:32	59.971	3738.56	350.00	223.02	16.00	10.00	0.00	-103.00	7782.15	29.869	92.831	0.0290	
2:40:34	59.971	3743.507	3090	29.869	28.259	0.000	3814.530	3767.909	3803.511	3771.053	3749.347	2:40:34	59.971	3743.51	350.00	223.02	16.00	10.00	0.00	-103.00	7782.48	29.869	97.780	0.0290	
2:40:36	59.972	3743.419	3090	28.840	28.462	0.000	3814.733	3767.847	3803.539	3771.053	3749.402	2:40:36	59.972	3743.42	350.00	223.02	16.00	10.00	0.00	-103.00	7782.81	28.840	97.692	0.0280	
2:40:38	59.968	3745.251	3090	32.962	30.037	0.000	3816.308	3767.790	3803.572	3771.053	3749.457	2:40:38	59.968	3745.25	350.00	223.02	16.00	10.00	0.00	-103.00	7783.14	32.962	99.524	0.0320	
2:40:40	59.966	3745.744	3090	35.020	31.781	0.000	3818.052	3767.735	3803.608	3771.053	3749.511	2:40:40	59.966	3745.74	350.00	223.02	16.00	10.00	0.00	-103.00	7783.47	35.020	100.017	0.0340	
2:40:42	59.966	3747.340	3090	35.020	32.915	0.000	3819.186	3767.684	3803.647	3771.053	3749.566	2:40:42	59.966	3747.34	350.00	223.02	16.00	10.00	0.00	-103.00	7783.80	35.020	101.613	0.0340	
2:40:44	59.971	3750.700	3090	29.869	31.849	0.000	3818.120	3767.641	3803.683	3771.053	3749.619	2:40:44	59.971	3750.70	350.00	223.02	16.00	10.00	0.00	-103.00	7784.13	29.869	104.973	0.0290	
2:40:46	59.973	3749.750	3090	27.810	30.435	0.000	3816.707	3767.597	3803.716	3771.053	3749.673	2:40:46	59.973	3749.75	350.00	223.02	16.00	10.00	0.00	-103.00	7784.46	27.810	104.023	0.0270	
2:40:48	59.972	3746.217	3090	28.840	29.877	0.000	3816.148	3767.543	3803.747	3771.053	3749.726	2:40:48	59.972	3746.22	350.00	223.02	16.00	10.00	0.00	-103.00	7784.79	28.840	100.490	0.0280	
2:40:50	59.969	3744.683	3090	31.928	30.595	0.000	3816.866	3767.487	3803.779	3771.053	3749.779	2:40:50	59.969	3744.68	350.00	223.02	16.00	10.00	0.00	-103.00	7785.12	31.928	98.956	0.0310	
2:40:52	59.972	3743.745	3090	28.840	29.981	0.000	3816.252	3767.428	3803.810	3771.053	3749.832	2:40:52	59.972	3743.75	350.00	223.02	16.00	10.00	0.00	-103.00	7785.45	28.840	98.018	0.0280	
2:40:54	59.974	3743.149	3090	26.781	28.861	0.000	3815.132	3767.368	3803.838	3771.053	3749.885	2:40:54	59.974	3743.15	350.00	223.02	16.00	10.00	0.00	-103.00	7785.78	26.781	97.422	0.0260	
2:40:56	59.973	3740.299	3090	27.810	28.493	0.000	3814.764	3767.301	3803.865	3771.053	3749.937	2:40:56	59.973	3740.30	350.00	223.02	16.00	10.00	0.00	-103.00	7786.11	27.810	94.572	0.0270	
2:40:58	59.97	3739.453	3090	30.899	29.335	0.000	3815.606	3767.233	3803.894	3771.053	3749.989	2:40:58	59.970	3739.45	350.00	223.02	16.00	10.00	0.00	-103.00	7786.44	30.899	93.726	0.0300	
2:41:00	59.971	3733.376	3090	29.869	29.522	0.000	3815.793	3767.150	3803.923	3771.053	3750.041	2:41:00	59.971	3733.38	350.00	223.02	16.00	10.00	0.00	-103.00	7786.77	29.869	87.649	0.0290	
2:41:02	59.974	3731.830	3090	26.781	28.563	0.000	3814.834	3767.064	3803.950	3771.053	3750.092	2:41:02	59.974	3731.83	350.00	223.02	16.00	10.00	0.00	-103.00	7787.10	26.781	86.103	0.0260	
2:41:04	59.982	3737.583	3090	18.542	25.055	0.000	3811.327	3766.992	3803.968	3771.053	3750.143	2:41:04	59.982	3737.58	350.00	223.02	16.00	10.00	0.00	-103.00	7787.43	18.542	91.855	0.0180	
2:41:06	59.985	3736.229	3090	15.449	21.693	0.000	3807.964	3766.917	3803.977	3771.053	3750.194	2:41:06	59.985	3736.23	350.00	223.02	16.00	10.00	0.00	-103.00	7787.76	15.449	90.502	0.0150	
2:41:08	59.985	3734.897	3090	15.449	19.508	0.000	3805.779	3766.839	3803.982	3771.053	3750.245	2:41:08	59.985	3734.90	350.00	223.02	16.00	10.00	0.00	-103.00	7788.09	15.449	89.170	0.0150	
2:41:10	59.985	3733.434	3090	15.449	18.087	0.000	3804.359	3766.758	3803.983	3771.053	3750.296	2:41:10	59.985	3733.43	350.00	223.02	16.00	10.00	0.00	-103.00	7788.42	15.449	87.707	0.0150	
2:41:12	59.987	3733.115	3090	13.391	16.443	0.000	3802.715	3766.677	3803.980	3771.053	3750.346	2:41:12	59.987	3733.12	350.00	223.02	16.00	10.00	0.00	-103.00	7788.75	13.391	87.388	0.0130	
2:41:14	59.989	3730.510	3090	11.332	14.654	0.000	3800.926	3766.590	3803.972	3771.053	3750.396	2:41:14	59.989	3730.51	350.00	223.02	16.00	10.00	0.00	-103.00	7789.08	11.332	84.783	0.0110	
2:41:16	59.989	3729.180	3090	11.332	13.491	0.000	3799.763	3766.500	3803.962	3771.053	3750.446	2:41:16	59.989	3729.18	350.00	223.02	16.00	10.00	0.00	-103.00	7789.41	11.332	83.453	0.0110	
2:41:18	59.986	3725.459	3090	14.420	13.816	0.000	3800.088	3766.401	3803.953	3771.053	3750.495	2:41:18	59.986	3725.46	350.00	223.02	16.00	10.00	0.00	-103.00	7789.74	14.420	79.732	0.0140	
2:41:20	59.987	3724.785	3090	13.391	13.667	0.000	3799.939	3766.302	3803.943	3771.053	3750.545	2:41:20	59.987	3724.78	350.00	223.02	16.00	10.00	0.00	-103.00	7790.07	13.391	79.058	0.0130	
2:41:22	59.99	3720.108	3090	10.298	12.488	0.000	3798.759	3766.192	3803.931	3771.053	3750.594	2:41:22	59.990	3720.11	350.00	223.02	16.00	10.00	0.00	-103.00	7790.40	10.298	74.381	0.0100	
2:41:24	59.994	3720.938	3090	6.181	10.280	0.000	3796.552	3766.084	3803.913	3771.053	3750.642	2:41:24	59.994	3720.94	350.00	223.02	16.00	10.00	0.00	-103.00	7790.73	6.181	75.211	0.0060	
2:41:26	59.996	3725.661	3090	4.122	8.125	0.000	3794.396	3765.988	3803.891	3771.053	3750.691	2:41:26	59.996	3725.66	350.00	223.02	16.00	10.00	0.00	-103.00	7791.06	4.122	79.934	0.0040	
2:41:28	60.001	3725.677	3090	-1.029	4.921	0.000	3791.192	3765.892	3803.861	3771.053	3750.739	2:41:28	60.001	3725.68	350.00	223.02	16.00	10.00	0.00	-103.00	7791.39	-1.029	79.950	0.0010	
2:41:30	60.003	3727.754	3090	-3.088	2.118	0.000	3788.389	3765.802	3803.824	3771.053	3750.788	2:41:30	60.003	3727.75	350.00	223.02	16.00	10.00	0.00	-103.00	7791.72	-3.088	82.027	0.0030	
2:41:32	60.004	3727.825	3090	-4.122	-0.066	0.000	3786.205	3765.713	3803.782	3771.053	3750.835	2:41:32	60.004	3727.82	350.00	223.02	16.00	10.00	0.00	-103.00	7792.05	-4.122	82.098	0.0040	
2:41:34	60.006	3727.683	3090	-6.181	-2.206	0.000	3784.065	3765.623	3803.736	3771.053	3750.883	2:41:34	60.006	3727.68	350.00	223.02	16.00	10.00	0.00	-103.00	7792.38	-6.181	81.956	0.0060	
2:41:36	60.012	3727.231	3090	-12.361	-5.760	0.000	3780.511	3765.533	3803.681	3771.053	3750.931	2:41:36	60.012	3727.23	350.00	223.02	16.00	10.00	0.00	-103.00	7792.71	-12.361	81.504	0.0120	
2:41:38	60.014	3725.012	3090	-14.420	-8.791	0.000	3777.480	3765.438	3803.620	3771.053	3750.978	2:41:38	60.014	3725.01	350.00	223.02	16.00	10.00	0.00	-103.00	7793.04	-14.420	79.285	0.0140	
2:41:40	60.019	3726.446	3090	-19.571	-12.564	0.000	3773.707	3765.347	3803.550	3771.053	3751.025	2:41:40	60.019	3726.45	350.00	223.02	16.00	10.00	0.00	-103.00	7793.37	-19.571	80.719	0.0190	
2:41:42	60.021	3726.016	3090	-21.630	-15.737	0.000	3770.534	3765.255	3803.473	3771.053	3751.072	2:41:42	60.021	3726.02	350.00	223.02	16.00	10.00	0.00	-103.00	7793.70	-21.630	80.289	0.0210	
2:41:44	60.025	3719.123	3090	-25.752	-19.242	0.000	3767.029	3765.148	3803.389	3771.053	3751.118	2:41:44	60.025	3719.12	350.00	223.02	16.00	10.00	0.00	-103.00	7794.03	-25.752	73.396	0.0250	
2:41:46	60.026	3716.375	3090	-26.781	-21.881	0.000	3764.390	3765.035	3803.298	3771.053	3751.165	2:41:46	60.026	3716.37	350.00	223.02	16.00	10.00	0.00	-103.00	7794.36	-26.781	70.647	0.0260	
2:41:48	60.027	3717.333	3090	-27.810	-23.956	0.000	3762.315	3764.924	3803.203	3771.053	3751.211	2:41:48	60.027	3717.33	350.00	223.02	16.00	10.00	0.00	-103.00	7794.69	-27.810	71.605	0.0270	
2:41:50	60.029	3717.560	3090	-29.869	-26.026	0.000	3760.245	3764.815	3803.104	3771.053	3751.257	2:41:50	60.029	3717.56	350.00	223.02	16.00	10.00	0.00	-103.00	7795.02	-29.869	71.833	0.0290	
2:41:52	60.029	3717.142	3090	-29.869	-27.371	0.000	3758.900	3764.705	3803.002	3771.053	3751.302	2:41:52	60.029	3717.14	350.00	223.02	16.00	10.00	0.00	-103.00	7795.35	-29.869	71.415	0.0290	
2:41:54	60.037	3715.166	3090	-38.109	-31.129	0.000	3755.142	3764.591	3802.892	3771.053	3751.348	2:41:54	60.037	3715.17	350.00	223.02	16.00	10.00	0.00	-103.00	7795.68	-38.109	69.439	0.0370	-103
2:41:56	60.036	3713.632	3090	-37.079	-33.212	0.000	3753.060	3764.474	3802.778	3771.053	3751.393	2:41:56	60.036	3713.63	350.00	223.02	16.00	10.00	0.00	-103.00	7796.01	-37.079	67.905	0.0360	
2:41:58	60.037	3710.283	3090	-38.109	-34.926	0.000	3751.346	3764.350	3802.660	3771.053	3751.438	2:41:58	60.037	3710.28	350.00	223.02	16.00	10.00	0.00	-103.00	7796.34	-38.109	64.556	0.0370	-103
2:42:00	60.037	3710.158	3090	-38.109	-36.040	0.000	3750.231	3764.227	3802.540	3771.053	3751.483	2:42:00	60.037	3710.16	350.00	223.02	16.00	10.00	0.00	-103.00	7796.67	-38.109	64.431	0.0370	-103
2:42:02	60.036	3699.356	3090	-37.079	-36.404	0.000	3749.868	3764.079	3802.420	3771.053	3751.528	2:42:02	60.036	3699.36	350.00	223.02	16.00	10.00	0.00	-103.00	7797.00	-37.079	53.629	0.0360	
2:42:04	60.041	3698.591	3090	-42.230	-38.443	0.000	3747.828	3763.930	3802.296	3771.053	3751.572	2:42:04	60.041	3698.59	350.00	223.02	16.00	10.00	0.00	-103.00	7797.33	-42.230	52.864	0.0410	-103
2:42:06	60.043	3704.591	3090	-44.289	-40.489	0.000	3745.782	3763.796	3802.168	3771.053	3751.617	2:42:06	60.043	3704.59	350.00	223.02	16.00	10.00	0.00	-103.00	7797.66	-44.289	58.864	0.0430	-103
2:42:08	60.044	3703.275	3090	-45.319	-42.179	0.000	3744.092	3763.659	3802.037	3771.053	3751.661	2:42:08	60.044	3703.28	350.00	223.02	16.00	10.00	0.00	-103.00	7797.99	-45.319	57.548	0.0440	-103
2:42:10	60.043	3702.482	3090	-44.289	-42.918	0.000	3743.353	3763.521	3801.904	3771.053	3751.705	2:42:10	60.043	3702.48	350.00	223.02	16.00	10.00	0.00	-103.00	7798.32	-44.289	56.755	0.0430	-103
2:42:12	60.046	3701.316	3090	-47.381	-44.480	0.000	3741.791	3763.380	3801.769	3771.053	3751.748	2:42:12	60.046	3701.32	350.00	223.02	16.00	10.00	0.00	-103.00	7798.65	-47.381	55.589	0.0460	-103
2:42:14	60.048	3700.826	3090	-49.440	-46.216	0.000	3740.055	3763.240	3801.630	3771.053	3751.792	2:42:14	60.048	3700.83	350.00	223.02	16.00	10.00	0.00	-103.00	7798.98	-49.440	55.099	0.0480	-103
2:42:16	60.046	3699.529	3090	-47.381	-46.624	0.000	3739.647	3763.097	3801.491	3771.053	3751.835	2:42:16	60.046	3699.53	350.00	223.02	16.00	10.00	0.00	-103.00	7799.31	-47.381	53.802	0.0460	-103
2:42:18	60.046	3699.726	3090	-47.381	-46.889	0.000	3739.382	3762.955	3801.352	3771.053	3751.878	2:42:18	60.046	3699.73	350.00	223.02	16.00	10.00	0.00	-103.00	7799.64	-47.381	53.999	0.0460	-103
2:42:20	60.043	3690.100	3090	-44.289	-45.979	0.000	3740.292	3762.793	3801.216	3771.053	3751.921	2:42:20	60.043	3690.10	350.00	223.02	16.00	10.00	0.00	-103.00	7799.97	-44.289	44.373	0.0430	-103
2:42:22	60.043	3690.477	3090	-44.289	-45.388	0.000	3740.884	3762.632	3801.082	3771.053	3751.964	2:42:22	60.043	3690.48	350.00	223.02	16.00	10.00	0.00	-103.00	7800.30	-44.289	44.750	0.0430	-103
2:42:24	60.044	3696.865	3090	-45.319	-45.364	0.000	3740.908	3762.485	3800.948	3771.053	3752.006	2:42:24	60.044	3696.86	350.00	223.02	16.00	10.00	0.00	-103.00	7800.63	-45.319	51.137	0.0440	-103
2:42:26	60.043	3696.877	3090	-44.289	-44.988	0.000	3741.284	3762.340	3800.816	3771.053	3752.049	2:42:26	60.043	3696.88	350.00	223.02	16.00	10.00	0.00	-103.00	7800.96	-44.289	51.150	0.0430	-103



T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

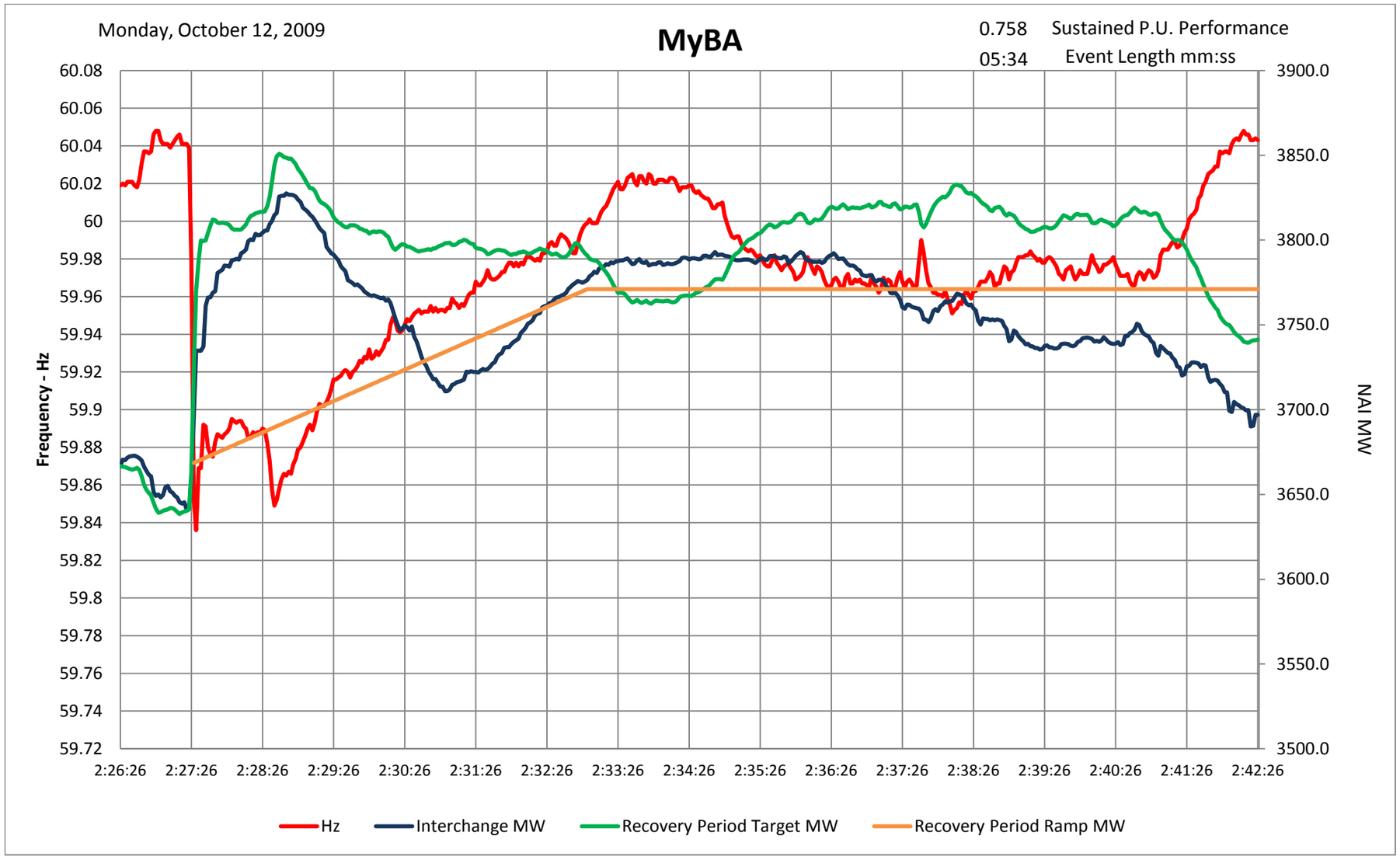
# of rows to shift T(0)

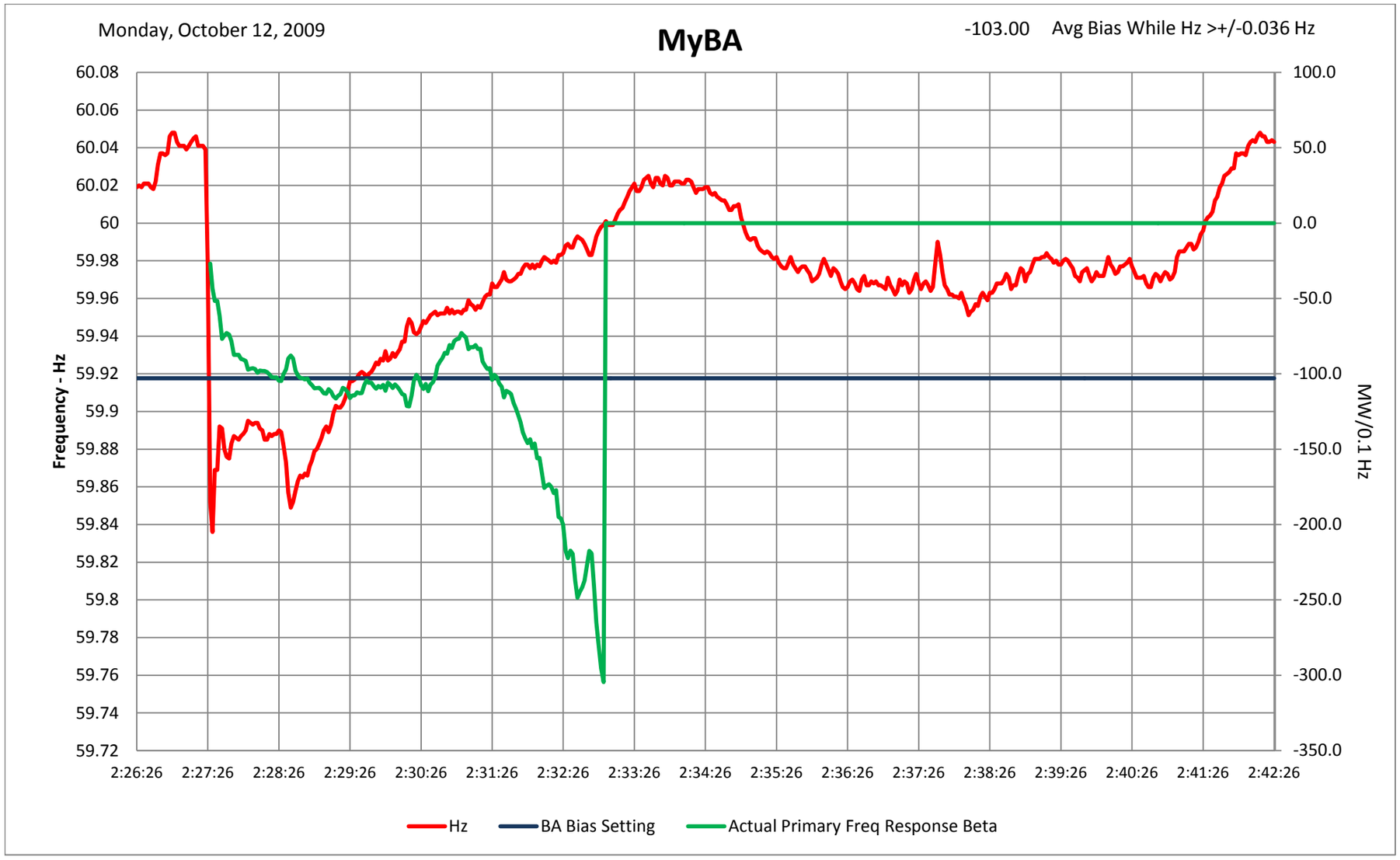
1

A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.

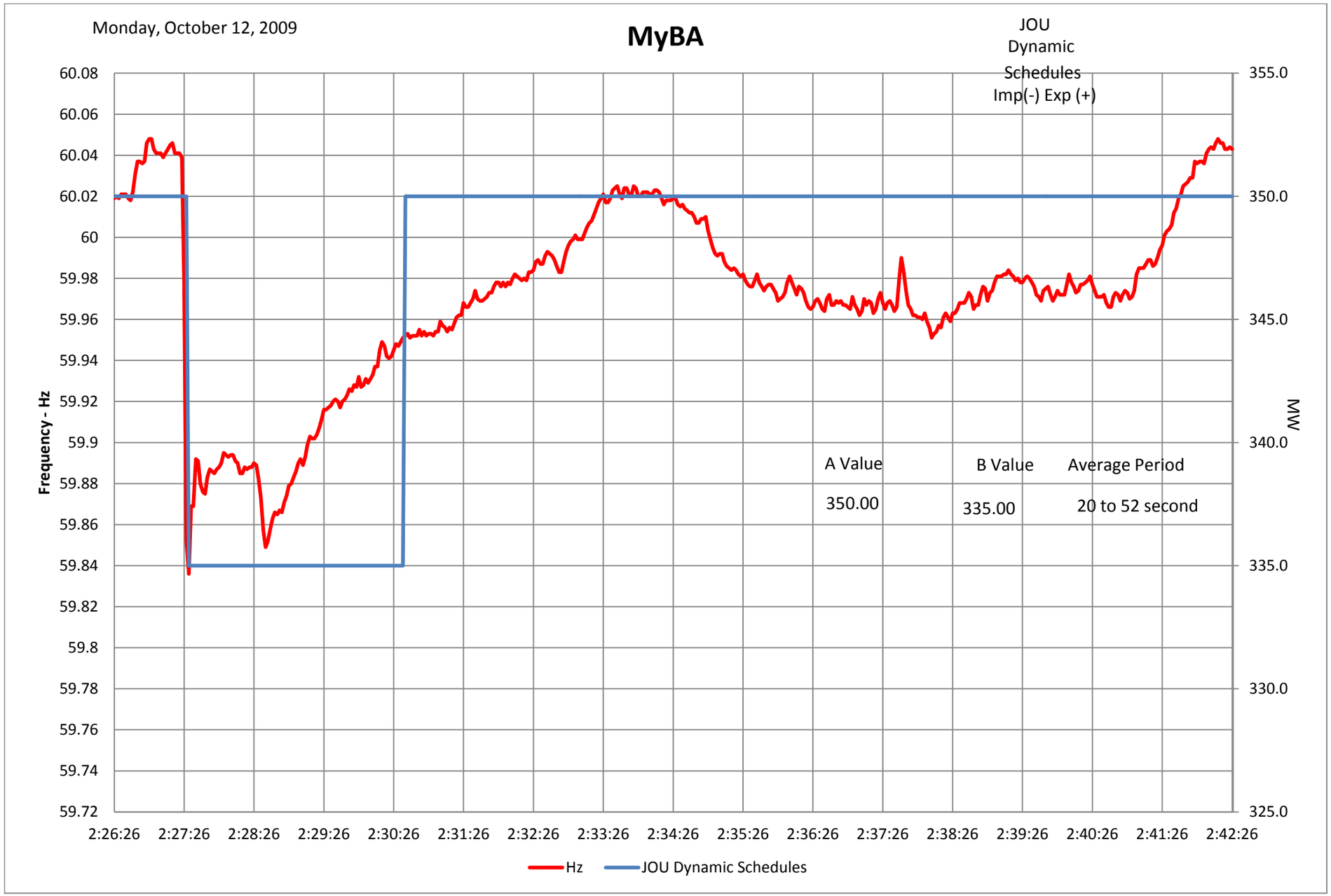

Monday, October 12, 2009
MyBA
0.758
Sustained P.U. Performance
05:34
Event Length mm:ss
Frequency - Hz
NAI MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
3900.0
3850.0
3800.0
3750.0
3700.0
3650.0
3600.0
3550.0
3500.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Interchange MW
Recovery Period Target MW
Recovery Period Ramp MW

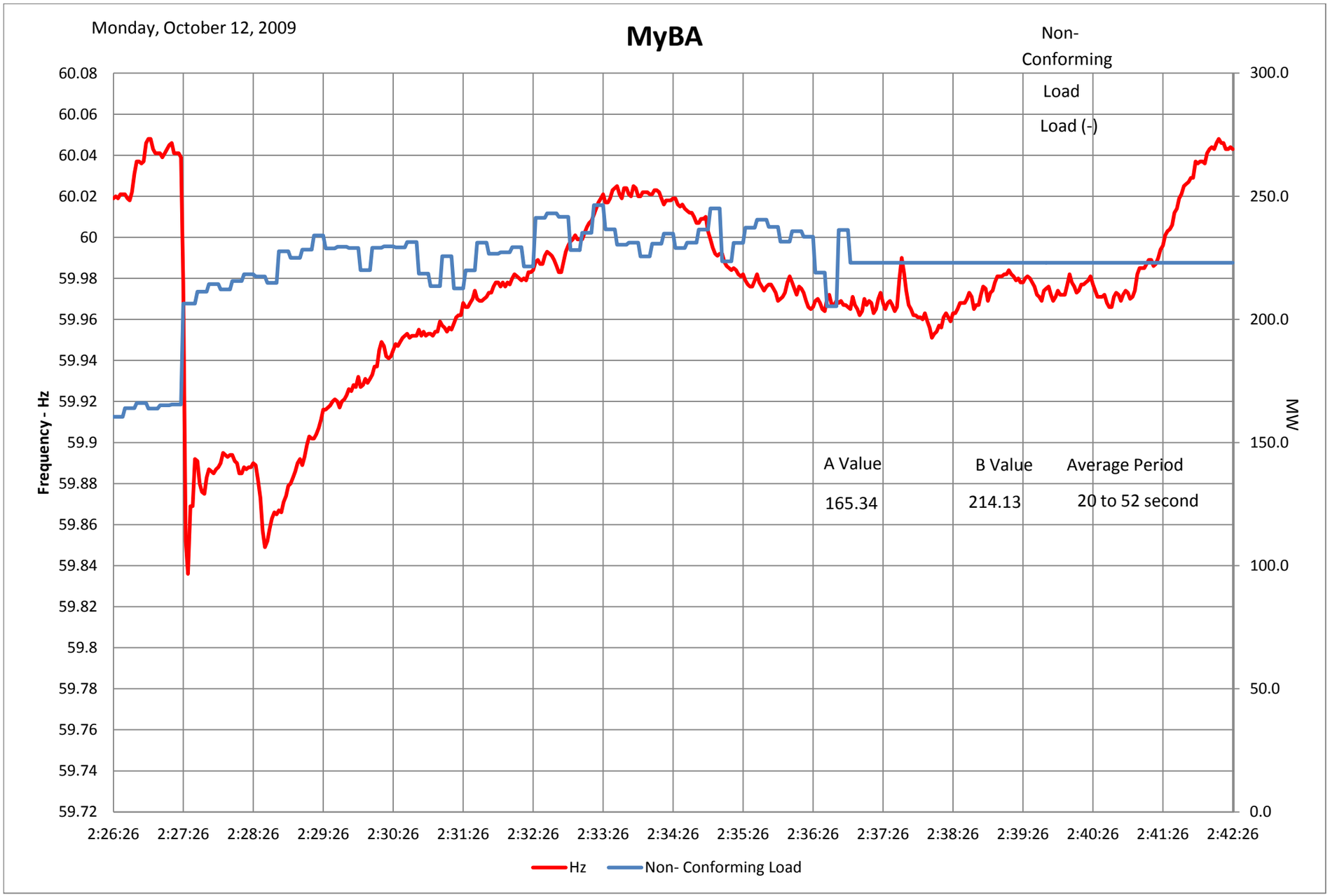

Monday, October 12, 2009
MyBA
-103.00 Avg Bias While Hz >+/-0.036 Hz
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
-250.0
-300.0
-350.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
BA Bias Setting
Actual Primary Freq Response Beta

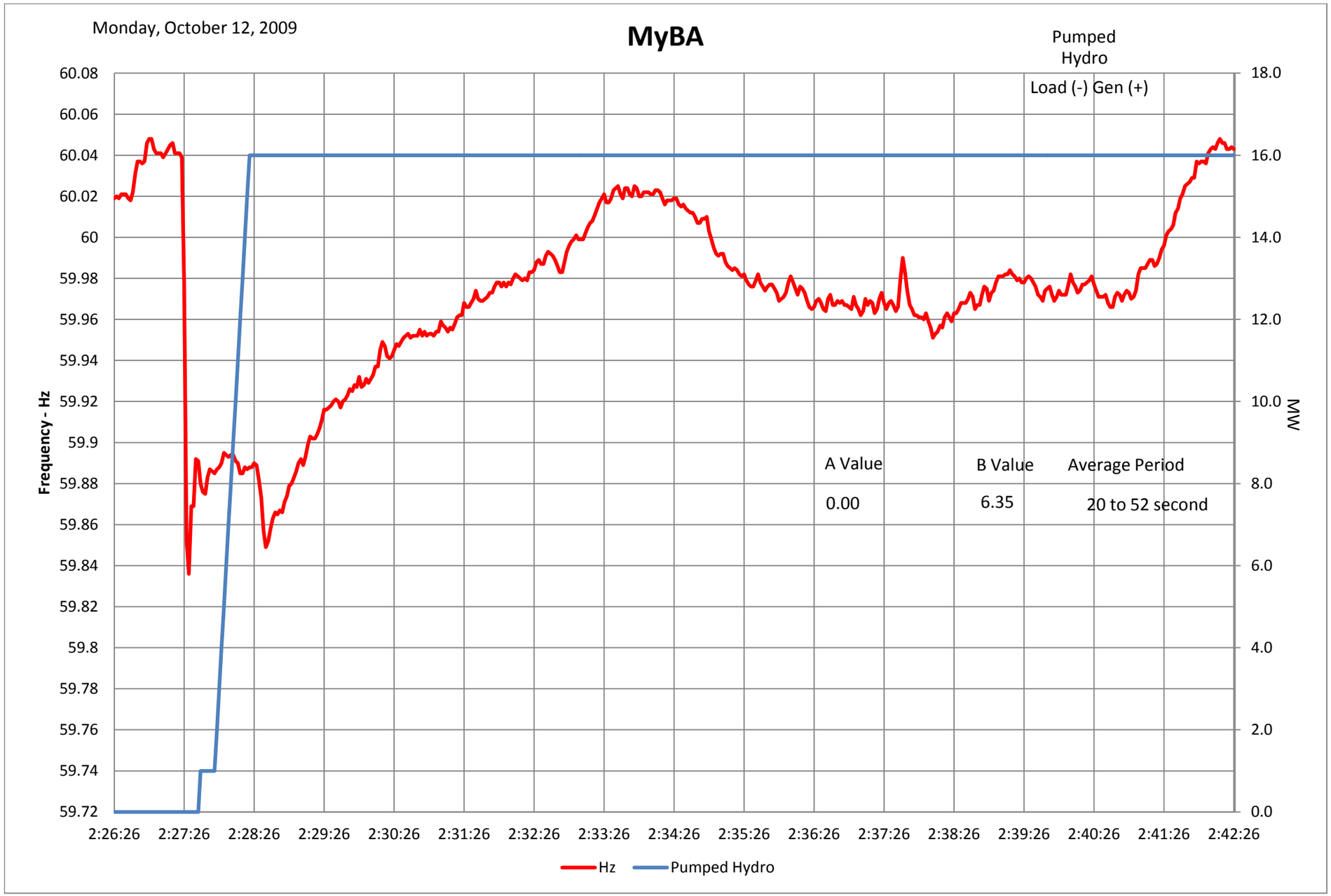
						Value A Data BA Performance												Value B 20 to 52 second Average Period Evaluation														Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
Monday, October 12, 2009	2:27:26	60.039	60.042	2:27:26	59.836	60.042	3645.73	350.00	165.34	0.00	0.00	-4.21	15.00	-103.00	7651.305	-43.39	59.889	3803.35	335.00	165.34	6.35	0.00	11.09	0.00	0.744	1.000	0.758	-103.00	7632.00	114.21	-103.00	1.399	1.293	1.582	1.571	1.849	0.856	0.808	0.829	0.633	0.689	-103.00	-103.00

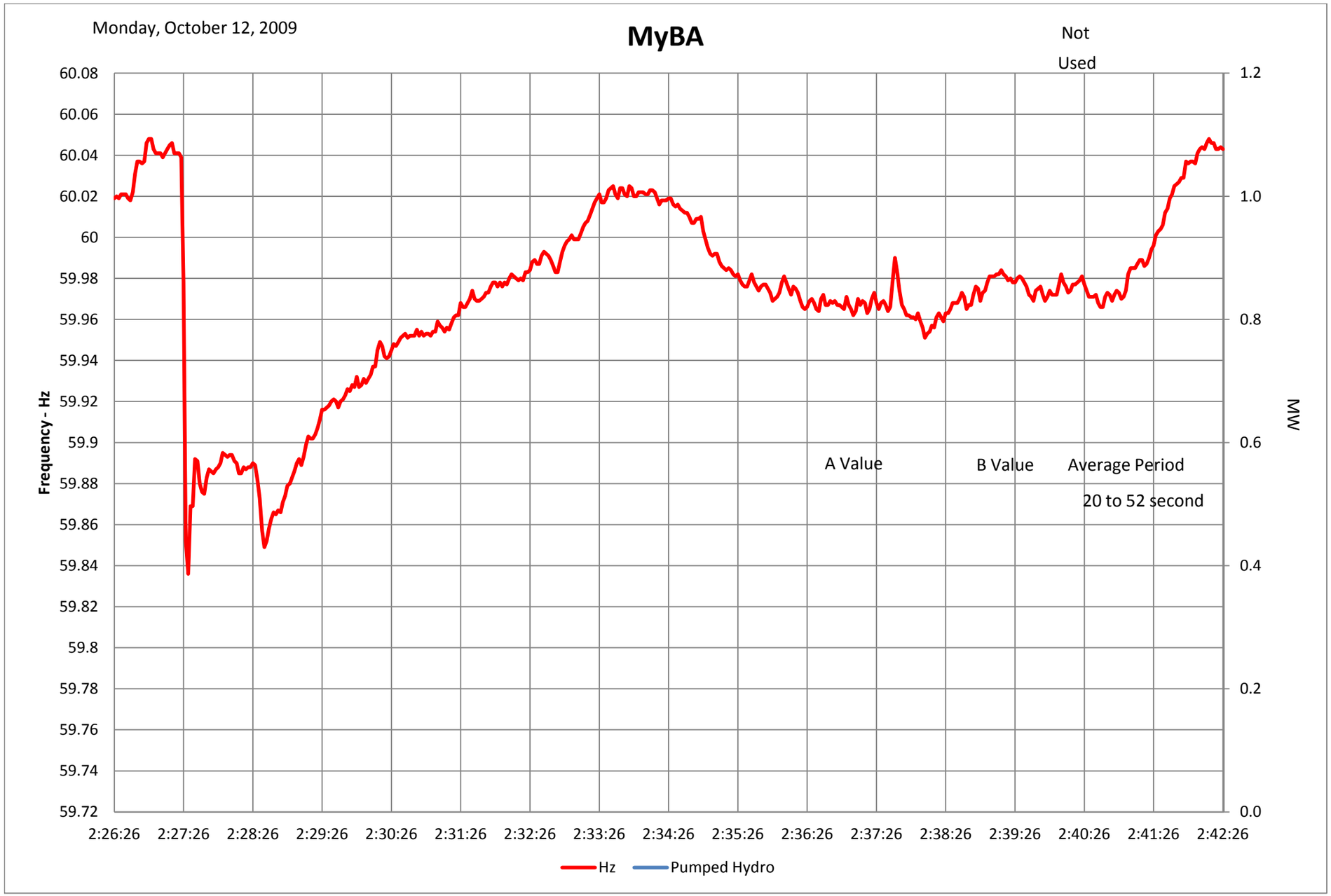
Steps	**To be completed for each event evaluated.**
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order: Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Net Actual Interchange Column D: Joint Owned Unit dynamic schedule Column E: Non Conforming Load Column F: Pumped Hydro Column G: Not Used Column H: Transferred Frequency Response Column I: Contingent BA Lost load or generation Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D, E, F and H are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data. Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time. If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary. To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events) This value controls the end of the "Sustained Frequency Response" evaluation period. Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

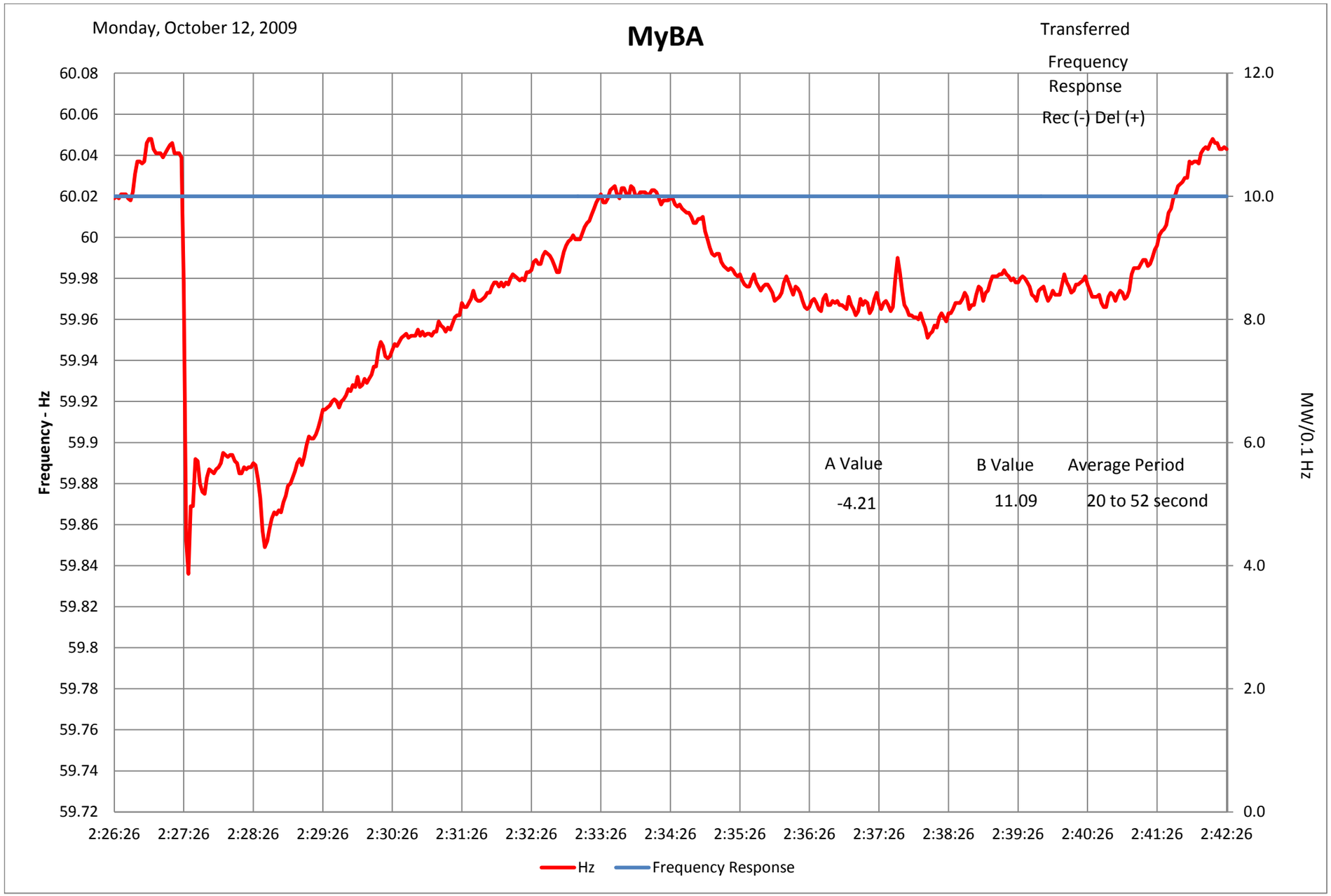
Steps	**To be completed the first time you use Form 2 for your BA.**
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "NYISO".
B	For informational and educational purposes, a "Sustained" performance evaluation is provided in the "Evaluation" worksheet and in the "Sustained" Graph. This evaluation uses a Time Constant (TC) to model the frequency response of your BA. The time constant is located in cell "L13" of the "Evaluation" spreadsheet and should be edited for the types of generators in your BA. Presently this time constant is set at 0.35. The higher the value of the time constant, the faster the delivery of frequency response is expected. Setting the TC to 1.0 effectively turns off the delay and instantaneous frequency response will be modeled. Do not set higher than 1.0. This time constant is only used in the "Sustained" evaluation and is not used for the Field Trial evaluation of performance to the FRO. A typical setting for this time constant is 0.08 to 0.15 for hydro units, 0.10 to 0.20 for large steam turbines and 0.20 to 0.40 for combustion turbines. By observing the slope of your "Interchange Actual" on the "Sustained" Graph, adjust the time constant until the initial slope of the "Target" is similar to the slope of the NAI data. When set appropriately, the "Target" trend on the "Sustained" graph will model what the Net Actua Interchange should have done during the event recovery period based on your Bias setting during the event.

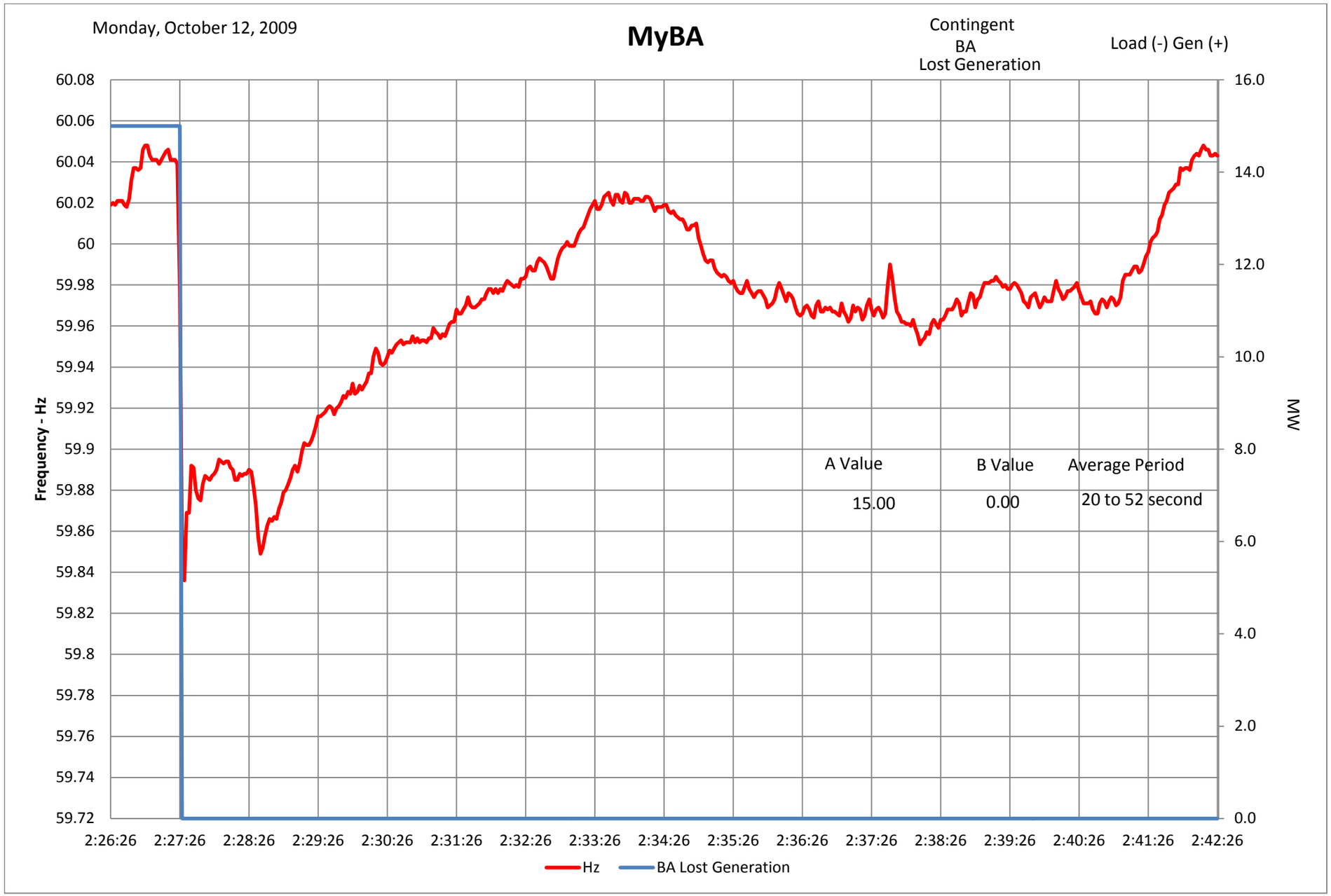

Monday, October 12, 2009
MyBA
JOU Dynamic Schedules Imp(-) Exp (+)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
355.0
350.0
345.0
340.0
335.0
330.0
325.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
350.00
B Value
335.00
Average Period
20 to 52 second
Hz
JOU Dynamic Schedules

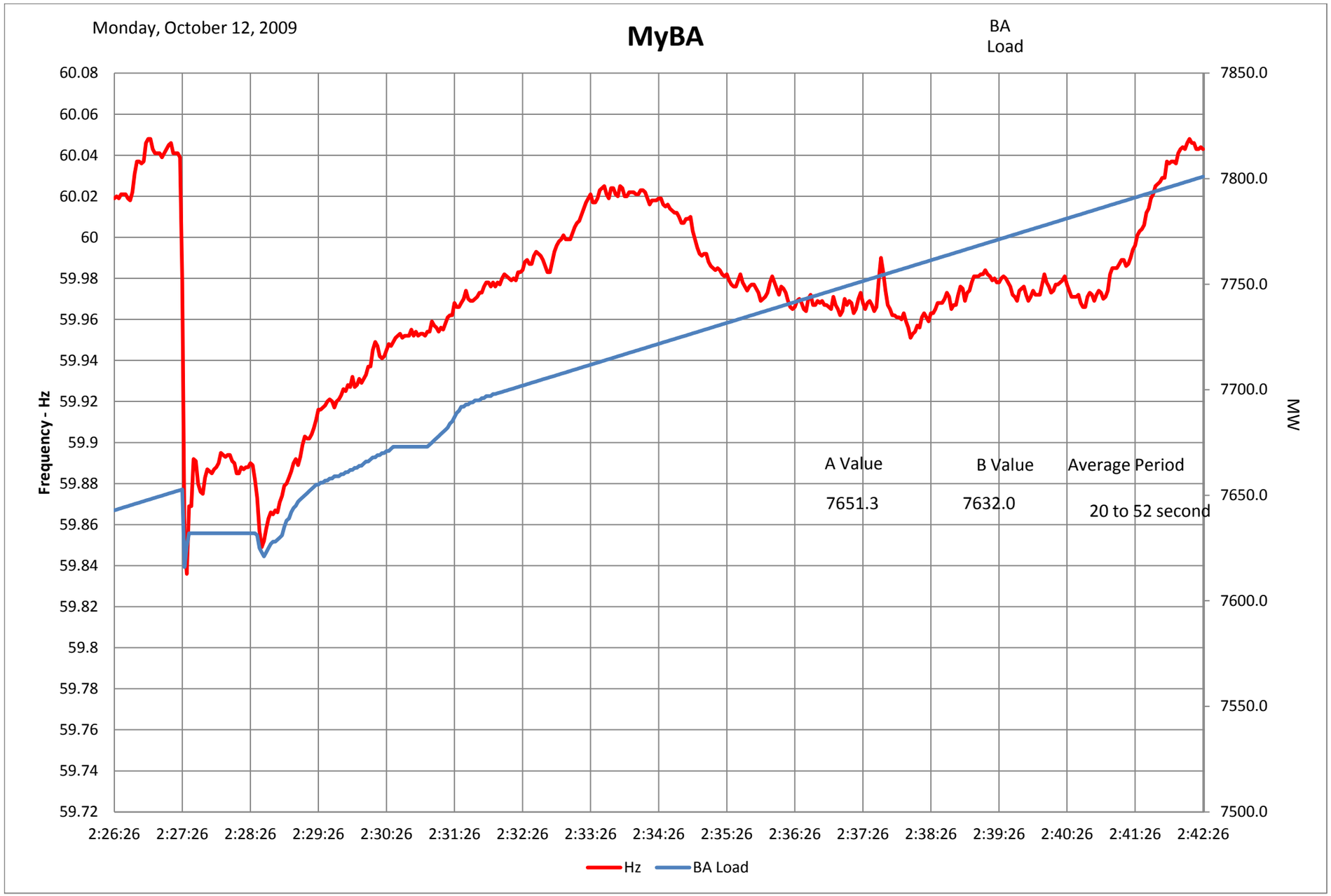

Monday, October 12, 2009
MyBA
Non-Conforming Load
Load (-)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
300.0
250.0
200.0
150.0
100.0
50.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
165.34
B Value
214.13
Average Period
20 to 52 second
Hz
Non- Conforming Load

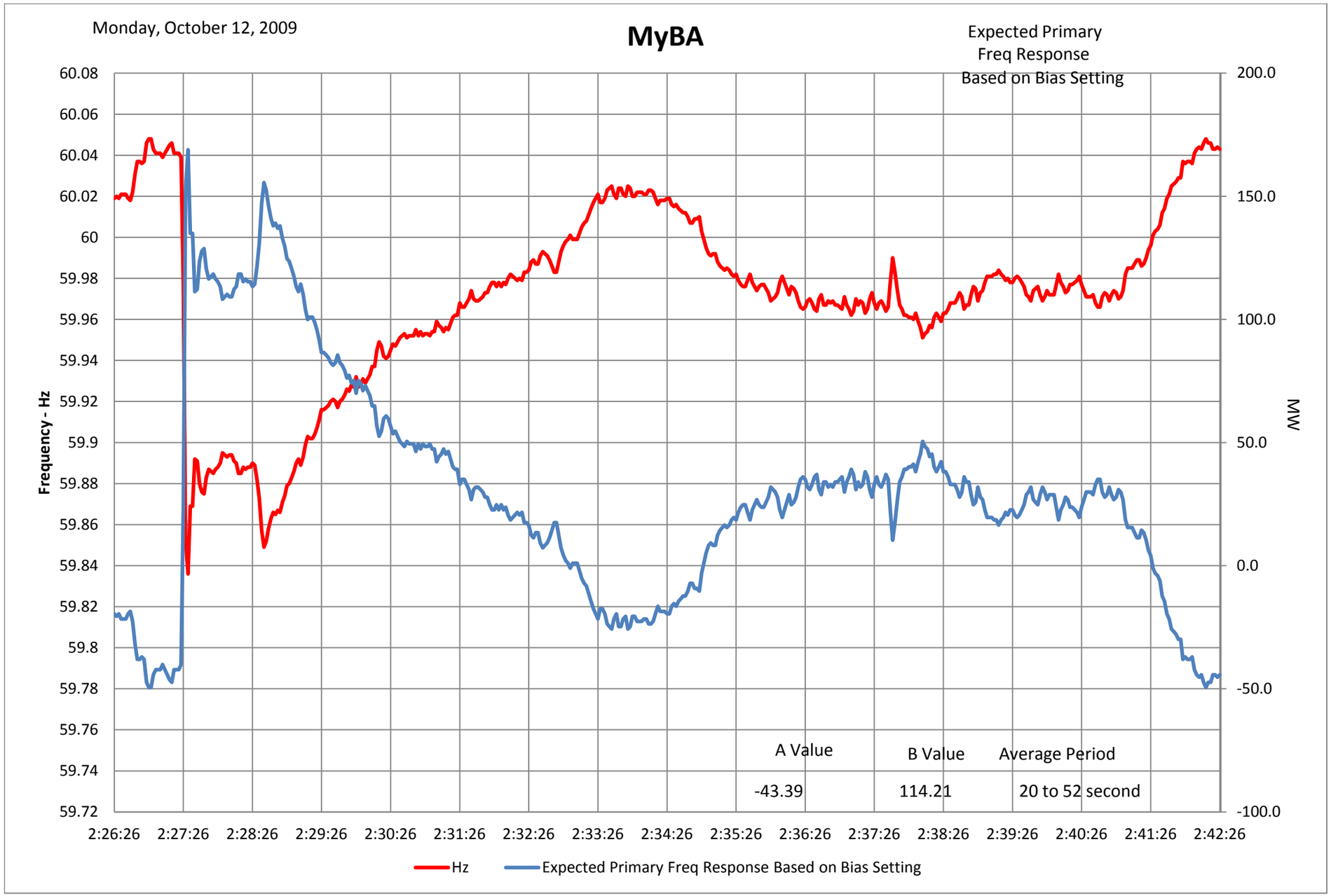

Monday, October 12, 2009
MyBA
Pumped Hydro
Load (-) Gen (+)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
0.00
B Value
6.35
Average Period
20 to 52 second
Hz
Pumped Hydro


Monday, October 12, 2009
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
1.2
1.0
0.8
0.6
0.4
0.2
0.0
MW
A Value
B Value
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Pumped Hydro


Monday, October 12, 2009
MyBA
Transferred Frequency Response
Rec (-) Del (+)
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
-4.21
B Value
11.09
Average Period
20 to 52 second
Hz
Frequency Response


Monday, October 12, 2009
MyBA
Contingent
BA
Lost Generation
Load (-) Gen (+)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
15.00
B Value
0.00
Average Period
20 to 52 second
Hz
BA Lost Generation


Monday, October 12, 2009
MyBA
BA Load
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
7850.0
7800.0
7750.0
7700.0
7650.0
7600.0
7550.0
7500.0
MW
A Value
7651.3
B Value
7632.0
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
BA Load


Monday, October 12, 2009
MyBA
Expected Primary
Freq Response
Based on Bias Setting
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
B Value
Average Period
-43.39
114.21
20 to 52 second
Hz
Expected Primary Freq Response Based on Bias Setting

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:40:00	60.0097	471		0	0				-653	29756.85
05/16/11 07:40:02	60.00745	471		0	0				-653	29756.85
05/16/11 07:40:04	60.00452	471		0	0				-653	29756.82
05/16/11 07:40:06	60.00259	471		0	0				-653	29756.82
05/16/11 07:40:08	60.00034	471		0	0				-653	29756.82
05/16/11 07:40:10	59.99872	471		0	0				-653	29756.82
05/16/11 07:40:12	59.9971	471		0	0				-653	29756.82
05/16/11 07:40:14	59.99548	471		0	0				-653	29766.46
05/16/11 07:40:16	59.99353	471		0	0				-653	29766.46
05/16/11 07:40:18	59.99063	471		0	0				-653	29766.46
05/16/11 07:40:20	59.9874	471		0	0				-653	29766.46
05/16/11 07:40:22	59.98416	471		0	0				-653	29766.46
05/16/11 07:40:24	59.98093	471		0	0				-653	29766.37
05/16/11 07:40:26	59.97867	471		0	0				-653	29766.37
05/16/11 07:40:28	59.97836	471		0	0				-653	29766.37
05/16/11 07:40:30	59.97836	471		0	0				-653	29766.37
05/16/11 07:40:32	59.97836	471		0	0				-653	29766.37
05/16/11 07:40:34	59.97577	471		0	0				-653	29780.98
05/16/11 07:40:36	59.97382	471		0	0				-653	29780.98
05/16/11 07:40:38	59.97223	471		0	0				-653	29780.98
05/16/11 07:40:40	59.97223	471		0	0				-653	29780.98
05/16/11 07:40:42	59.97318	471		0	0				-653	29780.98
05/16/11 07:40:44	59.97351	471		0	0				-653	29780.95
05/16/11 07:40:46	59.97415	471		0	0				-653	29780.95
05/16/11 07:40:48	59.97287	471		0	0				-653	29780.95
05/16/11 07:40:50	59.97287	471		0	0				-653	29780.95
05/16/11 07:40:52	59.97287	471		0	0				-653	29780.95
05/16/11 07:40:54	59.96832	471		0	0				-653	29770.34
05/16/11 07:40:56	59.96768	471		0	0				-653	29770.34
05/16/11 07:40:58	59.96899	471		0	0				-653	29770.34
05/16/11 07:41:00	59.97028	471		0	0				-653	29770.34
05/16/11 07:41:02	59.97223	471		0	0				-653	29770.34
05/16/11 07:41:04	59.97382	471		0	0				-653	29770.34
05/16/11 07:41:06	59.97479	471		0	0				-653	29770.34
05/16/11 07:41:08	59.9761	471		0	0				-653	29770.34
05/16/11 07:41:10	59.97769	471		0	0				-653	29770.34
05/16/11 07:41:12	59.97998	471		0	0				-653	29770.34
05/16/11 07:41:14	59.98318	471		0	0				-653	29782.73
05/16/11 07:41:16	59.98578	471		0	0				-653	29782.73
05/16/11 07:41:18	59.9874	471		0	0				-653	29782.73

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
	0				
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.005	0.005	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:41:20	59.98868	471		0	0				-653	29782.73
05/16/11 07:41:22	59.98999	471		0	0				-653	29782.73
05/16/11 07:41:24	59.99191	471		0	0				-653	29782.82
05/16/11 07:41:26	59.99353	471		0	0				-653	29782.82
05/16/11 07:41:28	59.99612	471		0	0				-653	29782.82
05/16/11 07:41:30	59.99805	471		0	0				-653	29782.82
05/16/11 07:41:32	59.99902	471		0	0				-653	29782.82
05/16/11 07:41:34	59.99902	471		0	0				-653	29786.15
05/16/11 07:41:36	59.99774	471		0	0				-653	29786.15
05/16/11 07:41:38	59.99646	471		0	0				-653	29786.15
05/16/11 07:41:40	59.99579	471		0	0				-653	29786.15
05/16/11 07:41:42	59.99612	471		0	0				-653	29786.15
05/16/11 07:41:44	59.9971	471		0	0				-653	29786.21
05/16/11 07:41:46	59.99774	471		0	0				-653	29786.21
05/16/11 07:41:48	59.99838	471		0	0				-653	29786.21
05/16/11 07:41:50	59.99936	471		0	0				-653	29786.21
05/16/11 07:41:52	60	471		0	0				-653	29786.21
05/16/11 07:41:54	60.00064	471		0	0				-653	29778.98
05/16/11 07:41:56	60.00128	471		0	0				-653	29778.98
05/16/11 07:41:58	60.00226	471		0	0				-653	29778.98
05/16/11 07:42:00	60.00388	471		0	0				-653	29778.98
05/16/11 07:42:02	60.00647	471		0	0				-653	29778.98
05/16/11 07:42:04	60.0097	471		0	0				-653	29778.92
05/16/11 07:42:06	60.01358	471		0	0				-653	29778.92
05/16/11 07:42:08	60.01614	471		0	0				-653	29778.92
05/16/11 07:42:10	60.01776	471		0	0				-653	29778.92
05/16/11 07:42:12	60.01776	471		0	0				-653	29778.92
05/16/11 07:42:14	60.01486	471		0	0				-653	29787.9
05/16/11 07:42:16	60.01163	471		0	0				-653	29787.9
05/16/11 07:42:18	60.00903	471		0	0				-653	29787.9
05/16/11 07:42:20	60.00775	471		0	0				-653	29787.9
05/16/11 07:42:22	60.00775	471		0	0				-653	29787.9
05/16/11 07:42:24	60.00903	471		0	0				-653	29787.84
05/16/11 07:42:26	60.00903	471		0	0				-653	29787.84
05/16/11 07:42:28	60.01324	471		0	0				-653	29787.84
05/16/11 07:42:30	60.01486	471		0	0				-653	29787.84
05/16/11 07:42:32	60.0152	471		0	0				-653	29787.84
05/16/11 07:42:34	60.0152	471		0	0				-653	29813.39
05/16/11 07:42:36	60.01486	471		0	0				-653	29813.39
05/16/11 07:42:38	60.01422	471		0	0				-653	29813.39

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:42:40	60.01358	471		0	0				-653	29813.39
05/16/11 07:42:42	60.01227	471		0	0				-653	29813.39
05/16/11 07:42:44	60.01099	471		0	0				-653	29813.33
05/16/11 07:42:46	60.00873	471		0	0				-653	29813.33
05/16/11 07:42:48	60.00647	471		0	0				-653	29813.33
05/16/11 07:42:50	60.00485	471		0	0				-653	29813.33
05/16/11 07:42:52	60.00354	471		0	0				-653	29813.33
05/16/11 07:42:54	60.00195	471		0	0				-653	29797.46
05/16/11 07:42:56	60	471		0	0				-653	29797.46
05/16/11 07:42:58	59.99774	471		0	0				-653	29797.46
05/16/11 07:43:00	59.99612	471		0	0				-653	29797.46
05/16/11 07:43:02	59.99646	471		0	0				-653	29797.46
05/16/11 07:43:04	59.99741	471		0	0				-653	29797.52
05/16/11 07:43:06	59.99838	471		0	0				-653	29797.52
05/16/11 07:43:08	59.99936	471		0	0				-653	29797.52
05/16/11 07:43:10	59.99902	471		0	0				-653	29797.52
05/16/11 07:43:12	59.99872	471		0	0				-653	29797.52
05/16/11 07:43:14	59.99774	471		0	0				-653	29780.33
05/16/11 07:43:16	59.99646	471		0	0				-653	29780.33
05/16/11 07:43:18	59.99677	471		0	0				-653	29780.33
05/16/11 07:43:20	59.99677	471		0	0				-653	29780.33
05/16/11 07:43:22	59.99774	471		0	0				-653	29780.33
05/16/11 07:43:24	59.99805	471		0	0				-653	29780.27
05/16/11 07:43:26	59.99774	471		0	0				-653	29780.27
05/16/11 07:43:28	59.99579	471		0	0				-653	29780.27
05/16/11 07:43:30	59.99387	471		0	0				-653	29780.27
05/16/11 07:43:32	59.99255	471		0	0				-653	29780.27
05/16/11 07:43:34	59.99127	471		0	0				-653	29785.63
05/16/11 07:43:36	59.98999	471		0	0				-653	29785.63
05/16/11 07:43:38	59.98965	471		0	0				-653	29785.63
05/16/11 07:43:40	59.98837	471		0	0				-653	29785.63
05/16/11 07:43:42	59.98709	471		0	0				-653	29785.63
05/16/11 07:43:44	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:46	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:48	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:50	59.98676	471		0	0				-653	29785.63
05/16/11 07:43:52	59.98676	471		0	0				-653	29785.63
05/16/11 07:43:54	59.98642	471		0	0				-653	29787.12
05/16/11 07:43:56	59.98611	471		0	0				-653	29787.12
05/16/11 07:43:58	59.98611	471		0	0				-653	29787.12

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:44:00	59.98514	471		0	0				-653	29787.12
05/16/11 07:44:02	59.98416	471		0	0				-653	29787.12
05/16/11 07:44:04	59.98352	471		0	0				-653	29787.12
05/16/11 07:44:06	59.98224	471		0	0				-653	29787.12
05/16/11 07:44:08	59.98029	471		0	0				-653	29787.12
05/16/11 07:44:10	59.979	471		0	0				-653	29787.12
05/16/11 07:44:12	59.97769	471		0	0				-653	29787.12
05/16/11 07:44:14	59.97675	471		0	0				-653	29780.67
05/16/11 07:44:16	59.97641	471		0	0				-653	29780.67
05/16/11 07:44:18	59.97739	471		0	0				-653	29780.67
05/16/11 07:44:20	59.97998	471		0	0				-653	29780.67
05/16/11 07:44:22	59.98318	471		0	0				-653	29780.67
05/16/11 07:44:24	59.98611	471		0	0				-653	29780.76
05/16/11 07:44:26	59.98837	471		0	0				-653	29780.76
05/16/11 07:44:28	59.9903	471		0	0				-653	29780.76
05/16/11 07:44:30	59.99191	471		0	0				-653	29780.76
05/16/11 07:44:32	59.99353	471		0	0				-653	29780.76
05/16/11 07:44:34	59.99579	471		0	0				-653	29777.7
05/16/11 07:44:36	60	471		0	0				-653	29777.7
05/16/11 07:44:38	60.00354	471		0	0				-653	29777.7
05/16/11 07:44:40	60.00647	471		0	0				-653	29777.7
05/16/11 07:44:42	60.00839	471		0	0				-653	29777.7
05/16/11 07:44:44	60.00903	471		0	0				-653	29777.7
05/16/11 07:44:46	60.00873	471		0	0				-653	29777.7
05/16/11 07:44:48	60.00873	471		0	0				-653	29777.7
05/16/11 07:44:50	60.00937	471		0	0				-653	29777.7
05/16/11 07:44:52	60.01099	471		0	0				-653	29777.7
05/16/11 07:44:54	60.01453	471		0	0				-653	29788.63
05/16/11 07:44:56	60.0181	471		0	0				-653	29788.63
05/16/11 07:44:58	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:00	60.02036	471		0	0				-653	29788.63
05/16/11 07:45:02	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:04	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:06	60.01907	471		0	0				-653	29788.63
05/16/11 07:45:08	60.0181	471		0	0				-653	29788.63
05/16/11 07:45:10	60.01712	471		0	0				-653	29788.63
05/16/11 07:45:12	60.01712	471		0	0				-653	29788.63
05/16/11 07:45:14	60.01712	471		0	0				-653	29788.51
05/16/11 07:45:16	60.01453	471		0	0				-653	29788.51
05/16/11 07:45:18	60.01358	471		0	0				-653	29788.51

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:45:20	60.01227	471		0	0				-653	29788.51
05/16/11 07:45:22	60.01163	471		0	0				-653	29788.51
05/16/11 07:45:24	60.01065	471		0	0				-653	29788.51
05/16/11 07:45:26	60.0097	471		0	0				-653	29788.51
05/16/11 07:45:28	60.00839	471		0	0				-653	29788.51
05/16/11 07:45:30	60.00745	471		0	0				-653	29788.51
05/16/11 07:45:32	60.00775	471		0	0				-653	29788.51
05/16/11 07:45:34	60.00839	471		0	0				-653	29780.62
05/16/11 07:45:36	60.00839	471		0	0				-653	29780.62
05/16/11 07:45:38	60.00809	471		0	0				-653	29780.62
05/16/11 07:45:40	60.00745	471		0	0				-653	29780.62
05/16/11 07:45:42	60.00711	471		0	0				-653	29780.62
05/16/11 07:45:44	60.00839	471		0	0				-653	29780.56
05/16/11 07:45:46	60.00937	471		0	0				-653	29780.56
05/16/11 07:45:48	60.0097	471		0	0				-653	29780.56
05/16/11 07:45:50	60.01001	471		0	0				-653	29780.56
05/16/11 07:45:52	60.01065	471		0	0				-653	29780.56
05/16/11 07:45:54	60.01196	471		0	0				-653	29784.96
05/16/11 07:45:56	60.01324	471		0	0				-653	29784.96
05/16/11 07:45:58	60.01453	471		0	0				-653	29784.96
05/16/11 07:46:00	60.01614	471		0	0				-653	29784.96
05/16/11 07:46:02	60.01712	471		0	0				-653	29784.96
05/16/11 07:46:04	60.01712	471		0	0				-653	29784.93
05/16/11 07:46:06	60.01614	471		0	0				-653	29784.93
05/16/11 07:46:08	60.01584	471		0	0				-653	29784.93
05/16/11 07:46:10	60.01614	471		0	0				-653	29784.93
05/16/11 07:46:12	60.01584	471		0	0				-653	29784.93
05/16/11 07:46:14	60.01486	471		0	0				-653	29760.42
05/16/11 07:46:16	60.01422	471		0	0				-653	29760.42
05/16/11 07:46:18	60.01227	471		0	0				-653	29760.42
05/16/11 07:46:20	60.0097	471		0	0				-653	29760.42
05/16/11 07:46:22	60.00711	471		0	0				-653	29760.42
05/16/11 07:46:24	60.00583	471		0	0				-653	29760.42
05/16/11 07:46:26	60.00516	471		0	0				-653	29760.42
05/16/11 07:46:28	60.00516	471		0	0				-653	29760.42
05/16/11 07:46:30	60.00485	471		0	0				-653	29760.42
05/16/11 07:46:32	60.00388	471		0	0				-653	29760.42
05/16/11 07:46:34	60.00259	471		0	0				-653	29782.35
05/16/11 07:46:36	59.99902	471		0	0				-653	29782.35
05/16/11 07:46:38	59.9971	471		0	0				-653	29782.35

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	Rows of data to shift to align T(0)
	59.999	0.078	-0.078	0.009	1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:46:40	59.99646	471		0	0				-653	29782.35
05/16/11 07:46:42	59.99579	471		0	0				-653	29782.35
05/16/11 07:46:44	59.99417	471		0	0				-653	29782.44
05/16/11 07:46:46	59.99225	471		0	0				-653	29782.44
05/16/11 07:46:48	59.9903	471		0	0				-653	29782.44
05/16/11 07:46:50	59.98804	471		0	0				-653	29782.44
05/16/11 07:46:52	59.98709	471		0	0				-653	29782.44
05/16/11 07:46:54	59.98676	471		0	0				-653	29785.52
05/16/11 07:46:56	59.98578	471		0	0				-653	29785.52
05/16/11 07:46:58	59.9845	471		0	0				-653	29785.52
05/16/11 07:47:00	59.98288	471		0	0				-653	29785.52
05/16/11 07:47:02	59.98224	471		0	0				-653	29785.52
05/16/11 07:47:04	59.98224	471		0	0				-653	29785.55
05/16/11 07:47:06	59.98224	471		0	0				-653	29785.55
05/16/11 07:47:08	59.98254	471		0	0				-653	29785.55
05/16/11 07:47:10	59.98386	471		0	0				-653	29785.55
05/16/11 07:47:12	59.9848	471		0	0				-653	29785.55
05/16/11 07:47:14	59.98578	471		0	0				-653	29788.21
05/16/11 07:47:16	59.98642	471		0	0				-653	29788.21
05/16/11 07:47:18	59.98999	471		0	0				-653	29788.21
05/16/11 07:47:20	59.99225	471		0	0				-653	29788.21
05/16/11 07:47:22	59.99323	471		0	0				-653	29788.21
05/16/11 07:47:24	59.99646	471		0	0				-653	29788.06
05/16/11 07:47:26	59.99902	471		0	0				-653	29788.06
05/16/11 07:47:28	60.00064	471		0	0				-653	29788.06
05/16/11 07:47:30	60.00647	471		0	0				-653	29788.06
05/16/11 07:47:32	60.00903	471		0	0				-653	29788.06
05/16/11 07:47:34	60.01099	471		0	0				-653	29776.11
05/16/11 07:47:36	60.01132	471		0	0				-653	29776.11
05/16/11 07:47:38	60.01291	471		0	0				-653	29776.11
05/16/11 07:47:40	60.01324	471		0	0				-653	29776.11
05/16/11 07:47:42	60.01324	471		0	0				-653	29776.11
05/16/11 07:47:44	60.01422	471		0	0				-653	29776.17
05/16/11 07:47:46	60.0181	471		0	0				-653	29776.17
05/16/11 07:47:48	60.01907	471		0	0				-653	29776.17
05/16/11 07:47:50	60.02133	471		0	0				-653	29776.17
05/16/11 07:47:52	60.02197	471		0	0				-653	29776.17
05/16/11 07:47:54	60.02164	471		0	0				-653	29794.69
05/16/11 07:47:56	60.01971	471		0	0				-653	29794.69
05/16/11 07:47:58	60.01907	471		0	0				-653	29794.69

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.006	0.006	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:48:00	60.01746	471		0	0				-653	29794.69
05/16/11 07:48:02	60.01776	471		0	0				-653	29794.69
05/16/11 07:48:04	60.0184	471		0	0				-653	29794.66
05/16/11 07:48:06	60.01776	471		0	0				-653	29794.66
05/16/11 07:48:08	60.0152	471		0	0				-653	29794.66
05/16/11 07:48:10	60.01389	471		0	0				-653	29794.66
05/16/11 07:48:12	60.01422	471		0	0				-653	29794.66
05/16/11 07:48:14	60.0152	471		0	0				-653	29804.78
05/16/11 07:48:16	60.01614	471		0	0				-653	29804.78
05/16/11 07:48:18	60.01614	471		0	0				-653	29804.78
05/16/11 07:48:20	60.01422	471		0	0				-653	29804.78
05/16/11 07:48:22	60.01196	471		0	0				-653	29804.78
05/16/11 07:48:24	60.01035	471		0	0				-653	29804.86
05/16/11 07:48:26	60.00809	471		0	0				-653	29804.86
05/16/11 07:48:28	60.00613	471		0	0				-653	29804.86
05/16/11 07:48:30	60.00516	471		0	0				-653	29804.86
05/16/11 07:48:32	60.00452	471		0	0				-653	29804.86
05/16/11 07:48:34	60.00354	471		0	0				-653	29800.12
05/16/11 07:48:36	60.00128	471		0	0				-653	29800.12
05/16/11 07:48:38	60	471		0	0				-653	29800.12
05/16/11 07:48:40	59.99936	471		0	0				-653	29800.12
05/16/11 07:48:42	59.99838	471		0	0				-653	29800.12
05/16/11 07:48:44	59.99741	471		0	0				-653	29800.18
05/16/11 07:48:46	59.99579	471		0	0				-653	29800.18
05/16/11 07:48:48	59.99515	471		0	0				-653	29800.18
05/16/11 07:48:50	59.99646	471		0	0				-653	29800.18
05/16/11 07:48:52	59.99872	471		0	0				-653	29800.18
05/16/11 07:48:54	60.00128	471		0	0				-653	29799.82
05/16/11 07:48:56	60.00323	471		0	0				-653	29799.82
05/16/11 07:48:58	60.00421	471		0	0				-653	29799.82
05/16/11 07:49:00	60.00485	471		0	0				-653	29799.82
05/16/11 07:49:02	60.00549	471		0	0				-653	29799.82
05/16/11 07:49:04	60.00583	471		0	0				-653	29799.79
05/16/11 07:49:06	60.00583	471		0	0				-653	29799.79
05/16/11 07:49:08	60.00549	471		0	0				-653	29799.79
05/16/11 07:49:10	60.00388	471		0	0				-653	29799.79
05/16/11 07:49:12	60.00226	471		0	0				-653	29799.79
05/16/11 07:49:14	60.00226	471		0	0				-653	29795.67
05/16/11 07:49:16	60	471		0	0				-653	29795.67
05/16/11 07:49:18	60	471		0	0				-653	29795.67

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:49:20	60	471		0	0				-653	29795.67
05/16/11 07:49:22	60	471		0	0				-653	29795.67
05/16/11 07:49:24	60.00452	471		0	0				-653	29795.55
05/16/11 07:49:26	60.00583	471		0	0				-653	29795.55
05/16/11 07:49:28	60.00613	471		0	0				-653	29795.55
05/16/11 07:49:30	60.00583	471		0	0				-653	29795.55
05/16/11 07:49:32	60.00516	471		0	0				-653	29795.55
05/16/11 07:49:34	60.00388	471		0	0				-653	29783.53
05/16/11 07:49:36	60.00195	471		0	0				-653	29783.53
05/16/11 07:49:38	60.00128	471		0	0				-653	29783.53
05/16/11 07:49:40	60.00098	471		0	0				-653	29783.53
05/16/11 07:49:42	60.00034	471		0	0				-653	29783.53
05/16/11 07:49:44	60	471		0	0				-653	29783.47
05/16/11 07:49:46	59.99902	471		0	0				-653	29783.47
05/16/11 07:49:48	59.99872	471		0	0				-653	29783.47
05/16/11 07:49:50	59.99838	471		0	0				-653	29783.47
05/16/11 07:49:52	59.99612	471		0	0				-653	29783.47
05/16/11 07:49:54	59.99579	471		0	0				-653	29788.38
05/16/11 07:49:56	59.99515	471		0	0				-653	29788.38
05/16/11 07:49:58	59.99387	471		0	0				-653	29788.38
05/16/11 07:50:00	59.99225	471		0	0				-653	29788.38
05/16/11 07:50:02	59.99225	471		0	0				-653	29788.38
05/16/11 07:50:04	59.99484	471		0	0				-653	29788.38
05/16/11 07:50:06	59.99646	471		0	0				-653	29788.38
05/16/11 07:50:08	59.9971	471		0	0				-653	29788.38
05/16/11 07:50:10	59.99548	471		0	0				-653	29788.38
05/16/11 07:50:12	59.99289	471		0	0				-653	29788.38
05/16/11 07:50:14	59.98999	471		0	0				-653	29790.16
05/16/11 07:50:16	59.98773	471		0	0				-653	29790.16
05/16/11 07:50:18	59.98642	471		0	0				-653	29790.16
05/16/11 07:50:20	59.98547	471		0	0				-653	29790.16
05/16/11 07:50:22	59.98547	471		0	0				-653	29790.16
05/16/11 07:50:24	59.98611	471		0	0				-653	29790.07
05/16/11 07:50:26	59.98611	471		0	0				-653	29790.07
05/16/11 07:50:28	59.98676	471		0	0				-653	29790.07
05/16/11 07:50:30	59.98709	471		0	0				-653	29790.07
05/16/11 07:50:32	59.9874	471		0	0				-653	29790.07
05/16/11 07:50:34	59.98676	471		0	0				-653	29777.49
05/16/11 07:50:36	59.98611	471		0	0				-653	29777.49
05/16/11 07:50:38	59.98642	471		0	0				-653	29777.49

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.005	0.005	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:50:40	59.9874	471		0	0				-653	29777.49
05/16/11 07:50:42	59.98804	471		0	0				-653	29777.49
05/16/11 07:50:44	59.9874	471		0	0				-653	29777.49
05/16/11 07:50:46	59.98676	471		0	0				-653	29777.49
05/16/11 07:50:48	59.9848	471		0	0				-653	29777.49
05/16/11 07:50:50	59.98288	471		0	0				-653	29777.49
05/16/11 07:50:52	59.98062	471		0	0				-653	29777.49
05/16/11 07:50:54	59.97998	471		0	0				-653	29782.49
05/16/11 07:50:56	59.97931	471		0	0				-653	29782.49
05/16/11 07:50:58	59.979	471		0	0				-653	29782.49
05/16/11 07:51:00	59.97931	471		0	0				-653	29782.49
05/16/11 07:51:02	59.98093	471		0	0				-653	29782.49
05/16/11 07:51:04	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:06	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:08	59.9819	471		0	0				-653	29782.46
05/16/11 07:51:10	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:12	59.97964	471		0	0				-653	29782.46
05/16/11 07:51:14	59.97705	471		0	0				-653	29756.13
05/16/11 07:51:16	59.97479	471		0	0				-653	29756.13
05/16/11 07:51:18	59.97351	471		0	0				-653	29756.13
05/16/11 07:51:20	59.97287	471		0	0				-653	29756.13
05/16/11 07:51:22	59.97223	471		0	0				-653	29756.13
05/16/11 07:51:24	59.97189	471		0	0				-653	29756.18
05/16/11 07:51:26	59.97125	471		0	0				-653	29756.18
05/16/11 07:51:28	59.97156	471		0	0				-653	29756.18
05/16/11 07:51:30	59.97318	471		0	0				-653	29756.18
05/16/11 07:51:32	59.97415	471		0	0				-653	29756.18
05/16/11 07:51:34	59.97479	471		0	0				-653	29777.58
05/16/11 07:51:36	59.97382	471		0	0				-653	29777.58
05/16/11 07:51:38	59.97287	471		0	0				-653	29777.58
05/16/11 07:51:40	59.97318	471		0	0				-653	29777.58
05/16/11 07:51:42	59.97449	471		0	0				-653	29777.58
05/16/11 07:51:44	59.97675	471		0	0				-653	29777.4
05/16/11 07:51:46	59.97803	471		0	0				-653	29777.4
05/16/11 07:51:48	59.97998	471		0	0				-653	29777.4
05/16/11 07:51:50	59.98093	471		0	0				-653	29777.4
05/16/11 07:51:52	59.98093	471		0	0				-653	29777.4
05/16/11 07:51:54	59.97964	471		0	0				-653	29802.24
05/16/11 07:51:56	59.97803	471		0	0				-653	29802.24
05/16/11 07:51:58	59.97705	471		0	0				-653	29802.24

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:52:00	59.97739	471		0	0				-653	29802.24
05/16/11 07:52:02	59.97836	471		0	0				-653	29802.24
05/16/11 07:52:04	59.97931	471		0	0				-653	29802.18
05/16/11 07:52:06	59.98126	471		0	0				-653	29802.18
05/16/11 07:52:08	59.98416	471		0	0				-653	29802.18
05/16/11 07:52:10	59.98611	471		0	0				-653	29802.18
05/16/11 07:52:12	59.98709	471		0	0				-653	29802.18
05/16/11 07:52:14	59.9874	471		0	0				-653	29802.29
05/16/11 07:52:16	59.98804	471		0	0				-653	29802.29
05/16/11 07:52:18	59.98804	471		0	0				-653	29802.29
05/16/11 07:52:20	59.98773	471		0	0				-653	29802.29
05/16/11 07:52:22	59.9874	471		0	0				-653	29802.29
05/16/11 07:52:24	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:26	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:28	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:30	59.98773	471		0	0				-653	29802.32
05/16/11 07:52:32	59.98901	471		0	0				-653	29802.32
05/16/11 07:52:34	59.98965	471		0	0				-653	29795.02
05/16/11 07:52:36	59.98935	471		0	0				-653	29795.02
05/16/11 07:52:38	59.98837	471		0	0				-653	29795.02
05/16/11 07:52:40	59.98868	471		0	0				-653	29795.02
05/16/11 07:52:42	59.98868	471		0	0				-653	29795.02
05/16/11 07:52:44	59.9874	471		0	0				-653	29795.05
05/16/11 07:52:46	59.98611	471		0	0				-653	29795.05
05/16/11 07:52:48	59.98611	471		0	0				-653	29795.05
05/16/11 07:52:50	59.98709	471		0	0				-653	29795.05
05/16/11 07:52:52	59.98837	471		0	0				-653	29795.05
05/16/11 07:52:54	59.98935	471		0	0				-653	29781.42
05/16/11 07:52:56	59.98999	471		0	0				-653	29781.42
05/16/11 07:52:58	59.99127	471		0	0				-653	29781.42
05/16/11 07:53:00	59.99255	471		0	0				-653	29781.42
05/16/11 07:53:02	59.99387	471		0	0				-653	29781.42
05/16/11 07:53:04	59.99387	471		0	0				-653	29781.45
05/16/11 07:53:06	59.99289	471		0	0				-653	29781.45
05/16/11 07:53:08	59.99097	471		0	0				-653	29781.45
05/16/11 07:53:10	59.98868	471		0	0				-653	29781.45
05/16/11 07:53:12	59.98642	471		0	0				-653	29781.45
05/16/11 07:53:14	59.98386	471		0	0				-653	29802.43
05/16/11 07:53:16	59.9816	471		0	0				-653	29802.43
05/16/11 07:53:18	59.97931	471		0	0				-653	29802.43

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:53:20	59.97675	471		0	0				-653	29802.43
05/16/11 07:53:22	59.97415	471		0	0				-653	29802.43
05/16/11 07:53:24	59.97287	471		0	0				-653	29802.4
05/16/11 07:53:26	59.97223	471		0	0				-653	29802.4
05/16/11 07:53:28	59.97318	471		0	0				-653	29802.4
05/16/11 07:53:30	59.97449	471		0	0				-653	29802.4
05/16/11 07:53:32	59.97351	471		0	0				-653	29802.4
05/16/11 07:53:34	59.97253	471		0	0				-653	29804.4
05/16/11 07:53:36	59.97253	471		0	0				-653	29804.4
05/16/11 07:53:38	59.97223	471		0	0				-653	29804.4
05/16/11 07:53:40	59.97156	471		0	0				-653	29804.4
05/16/11 07:53:42	59.97189	471		0	0				-653	29804.4
05/16/11 07:53:44	59.97318	471		0	0				-653	29804.4
05/16/11 07:53:46	59.97479	471		0	0				-653	29804.4
05/16/11 07:53:48	59.9761	471		0	0				-653	29804.4
05/16/11 07:53:50	59.97803	471		0	0				-653	29804.4
05/16/11 07:53:52	59.98062	471		0	0				-653	29804.4
05/16/11 07:53:54	59.98254	471		0	0				-653	29797.32
05/16/11 07:53:56	59.98416	471		0	0				-653	29797.32
05/16/11 07:53:58	59.98611	471		0	0				-653	29797.32
05/16/11 07:54:00	59.98804	471		0	0				-653	29797.32
05/16/11 07:54:02	59.9903	471		0	0				-653	29797.32
05/16/11 07:54:04	59.99161	471		0	0				-653	29797.29
05/16/11 07:54:06	59.99323	471		0	0				-653	29797.29
05/16/11 07:54:08	59.99484	471		0	0				-653	29797.29
05/16/11 07:54:10	59.99579	471		0	0				-653	29797.29
05/16/11 07:54:12	59.99515	471		0	0				-653	29797.29
05/16/11 07:54:14	59.99612	471		0	0				-653	29823.76
05/16/11 07:54:16	59.99805	471		0	0				-653	29823.76
05/16/11 07:54:18	59.99936	471		0	0				-653	29823.76
05/16/11 07:54:20	60.00064	471		0	0				-653	29823.76
05/16/11 07:54:22	60.00098	471		0	0				-653	29823.76
05/16/11 07:54:24	60.00064	471		0	0				-653	29818.41
05/16/11 07:54:26	60	471		0	0				-653	29818.41
05/16/11 07:54:28	59.99902	471		0	0				-653	29818.41
05/16/11 07:54:30	59.99872	471		0	0				-653	29818.41
05/16/11 07:54:32	59.99936	471		0	0				-653	29818.41
05/16/11 07:54:34	60.00034	471		0	0				-653	29808.89
05/16/11 07:54:36	60.00162	471		0	0				-653	29808.89
05/16/11 07:54:38	60.00354	471		0	0				-653	29808.89

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:54:40	60.00485	471		0	0				-653	29808.89
05/16/11 07:54:42	60.00421	471		0	0				-653	29808.89
05/16/11 07:54:44	60.00195	471		0	0				-653	29814.89
05/16/11 07:54:46	59.99902	471		0	0				-653	29814.89
05/16/11 07:54:48	59.99646	471		0	0				-653	29814.89
05/16/11 07:54:50	59.99417	471		0	0				-653	29814.89
05/16/11 07:54:52	59.99323	471		0	0				-653	29814.89
05/16/11 07:54:54	59.99127	471		0	0				-653	29826.47
05/16/11 07:54:56	59.98935	471		0	0				-653	29826.47
05/16/11 07:54:58	59.98709	471		0	0				-653	29826.47
05/16/11 07:55:00	59.98578	471		0	0				-653	29826.47
05/16/11 07:55:02	59.98547	471		0	0				-653	29826.47
05/16/11 07:55:04	59.98547	471		0	0				-653	29826.41
05/16/11 07:55:06	59.98514	471		0	0				-653	29826.41
05/16/11 07:55:08	59.9845	471		0	0				-653	29826.41
05/16/11 07:55:10	59.9845	471		0	0				-653	29826.41
05/16/11 07:55:12	59.9848	471		0	0				-653	29826.41
05/16/11 07:55:14	59.9848	471		0	0				-653	29834.18
05/16/11 07:55:16	59.98611	471		0	0				-653	29834.18
05/16/11 07:55:18	59.9874	471		0	0				-653	29834.18
05/16/11 07:55:20	59.98868	471		0	0				-653	29834.18
05/16/11 07:55:22	59.98837	471		0	0				-653	29834.18
05/16/11 07:55:24	59.98837	471		0	0				-653	29836.13
05/16/11 07:55:26	59.98578	471		0	0				-653	29836.13
05/16/11 07:55:28	59.9845	471		0	0				-653	29836.13
05/16/11 07:55:30	59.9848	471		0	0				-653	29836.13
05/16/11 07:55:32	59.98547	471		0	0				-653	29836.13
05/16/11 07:55:34	59.98642	471		0	0				-653	29821.84
05/16/11 07:55:36	59.98773	471		0	0				-653	29821.84
05/16/11 07:55:38	59.98965	471		0	0				-653	29821.84
05/16/11 07:55:40	59.99063	471		0	0				-653	29821.84
05/16/11 07:55:42	59.99063	471		0	0				-653	29821.84
05/16/11 07:55:44	59.99063	471		0	0				-653	29821.87
05/16/11 07:55:46	59.99063	471		0	0				-653	29821.87
05/16/11 07:55:48	59.98642	471		0	0				-653	29821.87
05/16/11 07:55:50	59.9845	471		0	0				-653	29821.87
05/16/11 07:55:52	59.98224	471		0	0				-653	29821.87
05/16/11 07:55:54	59.98062	471		0	0				-653	29831.33
05/16/11 07:55:56	59.97739	471		0	0				-653	29831.33
05/16/11 07:55:58	59.97641	471		0	0				-653	29831.33

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:56:00	59.97641	471		0	0				-653	29831.33
05/16/11 07:56:02	59.9761	471		0	0				-653	29831.33
05/16/11 07:56:04	59.97543	471		0	0				-653	29831.33
05/16/11 07:56:06	59.97577	471		0	0				-653	29831.33
05/16/11 07:56:08	59.97675	471		0	0				-653	29831.33
05/16/11 07:56:10	59.97705	471		0	0				-653	29831.33
05/16/11 07:56:12	59.97705	471		0	0				-653	29831.33
05/16/11 07:56:14	59.97705	471		0	0				-653	29835.51
05/16/11 07:56:16	59.97675	471		0	0				-653	29835.51
05/16/11 07:56:18	59.97705	471		0	0				-653	29835.51
05/16/11 07:56:20	59.97739	471		0	0				-653	29835.51
05/16/11 07:56:22	59.97803	471		0	0				-653	29835.51
05/16/11 07:56:24	59.97803	471		0	0				-653	29856.55
05/16/11 07:56:26	59.97867	471		0	0				-653	29856.55
05/16/11 07:56:28	59.97964	471		0	0				-653	29856.55
05/16/11 07:56:30	59.9816	471		0	0				-653	29856.55
05/16/11 07:56:32	59.98352	471		0	0				-653	29856.55
05/16/11 07:56:34	59.98642	471		0	0				-653	29846.76
05/16/11 07:56:36	59.9903	471		0	0				-653	29846.76
05/16/11 07:56:38	59.99451	471		0	0				-653	29846.76
05/16/11 07:56:40	59.99741	471		0	0				-653	29846.76
05/16/11 07:56:42	59.99838	471		0	0				-653	29846.76
05/16/11 07:56:44	59.99805	471		0	0				-653	29860.05
05/16/11 07:56:46	59.99677	471		0	0				-653	29860.05
05/16/11 07:56:48	59.99612	471		0	0				-653	29860.05
05/16/11 07:56:50	59.99548	471		0	0				-653	29860.05
05/16/11 07:56:52	59.99612	471		0	0				-653	29860.05
05/16/11 07:56:54	59.99936	471		0	0				-653	29873.15
05/16/11 07:56:56	60.00323	471		0	0				-653	29873.15
05/16/11 07:56:58	60.00745	471		0	0				-653	29873.15
05/16/11 07:57:00	60.01163	471		0	0				-653	29873.15
05/16/11 07:57:02	60.01453	471		0	0				-653	29873.15
05/16/11 07:57:04	60.01746	471		0	0				-653	29873.15
05/16/11 07:57:06	60.01907	471		0	0				-653	29873.15
05/16/11 07:57:08	60.01938	471		0	0				-653	29873.15
05/16/11 07:57:10	60.01938	471		0	0				-653	29873.15
05/16/11 07:57:12	60.01938	471		0	0				-653	29873.15
05/16/11 07:57:14	60.02036	471		0	0				-653	29889.67
05/16/11 07:57:16	60.02197	471		0	0				-653	29889.67
05/16/11 07:57:18	60.02423	471		0	0				-653	29889.67

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:57:20	60.02682	471		0	0				-653	29889.67
05/16/11 07:57:22	60.02811	471		0	0				-653	29889.67
05/16/11 07:57:24	60.02939	471		0	0				-653	29886.6
05/16/11 07:57:26	60.03036	471		0	0				-653	29886.6
05/16/11 07:57:28	60.02875	471		0	0				-653	29886.6
05/16/11 07:57:30	60.02682	471		0	0				-653	29886.6
05/16/11 07:57:32	60.02457	471		0	0				-653	29886.6
05/16/11 07:57:34	60.02261	471		0	0				-653	29891.67
05/16/11 07:57:36	60.02231	471		0	0				-653	29891.67
05/16/11 07:57:38	60.02295	471		0	0				-653	29891.67
05/16/11 07:57:40	60.02359	471		0	0				-653	29891.67
05/16/11 07:57:42	60.02261	471		0	0				-653	29891.67
05/16/11 07:57:44	60.02164	471		0	0				-653	29891.64
05/16/11 07:57:46	60.01971	471		0	0				-653	29891.64
05/16/11 07:57:48	60.01776	471		0	0				-653	29891.64
05/16/11 07:57:50	60.01746	471		0	0				-653	29891.64
05/16/11 07:57:52	60.01682	471		0	0				-653	29891.64
05/16/11 07:57:54	60.01712	471		0	0				-653	29891.51
05/16/11 07:57:56	60.0184	471		0	0				-653	29891.51
05/16/11 07:57:58	60.01874	471		0	0				-653	29891.51
05/16/11 07:58:00	60.0181	471		0	0				-653	29891.51
05/16/11 07:58:02	60.01682	471		0	0				-653	29891.51
05/16/11 07:58:04	60.0152	471		0	0				-653	29891.6
05/16/11 07:58:06	60.0152	471		0	0				-653	29891.6
05/16/11 07:58:08	60.0155	471		0	0				-653	29891.6
05/16/11 07:58:10	60.0155	471		0	0				-653	29891.6
05/16/11 07:58:12	60.01453	471		0	0				-653	29891.6
05/16/11 07:58:14	60.01453	471		0	0				-653	29884.5
05/16/11 07:58:16	60.0152	471		0	0				-653	29884.5
05/16/11 07:58:18	60.01584	471		0	0				-653	29884.5
05/16/11 07:58:20	60.01614	471		0	0				-653	29884.5
05/16/11 07:58:22	60.01584	471		0	0				-653	29884.5
05/16/11 07:58:24	60.0152	471		0	0				-653	29881.79
05/16/11 07:58:26	60.0155	471		0	0				-653	29881.79
05/16/11 07:58:28	60.01614	471		0	0				-653	29881.79
05/16/11 07:58:30	60.01776	471		0	0				-653	29881.79
05/16/11 07:58:32	60.01907	471		0	0				-653	29881.79
05/16/11 07:58:34	60.02069	471		0	0				-653	29887.14
05/16/11 07:58:36	60.02133	471		0	0				-653	29887.14
05/16/11 07:58:38	60.02069	471		0	0				-653	29887.14

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	Rows of data to shift to align T(0)
	59.999	0.078	-0.078	0.009	1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:58:40	60.01907	471		0	0				-653	29887.14
05/16/11 07:58:42	60.01746	471		0	0				-653	29887.14
05/16/11 07:58:44	60.01614	471		0	0				-653	29873.08
05/16/11 07:58:46	60.0152	471		0	0				-653	29873.08
05/16/11 07:58:48	60.01453	471		0	0				-653	29873.08
05/16/11 07:58:50	60.01389	471		0	0				-653	29873.08
05/16/11 07:58:52	60.01358	471		0	0				-653	29873.08
05/16/11 07:58:54	60.01099	471		0	0				-653	29862.1
05/16/11 07:58:56	60.00549	471		0	0				-653	29862.1
05/16/11 07:58:58	59.99966	471		0	0				-653	29862.1
05/16/11 07:59:00	59.99451	471		0	0				-653	29862.1
05/16/11 07:59:02	59.99127	471		0	0				-653	29862.1
05/16/11 07:59:04	59.98965	471		0	0				-653	29861.95
05/16/11 07:59:06	59.98868	471		0	0				-653	29861.95
05/16/11 07:59:08	59.98676	471		0	0				-653	29861.95
05/16/11 07:59:10	59.9848	471		0	0				-653	29861.95
05/16/11 07:59:12	59.98288	471		0	0				-653	29861.95
05/16/11 07:59:14	59.98062	471		0	0				-653	29906.21
05/16/11 07:59:16	59.97803	471		0	0				-653	29906.21
05/16/11 07:59:18	59.9761	471		0	0				-653	29906.21
05/16/11 07:59:20	59.97577	471		0	0				-653	29906.21
05/16/11 07:59:22	59.9761	471		0	0				-653	29906.21
05/16/11 07:59:24	59.9761	471		0	0				-653	29878.69
05/16/11 07:59:26	59.97641	471		0	0				-653	29878.69
05/16/11 07:59:28	59.97543	471		0	0				-653	29878.69
05/16/11 07:59:30	59.97479	471		0	0				-653	29878.69
05/16/11 07:59:32	59.97382	471		0	0				-653	29878.69
05/16/11 07:59:34	59.97253	471		0	0				-653	29900.56
05/16/11 07:59:36	59.97223	471		0	0				-653	29900.56
05/16/11 07:59:38	59.97253	471		0	0				-653	29900.56
05/16/11 07:59:40	59.97351	471		0	0				-653	29900.56
05/16/11 07:59:42	59.97351	471		0	0				-653	29900.56
05/16/11 07:59:44	59.97318	471		0	0				-653	29896.99
05/16/11 07:59:46	59.97189	471		0	0				-653	29896.99
05/16/11 07:59:48	59.97092	471		0	0				-653	29896.99
05/16/11 07:59:50	59.97028	471		0	0				-653	29896.99
05/16/11 07:59:52	59.97028	471		0	0				-653	29896.99
05/16/11 07:59:54	59.97028	471		0	0				-653	29905.8
05/16/11 07:59:56	59.97028	471		0	0				-653	29905.8
05/16/11 07:59:58	59.97061	471		0	0				-653	29905.8

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.005	0.005	
0	0	0	-0.006	0.006	
0	0	0	-0.005	0.005	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:00:00	59.97287	471		0	0				-653	29905.8
05/16/11 08:00:02	59.97287	471		0	0				-653	29905.8
05/16/11 08:00:04	59.97479	471		0	0				-653	29905.77
05/16/11 08:00:06	59.97479	471		0	0				-653	29905.77
05/16/11 08:00:08	59.97382	471		0	0				-653	29905.77
05/16/11 08:00:10	59.96832	471		0	0				-653	29905.77
05/16/11 08:00:12	59.96802	471		0	0				-653	29905.77
05/16/11 08:00:14	59.96899	471		0	0				-653	29914.9
05/16/11 08:00:16	59.96994	471		0	0				-653	29914.9
05/16/11 08:00:18	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:20	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:22	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:24	59.97769	471		0	0				-653	29925.58
05/16/11 08:00:26	59.97739	471		0	0				-653	29925.58
05/16/11 08:00:28	59.9761	471		0	0				-653	29925.58
05/16/11 08:00:30	59.9761	471		0	0				-653	29925.58
05/16/11 08:00:32	59.97705	471		0	0				-653	29925.58
05/16/11 08:00:34	59.97769	471		0	0				-653	29938.87
05/16/11 08:00:36	59.97803	471		0	0				-653	29938.87
05/16/11 08:00:38	59.97803	471		0	0				-653	29938.87
05/16/11 08:00:40	59.97739	471		0	0				-653	29938.87
05/16/11 08:00:42	59.97675	471		0	0				-653	29938.87
05/16/11 08:00:44	59.97641	471		0	0				-653	29952.51
05/16/11 08:00:46	59.97479	471		0	0				-653	29952.51
05/16/11 08:00:48	59.97449	471		0	0				-653	29952.51
05/16/11 08:00:50	59.97543	471		0	0				-653	29952.51
05/16/11 08:00:52	59.97705	471		0	0				-653	29952.51
05/16/11 08:00:54	59.97931	471		0	0				-653	29952.51
05/16/11 08:00:56	59.97964	471		0	0				-653	29948.95
05/16/11 08:00:58	59.979	471		0	0				-653	29948.95
05/16/11 08:01:00	59.97803	471		0	0				-653	29948.95
05/16/11 08:01:02	59.97803	471		0	0				-653	29948.95
05/16/11 08:01:04	59.979	471		0	0				-653	29948.95
05/16/11 08:01:06	59.98029	471		0	0				-653	29948.95
05/16/11 08:01:08	59.9819	471		0	0				-653	29948.95
05/16/11 08:01:10	59.98318	471		0	0				-653	29948.95
05/16/11 08:01:12	59.9845	471		0	0				-653	29948.95
05/16/11 08:01:14	59.98578	471		0	0				-653	29951.05
05/16/11 08:01:16	59.98642	471		0	0				-653	29951.05
05/16/11 08:01:18	59.98642	471		0	0				-653	29951.05

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:01:20	59.98709	471		0	0				-653	29951.05
05/16/11 08:01:22	59.98773	471		0	0				-653	29951.05
05/16/11 08:01:24	59.98965	471		0	0				-653	29955.09
05/16/11 08:01:26	59.99161	471		0	0				-653	29955.09
05/16/11 08:01:28	59.99255	471		0	0				-653	29955.09
05/16/11 08:01:30	59.99323	471		0	0				-653	29955.09
05/16/11 08:01:32	59.99289	471		0	0				-653	29955.09
05/16/11 08:01:34	59.99097	471		0	0				-653	29967.69
05/16/11 08:01:36	59.98804	471		0	0				-653	29967.69
05/16/11 08:01:38	59.98578	471		0	0				-653	29967.69
05/16/11 08:01:40	59.98386	471		0	0				-653	29967.69
05/16/11 08:01:42	59.98318	471		0	0				-653	29967.69
05/16/11 08:01:44	59.98318	471		0	0				-653	29983.13
05/16/11 08:01:46	59.98288	471		0	0				-653	29983.13
05/16/11 08:01:48	59.98126	471		0	0				-653	29983.13
05/16/11 08:01:50	59.97998	471		0	0				-653	29983.13
05/16/11 08:01:52	59.97964	471		0	0				-653	29983.13
05/16/11 08:01:54	59.98029	471		0	0				-653	29976.75
05/16/11 08:01:56	59.98126	471		0	0				-653	29976.75
05/16/11 08:01:58	59.98352	471		0	0				-653	29976.75
05/16/11 08:02:00	59.98386	471		0	0				-653	29976.75
05/16/11 08:02:02	59.98126	471		0	0				-653	29976.75
05/16/11 08:02:04	59.97543	471		0	0				-653	29976.78
05/16/11 08:02:06	59.96832	471		0	0				-653	29976.78
05/16/11 08:02:08	59.9635	471		0	0				-653	29976.78
05/16/11 08:02:10	59.96155	471		0	0				-653	29976.78
05/16/11 08:02:12	59.96091	471		0	0				-653	29976.78
05/16/11 08:02:14	59.96155	471		0	0				-653	30008.51
05/16/11 08:02:16	59.96057	471		0	0				-653	30008.51
05/16/11 08:02:18	59.95801	471		0	0				-653	30008.51
05/16/11 08:02:20	59.95575	471		0	0				-653	30008.51
05/16/11 08:02:22	59.95575	471		0	0				-653	30008.51
05/16/11 08:02:24	59.95703	471		0	0				-653	30037.25
05/16/11 08:02:26	59.95895	471		0	0				-653	30037.25
05/16/11 08:02:28	59.96057	471		0	0				-653	30037.25
05/16/11 08:02:30	59.96155	471		0	0				-653	30037.25
05/16/11 08:02:32	59.96252	471		0	0				-653	30037.25
05/16/11 08:02:34	59.96414	471		0	0				-653	30055.73
05/16/11 08:02:36	59.96512	471		0	0				-653	30055.73
05/16/11 08:02:38	59.96512	471		0	0				-653	30055.73

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.006	0.006	
0	0	0	-0.007	0.007	
0	0	0	-0.005	0.005	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:02:40	59.96576	471		0	0				-653	30055.73
05/16/11 08:02:42	59.96704	471		0	0				-653	30055.73
05/16/11 08:02:44	59.96994	471		0	0				-653	30068.76
05/16/11 08:02:46	59.97253	471		0	0				-653	30068.76
05/16/11 08:02:48	59.97415	471		0	0				-653	30068.76
05/16/11 08:02:50	59.9761	471		0	0				-653	30068.76
05/16/11 08:02:52	59.97739	471		0	0				-653	30068.76
05/16/11 08:02:54	59.97931	471		0	0				-653	30068.21
05/16/11 08:02:56	59.98029	471		0	0				-653	30068.21
05/16/11 08:02:58	59.98062	471		0	0				-653	30068.21
05/16/11 08:03:00	59.98029	471		0	0				-653	30068.21
05/16/11 08:03:02	59.98029	471		0	0				-653	30068.21
05/16/11 08:03:04	59.97836	471		0	0				-653	30068.24
05/16/11 08:03:06	59.97836	471		0	0				-653	30068.24
05/16/11 08:03:08	59.979	471		0	0				-653	30068.24
05/16/11 08:03:10	59.97998	471		0	0				-653	30068.24
05/16/11 08:03:12	59.98029	471		0	0				-653	30068.24
05/16/11 08:03:14	59.98093	471		0	0				-653	30076.2
05/16/11 08:03:16	59.98093	471		0	0				-653	30076.2
05/16/11 08:03:18	59.97998	471		0	0				-653	30076.2
05/16/11 08:03:20	59.98062	471		0	0				-653	30076.2
05/16/11 08:03:22	59.98029	471		0	0				-653	30076.2
05/16/11 08:03:24	59.97998	471		0	0				-653	30093.95
05/16/11 08:03:26	59.979	471		0	0				-653	30093.95
05/16/11 08:03:28	59.97931	471		0	0				-653	30093.95
05/16/11 08:03:30	59.97998	471		0	0				-653	30093.95
05/16/11 08:03:32	59.98029	471		0	0				-653	30093.95
05/16/11 08:03:34	59.98029	471		0	0				-653	30100.97
05/16/11 08:03:36	59.98029	471		0	0				-653	30100.97
05/16/11 08:03:38	59.97964	471		0	0				-653	30100.97
05/16/11 08:03:40	59.979	471		0	0				-653	30100.97
05/16/11 08:03:42	59.97803	471		0	0				-653	30100.97
05/16/11 08:03:44	59.97803	471		0	0				-653	30118.87
05/16/11 08:03:46	59.97867	471		0	0				-653	30118.87
05/16/11 08:03:48	59.97964	471		0	0				-653	30118.87
05/16/11 08:03:50	59.98224	471		0	0				-653	30118.87
05/16/11 08:03:52	59.9848	471		0	0				-653	30118.87
05/16/11 08:03:54	59.98514	471		0	0				-653	30118.77
05/16/11 08:03:56	59.98416	471		0	0				-653	30118.77
05/16/11 08:03:58	59.98224	471		0	0				-653	30118.77

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:04:00	59.98029	471		0	0				-653	30118.77
05/16/11 08:04:02	59.979	471		0	0				-653	30118.77
05/16/11 08:04:04	59.97867	471		0	0				-653	30118.74
05/16/11 08:04:06	59.97931	471		0	0				-653	30118.74
05/16/11 08:04:08	59.97998	471		0	0				-653	30118.74
05/16/11 08:04:10	59.97931	471		0	0				-653	30118.74
05/16/11 08:04:12	59.979	471		0	0				-653	30118.74
05/16/11 08:04:14	59.97803	471		0	0				-653	30106.93
05/16/11 08:04:16	59.97675	471		0	0				-653	30106.93
05/16/11 08:04:18	59.97739	471		0	0				-653	30106.93
05/16/11 08:04:20	59.979	471		0	0				-653	30106.93
05/16/11 08:04:22	59.97964	471		0	0				-653	30106.93
05/16/11 08:04:24	59.98093	471		0	0				-653	30106.61
05/16/11 08:04:26	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:28	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:30	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:32	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:34	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:36	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:38	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:40	59.9816	471		0	0				-653	30116.02
05/16/11 08:04:42	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:44	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:46	59.98126	471		0	0				-653	30141.59
05/16/11 08:04:48	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:50	59.98254	471		0	0				-653	30141.59
05/16/11 08:04:52	59.98352	471		0	0				-653	30141.59
05/16/11 08:04:54	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:56	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:58	59.98416	471		0	0				-653	30144.23
05/16/11 08:05:00	59.98514	471		0	0				-653	30144.23
05/16/11 08:05:02	59.9874	471		0	0				-653	30144.23
05/16/11 08:05:04	59.98901	471		0	0				-653	30144.23
05/16/11 08:05:06	59.98804	471		0	0				-653	30144.23
05/16/11 08:05:08	59.98642	471		0	0				-653	30144.23
05/16/11 08:05:10	59.98288	471		0	0				-653	30144.23
05/16/11 08:05:12	59.98254	471		0	0				-653	30144.23
05/16/11 08:05:14	59.98318	471		0	0				-653	30148.67
05/16/11 08:05:16	59.9819	471		0	0				-653	30148.67
05/16/11 08:05:18	59.98062	471		0	0				-653	30148.67

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:05:20	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:22	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:24	59.97964	471		0	0				-653	30155.67
05/16/11 08:05:26	59.98029	471		0	0				-653	30155.67
05/16/11 08:05:28	59.98224	471		0	0				-653	30155.67
05/16/11 08:05:30	59.98352	471		0	0				-653	30155.67
05/16/11 08:05:32	59.98578	471		0	0				-653	30155.67
05/16/11 08:05:34	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:36	59.98804	471		0	0				-653	30142.79
05/16/11 08:05:38	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:40	59.98611	471		0	0				-653	30142.79
05/16/11 08:05:42	59.9848	471		0	0				-653	30142.79
05/16/11 08:05:44	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:46	59.98318	471		0	0				-653	30154.67
05/16/11 08:05:48	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:50	59.98416	471.3000183		0	0				-653	30150.35
05/16/11 08:05:52	59.98514	471.3000183		0	0				-653	30150.35
05/16/11 08:05:54	59.98547	471.3000183		0	0				-653	30159.63
05/16/11 08:05:56	59.98642	471.3000183		0	0				-653	30159.63
05/16/11 08:05:58	59.98676	471.8999939		0	0				-653	30159.63
05/16/11 08:06:00	59.9874	471.8999939		0	0				-653	30159.63
05/16/11 08:06:02	59.98773	471.8999939		0	0				-653	30151.42
05/16/11 08:06:04	59.98901	471.8999939		0	0				-653	30151.42
05/16/11 08:06:06	59.98901	471.8999939		0	0				-653	30156.16
05/16/11 08:06:08	59.98804	471.3999939		0	0				-653	30156.16
05/16/11 08:06:10	59.98642	471.3999939		0	0				-653	30156.16
05/16/11 08:06:12	59.98547	471.3999939		0	0				-653	30156.16
05/16/11 08:06:14	59.98642	471.3999939		0	0				-653	30164.15
05/16/11 08:06:16	59.98935	471.3999939		0	0				-653	30164.15
05/16/11 08:06:18	59.99225	471.3999939		0	0				-653	30164.15
05/16/11 08:06:20	59.99515	471.3999939		0	0				-653	30164.15
05/16/11 08:06:22	59.99579	471.3999939		0	0				-653	30203.91
05/16/11 08:06:24	59.99515	471.3999939		0	0				-653	30203.91
05/16/11 08:06:26	59.99548	471.3999939		0	0				-653	30203.73
05/16/11 08:06:28	59.99741	470.8999939		0	0				-653	30203.73
05/16/11 08:06:30	60	470.8999939		0	0				-653	30203.73
05/16/11 08:06:32	60.00162	470.8999939		0	0				-653	30203.73
05/16/11 08:06:34	60.00162	470.8999939		0	0				-653	30199.61
05/16/11 08:06:36	60.00195	470.8999939		0	0				-653	30199.61
05/16/11 08:06:38	59.95963	0		0	0				-653	30199.61

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta Hz	Absolute Delta Hz	
806	03:52 Event Length mm:ss				
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	1	-0.042	0.042	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:06:40	59.88144	0		0	0				-653	30199.61
05/16/11 08:06:42	59.87237	0		0	0				-653	30086.11
05/16/11 08:06:44	59.87011	0		0	0				-653	30086.11
05/16/11 08:06:46	59.87432	0		0	0				-653	30086.14
05/16/11 08:06:48	59.88076	0		0	0				-653	30086.14
05/16/11 08:06:50	59.88531	0		0	0				-653	30086.14
05/16/11 08:06:52	59.88787	0		0	0				-653	30086.14
05/16/11 08:06:54	59.88949	0		0	0				-653	30094.43
05/16/11 08:06:56	59.8908	0		0	0				-653	30094.43
05/16/11 08:06:58	59.89175	0		0	0				-653	30094.43
05/16/11 08:07:00	59.89242	0		0	0				-653	30094.43
05/16/11 08:07:02	59.89306	0		0	0				-653	30139.49
05/16/11 08:07:04	59.89306	0		0	0				-653	30139.49
05/16/11 08:07:06	59.89306	0		0	0				-653	30133.38
05/16/11 08:07:08	59.89532	0		0	0				-653	30133.38
05/16/11 08:07:10	59.89788	0		0	0				-653	30133.38
05/16/11 08:07:12	59.8995	0		0	0				-653	30133.38
05/16/11 08:07:14	59.90081	0		0	0				-653	30137.26
05/16/11 08:07:16	59.9021	0		0	0				-653	30137.26
05/16/11 08:07:18	59.90179	0		0	0				-653	30137.26
05/16/11 08:07:20	59.90081	0		0	0				-653	30137.26
05/16/11 08:07:22	59.90081	0		0	0				-653	30171.38
05/16/11 08:07:24	59.90048	0		0	0				-653	30171.38
05/16/11 08:07:26	59.8992	0		0	0				-653	30168.76
05/16/11 08:07:28	59.89886	0		0	0				-653	30168.76
05/16/11 08:07:30	59.89856	0		0	0				-653	30168.76
05/16/11 08:07:32	59.90017	0		0	0				-653	30168.76
05/16/11 08:07:34	59.90243	0		0	0				-653	30208.99
05/16/11 08:07:36	59.90469	0		0	0				-653	30208.99
05/16/11 08:07:38	59.90695	0		0	0				-653	30208.99
05/16/11 08:07:40	59.90887	0		0	0				-653	30208.99
05/16/11 08:07:42	59.90921	0		0	0				-653	30205.66
05/16/11 08:07:44	59.90857	0		0	0				-653	30205.66
05/16/11 08:07:46	59.90887	0		0	0				-653	30205.66
05/16/11 08:07:48	59.91018	0		0	0				-653	30205.66
05/16/11 08:07:50	59.91244	0		0	0				-653	30205.66
05/16/11 08:07:52	59.9147	0		0	0				-653	30205.66
05/16/11 08:07:54	59.9176	0		0	0				-653	30211.75
05/16/11 08:07:56	59.91922	0		0	0				-653	30211.75
05/16/11 08:07:58	59.92083	0		0	0				-653	30211.75

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	-0.078	0.078	
1	0	1	-0.009	0.009	
1	0	1	-0.002	0.002	
1	0	1	0.004	0.004	
1	0	1	0.006	0.006	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:08:00	59.92215	0		0	0				-653	30211.75
05/16/11 08:08:02	59.92309	0		0	0				-653	30217.55
05/16/11 08:08:04	59.92505	0		0	0				-653	30217.55
05/16/11 08:08:06	59.92505	0		0	0				-653	30217.57
05/16/11 08:08:08	59.9273	0		0	0				-653	30217.57
05/16/11 08:08:10	59.93246	0		0	0				-653	30217.57
05/16/11 08:08:12	59.93505	0		0	0				-653	30217.57
05/16/11 08:08:14	59.93701	0		0	0				-653	30217.59
05/16/11 08:08:16	59.93765	0		0	0				-653	30217.59
05/16/11 08:08:18	59.93927	0		0	0				-653	30217.59
05/16/11 08:08:20	59.94183	0		0	0				-653	30217.59
05/16/11 08:08:22	59.94409	0		0	0				-653	30210.49
05/16/11 08:08:24	59.94571	0		0	0				-653	30210.49
05/16/11 08:08:26	59.94797	0		0	0				-653	30210.26
05/16/11 08:08:28	59.94766	0		0	0				-653	30210.26
05/16/11 08:08:30	59.9454	0		0	0				-653	30210.26
05/16/11 08:08:32	59.94443	0		0	0				-653	30210.26
05/16/11 08:08:34	59.94409	0		0	0				-653	30234.59
05/16/11 08:08:36	59.94507	0		0	0				-653	30234.59
05/16/11 08:08:38	59.94604	0		0	0				-653	30234.59
05/16/11 08:08:40	59.94638	0		0	0				-653	30234.59
05/16/11 08:08:42	59.94733	0		0	0				-653	30223.6
05/16/11 08:08:44	59.9483	0		0	0				-653	30223.6
05/16/11 08:08:46	59.94894	0		0	0				-653	30223.73
05/16/11 08:08:48	59.94992	0		0	0				-653	30223.73
05/16/11 08:08:50	59.9509	0		0	0				-653	30223.73
05/16/11 08:08:52	59.95154	0		0	0				-653	30223.73
05/16/11 08:08:54	59.95187	0		0	0				-653	30224.39
05/16/11 08:08:56	59.95346	0		0	0				-653	30224.39
05/16/11 08:08:58	59.95508	0		0	0				-653	30224.39
05/16/11 08:09:00	59.95575	0		0	0				-653	30224.39
05/16/11 08:09:02	59.95639	0		0	0				-653	30255.53
05/16/11 08:09:04	59.95801	0		0	0				-653	30255.53
05/16/11 08:09:06	59.96124	0		0	0				-653	30252.87
05/16/11 08:09:08	59.96252	0		0	0				-653	30252.87
05/16/11 08:09:10	59.96188	0		0	0				-653	30252.87
05/16/11 08:09:12	59.96124	0		0	0				-653	30252.87
05/16/11 08:09:14	59.96027	0		0	0				-653	30232.45
05/16/11 08:09:16	59.96057	0		0	0				-653	30232.45
05/16/11 08:09:18	59.96219	0		0	0				-653	30232.45

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:09:20	59.96512	0		0	0				-653	30232.45
05/16/11 08:09:22	59.96738	0		0	0				-653	30263.99
05/16/11 08:09:24	59.96899	0		0	0				-653	30263.99
05/16/11 08:09:26	59.97061	0		0	0				-653	30263.68
05/16/11 08:09:28	59.97318	0		0	0				-653	30263.68
05/16/11 08:09:30	59.97351	0		0	0				-653	30263.68
05/16/11 08:09:32	59.97287	0		0	0				-653	30263.68
05/16/11 08:09:34	59.97253	0		0	0				-653	30264.96
05/16/11 08:09:36	59.97318	0		0	0				-653	30264.96
05/16/11 08:09:38	59.97415	0		0	0				-653	30264.96
05/16/11 08:09:40	59.97543	0		0	0				-653	30264.96
05/16/11 08:09:42	59.97577	0		0	0				-653	30263.63
05/16/11 08:09:44	59.9761	0		0	0				-653	30263.63
05/16/11 08:09:46	59.97675	0		0	0				-653	30279.39
05/16/11 08:09:48	59.97803	0		0	0				-653	30279.39
05/16/11 08:09:50	59.97931	0		0	0				-653	30279.39
05/16/11 08:09:52	59.97998	0		0	0				-653	30279.39
05/16/11 08:09:54	59.97964	0		0	0				-653	30255.32
05/16/11 08:09:56	59.979	0		0	0				-653	30255.32
05/16/11 08:09:58	59.97964	0		0	0				-653	30255.32
05/16/11 08:10:00	59.98093	0		0	0				-653	30255.32
05/16/11 08:10:02	59.98224	0		0	0				-653	30260.67
05/16/11 08:10:04	59.98386	0		0	0				-653	30260.67
05/16/11 08:10:06	59.98514	0		0	0				-653	30259.99
05/16/11 08:10:08	59.98773	0		0	0				-653	30259.99
05/16/11 08:10:10	59.9903	0		0	0				-653	30259.99
05/16/11 08:10:12	59.99289	0		0	0				-653	30259.99
05/16/11 08:10:14	59.99579	0		0	0				-653	30274.08
05/16/11 08:10:16	59.99646	0		0	0				-653	30274.08
05/16/11 08:10:18	59.99579	0		0	0				-653	30274.08
05/16/11 08:10:20	59.99612	0		0	0				-653	30274.08
05/16/11 08:10:22	59.99579	0		0	0				-653	30297.68
05/16/11 08:10:24	59.99484	0		0	0				-653	30297.68
05/16/11 08:10:26	59.99484	0		0	0				-653	30297.65
05/16/11 08:10:28	59.99805	0		0	0				-653	30297.65
05/16/11 08:10:30	59.99872	0		0	0				-653	30297.65
05/16/11 08:10:32	60.00034	0		0	0				-653	30297.65
05/16/11 08:10:34	60.00195	0		0	0				-653	30300.1
05/16/11 08:10:36	60.00259	0		0	0				-653	30300.1
05/16/11 08:10:38	60.00226	0		0	0				-653	30300.1

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:10:40	60.00195	0		0	0				-653	30300.1
05/16/11 08:10:42	60.00064	0		0	0				-653	30314.84
05/16/11 08:10:44	59.99646	0		0	0				-653	30314.84
05/16/11 08:10:46	59.99191	0		0	0				-653	30309.71
05/16/11 08:10:48	59.98901	0		0	0				-653	30309.71
05/16/11 08:10:50	59.98773	0		0	0				-653	30309.71
05/16/11 08:10:52	59.98901	0		0	0				-653	30309.71
05/16/11 08:10:54	59.99255	0		0	0				-653	30319.5
05/16/11 08:10:56	59.99579	0		0	0				-653	30319.5
05/16/11 08:10:58	59.99902	0		0	0				-653	30319.5
05/16/11 08:11:00	60.00195	0		0	0				-653	30319.5
05/16/11 08:11:02	60.00485	0		0	0				-653	30357.21
05/16/11 08:11:04	60.00809	0		0	0				-653	30357.21
05/16/11 08:11:06	60.01163	0		0	0				-653	30357.18
05/16/11 08:11:08	60.01422	0		0	0				-653	30357.18
05/16/11 08:11:10	60.0152	0		0	0				-653	30357.18
05/16/11 08:11:12	60.0155	0		0	0				-653	30357.18
05/16/11 08:11:14	60.0155	0		0	0				-653	30354.26
05/16/11 08:11:16	60.01682	0		0	0				-653	30354.26
05/16/11 08:11:18	60.01907	0		0	0				-653	30354.26
05/16/11 08:11:20	60.02295	0		0	0				-653	30354.26
05/16/11 08:11:22	60.02618	0		0	0				-653	30354.48
05/16/11 08:11:24	60.02972	0		0	0				-653	30354.48
05/16/11 08:11:26	60.03262	0		0	0				-653	30353.83
05/16/11 08:11:28	60.03458	0		0	0				-653	30353.83
05/16/11 08:11:30	60.03522	0		0	0				-653	30353.83
05/16/11 08:11:32	60.03424	0		0	0				-653	30353.83
05/16/11 08:11:34	60.0336	0		0	0				-653	30370.41
05/16/11 08:11:36	60.03522	0		0	0				-653	30370.41
05/16/11 08:11:38	60.03812	0		0	0				-653	30370.41
05/16/11 08:11:40	60.04037	0		0	0				-653	30370.41
05/16/11 08:11:42	60.04105	0		0	0				-653	30374.79
05/16/11 08:11:44	60.04199	0		0	0				-653	30374.79
05/16/11 08:11:46	60.04233	0		0	0				-653	30366.14
05/16/11 08:11:48	60.0433	0		0	0				-653	30366.14
05/16/11 08:11:50	60.04425	0		0	0				-653	30366.14
05/16/11 08:11:52	60.04492	0		0	0				-653	30366.14
05/16/11 08:11:54	60.04556	0		0	0				-653	30373.53
05/16/11 08:11:56	60.04587	0		0	0				-653	30373.53
05/16/11 08:11:58	60.04654	0		0	0				-653	30373.53

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:12:00	60.0488	0		0	0				-653	30373.53
05/16/11 08:12:02	60.04974	0		0	0				-653	30343.46
05/16/11 08:12:04	60.0491	0		0	0				-653	30343.46
05/16/11 08:12:06	60.0491	0		0	0				-653	30335.12
05/16/11 08:12:08	60.05042	0		0	0				-653	30335.12
05/16/11 08:12:10	60.04974	0		0	0				-653	30335.12
05/16/11 08:12:12	60.04846	0		0	0				-653	30335.12
05/16/11 08:12:14	60.04718	0		0	0				-653	30337.29
05/16/11 08:12:16	60.04587	0		0	0				-653	30337.29
05/16/11 08:12:18	60.04587	0		0	0				-653	30337.29
05/16/11 08:12:20	60.04556	0		0	0				-653	30337.29
05/16/11 08:12:22	60.04425	0		0	0				-653	30350.2
05/16/11 08:12:24	60.04297	0		0	0				-653	30350.2
05/16/11 08:12:26	60.04169	0		0	0				-653	30350.07
05/16/11 08:12:28	60.04233	0		0	0				-653	30350.07
05/16/11 08:12:30	60.04459	0		0	0				-653	30350.07
05/16/11 08:12:32	60.04654	0		0	0				-653	30350.07
05/16/11 08:12:34	60.04718	0		0	0				-653	30354.77
05/16/11 08:12:36	60.0462	0		0	0				-653	30354.77
05/16/11 08:12:38	60.04425	0		0	0				-653	30354.77
05/16/11 08:12:40	60.04492	0		0	0				-653	30354.77
05/16/11 08:12:42	60.04523	0		0	0				-653	30372.38
05/16/11 08:12:44	60.04523	0		0	0				-653	30372.38
05/16/11 08:12:46	60.04556	0		0	0				-653	30372.38
05/16/11 08:12:48	60.0462	0		0	0				-653	30372.38
05/16/11 08:12:50	60.04654	0		0	0				-653	30372.38
05/16/11 08:12:52	60.04654	0		0	0				-653	30372.38
05/16/11 08:12:54	60.04523	0		0	0				-653	30349.1
05/16/11 08:12:56	60.04361	0		0	0				-653	30349.1
05/16/11 08:12:58	60.04199	0		0	0				-653	30349.1
05/16/11 08:13:00	60.04071	0		0	0				-653	30349.1
05/16/11 08:13:02	60.03876	0		0	0				-653	30363.65
05/16/11 08:13:04	60.03586	0		0	0				-653	30363.65
05/16/11 08:13:06	60.03394	0		0	0				-653	30363.88
05/16/11 08:13:08	60.0336	0		0	0				-653	30363.88
05/16/11 08:13:10	60.03262	0		0	0				-653	30363.88
05/16/11 08:13:12	60.03006	0		0	0				-653	30363.88
05/16/11 08:13:14	60.02747	0		0	0				-653	30364.77
05/16/11 08:13:16	60.02682	0		0	0				-653	30364.77
05/16/11 08:13:18	60.02585	0		0	0				-653	30364.77

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:13:20	60.02359	0		0	0				-653	30364.77
05/16/11 08:13:22	60.02197	0		0	0				-653	30374.33
05/16/11 08:13:24	60.02164	0		0	0				-653	30374.33
05/16/11 08:13:26	60.02231	0		0	0				-653	30364.67
05/16/11 08:13:28	60.02133	0		0	0				-653	30364.67
05/16/11 08:13:30	60.02133	0		0	0				-653	30364.67
05/16/11 08:13:32	60.02002	0		0	0				-653	30364.67
05/16/11 08:13:34	60.01776	0		0	0				-653	30361.56
05/16/11 08:13:36	60.01584	0		0	0				-653	30361.56
05/16/11 08:13:38	60.01291	0		0	0				-653	30361.56
05/16/11 08:13:40	60.01132	0		0	0				-653	30361.56
05/16/11 08:13:42	60.01001	0		0	0				-653	30350.69
05/16/11 08:13:44	60.00937	0		0	0				-653	30350.69
05/16/11 08:13:46	60.00775	0		0	0				-653	30344.52
05/16/11 08:13:48	60.00516	0		0	0				-653	30344.52
05/16/11 08:13:50	60.00452	0		0	0				-653	30344.52
05/16/11 08:13:52	60.00613	0		0	0				-653	30344.52
05/16/11 08:13:54	60.00613	0		0	0				-653	30354.37
05/16/11 08:13:56	60.00549	0		0	0				-653	30354.37
05/16/11 08:13:58	60.00516	0		0	0				-653	30354.37
05/16/11 08:14:00	60.00388	0		0	0				-653	30354.37
05/16/11 08:14:02	60.00259	0		0	0				-653	30373.31
05/16/11 08:14:04	60.00128	0		0	0				-653	30373.31
05/16/11 08:14:06	60.00128	0		0	0				-653	30373.78
05/16/11 08:14:08	60.00064	0		0	0				-653	30373.78
05/16/11 08:14:10	60.00034	0		0	0				-653	30373.78
05/16/11 08:14:12	60.00226	0		0	0				-653	30373.78
05/16/11 08:14:14	60.00421	0		0	0				-653	30366.33
05/16/11 08:14:16	60.00677	0		0	0				-653	30366.33
05/16/11 08:14:18	60.00903	0		0	0				-653	30366.33
05/16/11 08:14:20	60.01291	0		0	0				-653	30366.33
05/16/11 08:14:22	60.01486	0		0	0				-653	30373.85
05/16/11 08:14:24	60.01453	0		0	0				-653	30373.85
05/16/11 08:14:26	60.01422	0		0	0				-653	30373.05
05/16/11 08:14:28	60.0152	0		0	0				-653	30373.05
05/16/11 08:14:30	60.01614	0		0	0				-653	30373.05
05/16/11 08:14:32	60.01682	0		0	0				-653	30373.05
05/16/11 08:14:34	60.01746	0		0	0				-653	30369.77
05/16/11 08:14:36	60.01712	0		0	0				-653	30369.77
05/16/11 08:14:38	60.01682	0		0	0				-653	30369.77

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:14:40	60.01648	0		0	0				-653	30369.77
05/16/11 08:14:42	60.01614	0		0	0				-653	30388.99
05/16/11 08:14:44	60.01746	0		0	0				-653	30388.99
05/16/11 08:14:46	60.01776	0		0	0				-653	30388.16
05/16/11 08:14:48	60.01776	0		0	0				-653	30388.16
05/16/11 08:14:50	60.01648	0		0	0				-653	30388.16
05/16/11 08:14:52	60.01584	0		0	0				-653	30388.16
05/16/11 08:14:54	60.01648	0		0	0				-653	30376.94
05/16/11 08:14:56	60.01584	0		0	0				-653	30376.94
05/16/11 08:14:58	60.01358	0		0	0				-653	30376.94
05/16/11 08:15:00	60.01163	0		0	0				-653	30376.94
05/16/11 08:15:02	60.01132	0		0	0				-653	30371.85
05/16/11 08:15:04	60.01132	0		0	0				-653	30371.85
05/16/11 08:15:06	60.01099	0		0	0				-653	30362.65
05/16/11 08:15:08	60.01099	0		0	0				-653	30362.65
05/16/11 08:15:10	60.01291	0		0	0				-653	30362.65
05/16/11 08:15:12	60.01486	0		0	0				-653	30362.65
05/16/11 08:15:14	60.01776	0		0	0				-653	30395.46
05/16/11 08:15:16	60.01776	0		0	0				-653	30395.46
05/16/11 08:15:18	60.0184	0		0	0				-653	30395.46
05/16/11 08:15:20	60.0181	0		0	0				-653	30395.46
05/16/11 08:15:22	60.01746	0		0	0				-653	30397.03
05/16/11 08:15:24	60.0152	0		0	0				-653	30397.03
05/16/11 08:15:26	60.0152	0		0	0				-653	30396.67
05/16/11 08:15:28	60.01389	0		0	0				-653	30396.67
05/16/11 08:15:30	60.01746	0		0	0				-653	30396.67
05/16/11 08:15:32	60.01907	0		0	0				-653	30396.67
05/16/11 08:15:34	60.01907	0		0	0				-653	30388.62
05/16/11 08:15:36	60.02036	0		0	0				-653	30388.62
05/16/11 08:15:38	60.01874	0		0	0				-653	30388.62
05/16/11 08:15:40	60.01874	0		0	0				-653	30388.62
05/16/11 08:15:42	60.01971	0		0	0				-653	30381.78
05/16/11 08:15:44	60.01971	0		0	0				-653	30381.78
05/16/11 08:15:46	60.01971	0		0	0				-653	30382.96
05/16/11 08:15:48	60.0184	0		0	0				-653	30382.96
05/16/11 08:15:50	60.01486	0		0	0				-653	30382.96
05/16/11 08:15:52	60.01358	0		0	0				-653	30382.96
05/16/11 08:15:54	60.01389	0		0	0				-653	30381.48
05/16/11 08:15:56	60.01227	0		0	0				-653	30381.48
05/16/11 08:15:58	60.01001	0		0	0				-653	30381.48

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:16:00	60.00583	0		0	0				-653	30381.48
05/16/11 08:16:02	60.00162	0		0	0				-653	30394.03
05/16/11 08:16:04	60.00162	0		0	0				-653	30394.03
05/16/11 08:16:06	59.99805	0		0	0				-653	30394.07
05/16/11 08:16:08	59.99353	0		0	0				-653	30394.07
05/16/11 08:16:10	59.99255	0		0	0				-653	30394.07
05/16/11 08:16:12	59.99225	0		0	0				-653	30394.07
05/16/11 08:16:14	59.98999	0		0	0				-653	30376.91
05/16/11 08:16:16	59.98837	0		0	0				-653	30376.91
05/16/11 08:16:18	59.98416	0		0	0				-653	30376.91
05/16/11 08:16:20	59.9816	0		0	0				-653	30376.91
05/16/11 08:16:22	59.98093	0		0	0				-653	30367.96
05/16/11 08:16:24	59.98029	0		0	0				-653	30367.96
05/16/11 08:16:26	59.97998	0		0	0				-653	30367.46
05/16/11 08:16:28	59.97836	0		0	0				-653	30367.46
05/16/11 08:16:30	59.97513	0		0	0				-653	30367.46
05/16/11 08:16:32	59.97287	0		0	0				-653	30367.46
05/16/11 08:16:34	59.97189	0		0	0				-653	30361.18
05/16/11 08:16:36	59.97156	0		0	0				-653	30361.18
05/16/11 08:16:38	59.97382	0		0	0				-653	30361.18
05/16/11 08:16:40	59.97641	0		0	0				-653	30361.18
05/16/11 08:16:42	59.97836	0		0	0				-653	30365.59
05/16/11 08:16:44	59.97705	0		0	0				-653	30365.59
05/16/11 08:16:46	59.97449	0		0	0				-653	30365.19
05/16/11 08:16:48	59.97125	0		0	0				-653	30365.19
05/16/11 08:16:50	59.97092	0		0	0				-653	30365.19
05/16/11 08:16:52	59.97287	0		0	0				-653	30365.19
05/16/11 08:16:54	59.97449	0		0	0				-653	30375.91
05/16/11 08:16:56	59.97382	0		0	0				-653	30375.91
05/16/11 08:16:58	59.97318	0		0	0				-653	30375.91
05/16/11 08:17:00	59.97449	0		0	0				-653	30375.91
05/16/11 08:17:02	59.9761	0		0	0				-653	30367.4
05/16/11 08:17:04	59.97739	0		0	0				-653	30367.4
05/16/11 08:17:06	59.97836	0		0	0				-653	30367.72
05/16/11 08:17:08	59.97769	0		0	0				-653	30367.72
05/16/11 08:17:10	59.97705	0		0	0				-653	30367.72
05/16/11 08:17:12	59.97641	0		0	0				-653	30367.72
05/16/11 08:17:14	59.97543	0		0	0				-653	30416.87
05/16/11 08:17:16	59.97382	0		0	0				-653	30416.87
05/16/11 08:17:18	59.97318	0		0	0				-653	30416.87

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.004	0.004	
1	1	1	-0.004	0.004	
1	1	1	0.000	0.000	
1	0	1	-0.004	0.004	
1	0	1	-0.005	0.005	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:17:20	59.97223	0		0	0				-653	30416.87
05/16/11 08:17:22	59.97189	0		0	0				-653	30413.65
05/16/11 08:17:24	59.97092	0		0	0				-653	30413.65
05/16/11 08:17:26	59.96994	0		0	0				-653	30406.3
05/16/11 08:17:28	59.96832	0		0	0				-653	30406.3
05/16/11 08:17:30	59.96606	0		0	0				-653	30406.3
05/16/11 08:17:32	59.96542	0		0	0				-653	30406.3
05/16/11 08:17:34	59.96606	0		0	0				-653	30418.59
05/16/11 08:17:36	59.9693	0		0	0				-653	30418.59
05/16/11 08:17:38	59.97253	0		0	0				-653	30418.59
05/16/11 08:17:40	59.97351	0		0	0				-653	30418.59
05/16/11 08:17:42	59.97382	0		0	0				-653	30433.31
05/16/11 08:17:44	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:46	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:48	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:50	59.96768	0		0	0				-653	30433.31
05/16/11 08:17:52	59.97125	0		0	0				-653	30433.31
05/16/11 08:17:54	59.97577	0		0	0				-653	30451.3
05/16/11 08:17:56	59.97577	0		0	0				-653	30451.3
05/16/11 08:17:58	59.97577	0		0	0				-653	30451.3
05/16/11 08:18:00	59.98416	0		0	0				-653	30451.3
05/16/11 08:18:02	59.9819	0		0	0				-653	30425.74
05/16/11 08:18:04	59.979	0		0	0				-653	30425.74
05/16/11 08:18:06	59.97769	0		0	0				-653	30419.18
05/16/11 08:18:08	59.97769	0		0	0				-653	30419.18
05/16/11 08:18:10	59.98126	0		0	0				-653	30419.18
05/16/11 08:18:12	59.9848	0		0	0				-653	30419.18
05/16/11 08:18:14	59.98868	0		0	0				-653	30424.29
05/16/11 08:18:16	59.99161	0		0	0				-653	30424.29
05/16/11 08:18:18	59.99353	0		0	0				-653	30424.29
05/16/11 08:18:20	59.99579	0		0	0				-653	30424.29
05/16/11 08:18:22	59.99677	0		0	0				-653	30440.82
05/16/11 08:18:24	59.99774	0		0	0				-653	30440.82
05/16/11 08:18:26	59.99838	0		0	0				-653	30431.58
05/16/11 08:18:28	59.99774	0		0	0				-653	30431.58
05/16/11 08:18:30	59.9971	0		0	0				-653	30431.58
05/16/11 08:18:32	59.99741	0		0	0				-653	30431.58
05/16/11 08:18:34	59.99741	0		0	0				-653	30444.25
05/16/11 08:18:36	59.99741	0		0	0				-653	30444.25
05/16/11 08:18:38	60.00064	0		0	0				-653	30444.25

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.005	0.005	
1	0	1	0.004	0.004	
1	0	1	0.005	0.005	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.008	0.008	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	1	1	0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:18:40	60.00323	0		0	0				-653	30444.25
05/16/11 08:18:42	60.00354	0		0	0				-653	30465.11
05/16/11 08:18:44	60.00259	0		0	0				-653	30465.11
05/16/11 08:18:46	60.00098	0		0	0				-653	30465.3
05/16/11 08:18:48	59.99936	0		0	0				-653	30465.3
05/16/11 08:18:50	59.99741	0		0	0				-653	30465.3
05/16/11 08:18:52	59.99677	0		0	0				-653	30465.3
05/16/11 08:18:54	59.99677	0		0	0				-653	30478.25
05/16/11 08:18:56	59.9971	0		0	0				-653	30478.25
05/16/11 08:18:58	59.99774	0		0	0				-653	30478.25
05/16/11 08:19:00	59.99872	0		0	0				-653	30478.25
05/16/11 08:19:02	59.99966	0		0	0				-653	30473.86
05/16/11 08:19:04	60	0		0	0				-653	30473.86
05/16/11 08:19:06	60.00034	0		0	0				-653	30468.84
05/16/11 08:19:08	60.00098	0		0	0				-653	30468.84
05/16/11 08:19:10	60.00226	0		0	0				-653	30468.84
05/16/11 08:19:12	60.0029	0		0	0				-653	30468.84
05/16/11 08:19:14	60.00259	0		0	0				-653	30469.63
05/16/11 08:19:16	60.00226	0		0	0				-653	30469.63
05/16/11 08:19:18	60.00226	0		0	0				-653	30469.63
05/16/11 08:19:20	60.00323	0		0	0				-653	30469.63
05/16/11 08:19:22	60.00421	0		0	0				-653	30488.41
05/16/11 08:19:24	60.00485	0		0	0				-653	30488.41
05/16/11 08:19:26	60.00452	0		0	0				-653	30480.29
05/16/11 08:19:28	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:30	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:32	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:34	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:36	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:38	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:40	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:42	60.00613	0		0	0				-653	30487.82
05/16/11 08:19:44	60.00485	0		0	0				-653	30487.82
05/16/11 08:19:46	60.00452	0		0	0				-653	30489.73
05/16/11 08:19:48	60.00452	0		0	0				-653	30489.73
05/16/11 08:19:50	60.00354	0		0	0				-653	30489.73
05/16/11 08:19:52	60.0029	0		0	0				-653	30489.73
05/16/11 08:19:54	60.00162	0		0	0				-653	30480.09
05/16/11 08:19:56	60.00162	0		0	0				-653	30480.09
05/16/11 08:19:58	60.00421	0		0	0				-653	30480.09

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:20:00	60.00421	0		0	0				-653	30480.09
05/16/11 08:20:02	60.0029	0		0	0				-653	30480.91
05/16/11 08:20:04	60.00034	0		0	0				-653	30480.91
05/16/11 08:20:06	59.99805	0		0	0				-653	30480.84
05/16/11 08:20:08	59.99646	0		0	0				-653	30480.84
05/16/11 08:20:10	59.99515	0		0	0				-653	30480.84
05/16/11 08:20:12	59.99387	0		0	0				-653	30480.84
05/16/11 08:20:14	59.99289	0		0	0				-653	30476.09
05/16/11 08:20:16	59.99255	0		0	0				-653	30476.09
05/16/11 08:20:18	59.99225	0		0	0				-653	30476.09
05/16/11 08:20:20	59.98965	0		0	0				-653	30476.09
05/16/11 08:20:22	59.98514	0		0	0				-653	30456.76
05/16/11 08:20:24	59.98254	0		0	0				-653	30456.76
05/16/11 08:20:26	59.97836	0		0	0				-653	30457.12
05/16/11 08:20:28	59.97641	0		0	0				-653	30457.12
05/16/11 08:20:30	59.97705	0		0	0				-653	30457.12
05/16/11 08:20:32	59.97705	0		0	0				-653	30457.12
05/16/11 08:20:34	59.97705	0		0	0				-653	30446.98
05/16/11 08:20:36	59.97803	0		0	0				-653	30446.98
05/16/11 08:20:38	59.97964	0		0	0				-653	30446.98
05/16/11 08:20:40	59.9816	0		0	0				-653	30446.98
05/16/11 08:20:42	59.98126	0		0	0				-653	30461.02
05/16/11 08:20:44	59.97931	0		0	0				-653	30461.02
05/16/11 08:20:46	59.9761	0		0	0				-653	30460.94
05/16/11 08:20:48	59.97543	0		0	0				-653	30460.94
05/16/11 08:20:50	59.97577	0		0	0				-653	30460.94
05/16/11 08:20:52	59.97675	0		0	0				-653	30460.94
05/16/11 08:20:54	59.97803	0		0	0				-653	30469.23
05/16/11 08:20:56	59.979	0		0	0				-653	30469.23
05/16/11 08:20:58	59.97964	0		0	0				-653	30469.23
05/16/11 08:21:00	59.98062	0		0	0				-653	30469.23
05/16/11 08:21:02	59.9819	0		0	0				-653	30481.49
05/16/11 08:21:04	59.98224	0		0	0				-653	30481.49
05/16/11 08:21:06	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:08	59.98288	0		0	0				-653	30480.29
05/16/11 08:21:10	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:12	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:14	59.98288	0		0	0				-653	30473.15
05/16/11 08:21:16	59.98611	0		0	0				-653	30473.15
05/16/11 08:21:18	59.99387	0		0	0				-653	30473.15

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	0.008	0.008	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:21:20	60.00226	0		0	0				-653	30473.15
05/16/11 08:21:22	60.01099	0		0	0				-653	30470.66
05/16/11 08:21:24	60.01712	0		0	0				-653	30470.66
05/16/11 08:21:26	60.02069	0		0	0				-653	30470.6
05/16/11 08:21:28	60.02133	0		0	0				-653	30470.6
05/16/11 08:21:30	60.02133	0		0	0				-653	30470.6
05/16/11 08:21:32	60.02133	0		0	0				-653	30470.6
05/16/11 08:21:34	60.02325	0		0	0				-653	30461.28
05/16/11 08:21:36	60.02551	0		0	0				-653	30461.28
05/16/11 08:21:38	60.02682	0		0	0				-653	30461.28
05/16/11 08:21:40	60.02844	0		0	0				-653	30461.28
05/16/11 08:21:42	60.02972	0		0	0				-653	30450.44
05/16/11 08:21:44	60.03101	0		0	0				-653	30450.44
05/16/11 08:21:46	60.03198	0		0	0				-653	30451.91
05/16/11 08:21:48	60.03296	0		0	0				-653	30451.91
05/16/11 08:21:50	60.03458	0		0	0				-653	30451.91
05/16/11 08:21:52	60.03488	0		0	0				-653	30451.91
05/16/11 08:21:54	60.03488	0		0	0				-653	30446.52
05/16/11 08:21:56	60.03424	0		0	0				-653	30446.52
05/16/11 08:21:58	60.03458	0		0	0				-653	30446.52
05/16/11 08:22:00	60.03458	0		0	0				-653	30446.52
05/16/11 08:22:02	60.03555	0		0	0				-653	30452.43
05/16/11 08:22:04	60.03586	0		0	0				-653	30452.43
05/16/11 08:22:06	60.03683	0		0	0				-653	30452.43
05/16/11 08:22:08	60.03748	0		0	0				-653	30452.43
05/16/11 08:22:10	60.03748	0		0	0				-653	30452.43
05/16/11 08:22:12	60.03717	0		0	0				-653	30452.43
05/16/11 08:22:14	60.03781	0		0	0				-653	30473.21
05/16/11 08:22:16	60.03781	0		0	0				-653	30473.21
05/16/11 08:22:18	60.03748	0		0	0				-653	30473.21
05/16/11 08:22:20	60.0365	0		0	0				-653	30473.21
05/16/11 08:22:22	60.03683	0		0	0				-653	30476.61
05/16/11 08:22:24	60.03748	0		0	0				-653	30476.61
05/16/11 08:22:26	60.03748	0		0	0				-653	30476.55
05/16/11 08:22:28	60.03812	0		0	0				-653	30476.55
05/16/11 08:22:30	60.03876	0		0	0				-653	30476.55
05/16/11 08:22:32	60.04007	0		0	0				-653	30476.55
05/16/11 08:22:34	60.04169	0		0	0				-653	30473.8
05/16/11 08:22:36	60.04361	0		0	0				-653	30473.8
05/16/11 08:22:38	60.04523	0		0	0				-653	30473.8

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.008	0.008	
1	1	1	0.009	0.009	
1	1	1	0.006	0.006	
1	1	1	0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:22:40	60.04492	0		0	0				-653	30473.8
05/16/11 08:22:42	60.04459	0		0	0				-653	30471
05/16/11 08:22:44	60.04395	0		0	0				-653	30471
05/16/11 08:22:46	60.04199	0		0	0				-653	30471.97
05/16/11 08:22:48	60.03717	0		0	0				-653	30471.97
05/16/11 08:22:50	60.03296	0		0	0				-653	30471.97
05/16/11 08:22:52	60.03101	0		0	0				-653	30471.97
05/16/11 08:22:54	60.03134	0		0	0				-653	30485.47
05/16/11 08:22:56	60.03168	0		0	0				-653	30485.47
05/16/11 08:22:58	60.03101	0		0	0				-653	30485.47
05/16/11 08:23:00	60.03101	0		0	0				-653	30485.47
05/16/11 08:23:02	60.03232	0		0	0				-653	30505.49
05/16/11 08:23:04	60.03326	0		0	0				-653	30505.49
05/16/11 08:23:06	60.03326	0		0	0				-653	30505.26
05/16/11 08:23:08	60.03394	0		0	0				-653	30505.26
05/16/11 08:23:10	60.03296	0		0	0				-653	30505.26
05/16/11 08:23:12	60.03232	0		0	0				-653	30505.26
05/16/11 08:23:14	60.03168	0		0	0				-653	30515.6
05/16/11 08:23:16	60.03168	0		0	0				-653	30515.6
05/16/11 08:23:18	60.03232	0		0	0				-653	30515.6
05/16/11 08:23:20	60.03232	0		0	0				-653	30515.6
05/16/11 08:23:22	60.03168	0		0	0				-653	30505.28
05/16/11 08:23:24	60.03168	0		0	0				-653	30505.28
05/16/11 08:23:26	60.03134	0		0	0				-653	30506.12
05/16/11 08:23:28	60.03101	0		0	0				-653	30506.12
05/16/11 08:23:30	60.03036	0		0	0				-653	30506.12
05/16/11 08:23:32	60.03036	0		0	0				-653	30506.12
05/16/11 08:23:34	60.02972	0		0	0				-653	30493.68
05/16/11 08:23:36	60.02875	0		0	0				-653	30493.68
05/16/11 08:23:38	60.03006	0		0	0				-653	30493.68
05/16/11 08:23:40	60.03198	0		0	0				-653	30493.68
05/16/11 08:23:42	60.03326	0		0	0				-653	30529.28
05/16/11 08:23:44	60.03458	0		0	0				-653	30529.28
05/16/11 08:23:46	60.03488	0		0	0				-653	30529.08
05/16/11 08:23:48	60.0336	0		0	0				-653	30529.08
05/16/11 08:23:50	60.03326	0		0	0				-653	30529.08
05/16/11 08:23:52	60.03232	0		0	0				-653	30529.08
05/16/11 08:23:54	60.03134	0		0	0				-653	30529.52
05/16/11 08:23:56	60.03168	0		0	0				-653	30529.52
05/16/11 08:23:58	60.03326	0		0	0				-653	30529.52

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.005	0.005	
1	1	1	-0.004	0.004	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:24:00	60.03458	0		0	0				-653	30529.52
05/16/11 08:24:02	60.03586	0		0	0				-653	30535.57
05/16/11 08:24:04	60.0365	0		0	0				-653	30535.57
05/16/11 08:24:06	60.03748	0		0	0				-653	30533.89
05/16/11 08:24:08	60.03683	0		0	0				-653	30533.89
05/16/11 08:24:10	60.03619	0		0	0				-653	30533.89
05/16/11 08:24:12	60.03522	0		0	0				-653	30533.89
05/16/11 08:24:14	60.03424	0		0	0				-653	30521.82
05/16/11 08:24:16	60.03296	0		0	0				-653	30521.82
05/16/11 08:24:18	60.03198	0		0	0				-653	30521.82
05/16/11 08:24:20	60.03134	0		0	0				-653	30521.82
05/16/11 08:24:22	60.03168	0		0	0				-653	30533.64
05/16/11 08:24:24	60.03134	0		0	0				-653	30533.64
05/16/11 08:24:26	60.03101	0		0	0				-653	30532.32
05/16/11 08:24:28	60.03036	0		0	0				-653	30532.32
05/16/11 08:24:30	60.02972	0		0	0				-653	30532.32
05/16/11 08:24:32	60.03006	0		0	0				-653	30532.32
05/16/11 08:24:34	60.0307	0		0	0				-653	30551.2
05/16/11 08:24:36	60.03168	0		0	0				-653	30551.2
05/16/11 08:24:38	60.0336	0		0	0				-653	30551.2
05/16/11 08:24:40	60.03488	0		0	0				-653	30551.2
05/16/11 08:24:42	60.03522	0		0	0				-653	30548.06
05/16/11 08:24:44	60.03586	0		0	0				-653	30548.06
05/16/11 08:24:46	60.03717	0		0	0				-653	30543.69
05/16/11 08:24:48	60.03812	0		0	0				-653	30543.69
05/16/11 08:24:50	60.03717	0		0	0				-653	30543.69
05/16/11 08:24:52	60.03748	0		0	0				-653	30543.69
05/16/11 08:24:54	60.03845	0		0	0				-653	30546.32
05/16/11 08:24:56	60.03876	0		0	0				-653	30546.32
05/16/11 08:24:58	60.03781	0		0	0				-653	30546.32
05/16/11 08:25:00	60.03619	0		0	0				-653	30546.32
05/16/11 08:25:02	60.03488	0		0	0				-653	30546.28
05/16/11 08:25:04	60.03394	0		0	0				-653	30546.28
05/16/11 08:25:06	60.0336	0		0	0				-653	30546.38
05/16/11 08:25:08	60.0336	0		0	0				-653	30546.38
05/16/11 08:25:10	60.03458	0		0	0				-653	30546.38
05/16/11 08:25:12	60.0365	0		0	0				-653	30546.38
05/16/11 08:25:14	60.03748	0		0	0				-653	30556.84
05/16/11 08:25:16	60.03781	0		0	0				-653	30556.84
05/16/11 08:25:18	60.03748	0		0	0				-653	30556.84

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:25:20	60.0365	0		0	0				-653	30556.84
05/16/11 08:25:22	60.03488	0		0	0				-653	30557.42
05/16/11 08:25:24	60.0336	0		0	0				-653	30557.42
05/16/11 08:25:26	60.03232	0		0	0				-653	30557.43
05/16/11 08:25:28	60.03134	0		0	0				-653	30557.43
05/16/11 08:25:30	60.03101	0		0	0				-653	30557.43
05/16/11 08:25:32	60.03101	0		0	0				-653	30557.43
05/16/11 08:25:34	60.0307	0		0	0				-653	30566.39
05/16/11 08:25:36	60.02972	0		0	0				-653	30566.39
05/16/11 08:25:38	60.02908	0		0	0				-653	30566.39
05/16/11 08:25:40	60.02811	0		0	0				-653	30566.39
05/16/11 08:25:42	60.02649	0		0	0				-653	30567.26
05/16/11 08:25:44	60.02521	0		0	0				-653	30567.26
05/16/11 08:25:46	60.02359	0		0	0				-653	30562.43
05/16/11 08:25:48	60.02133	0		0	0				-653	30562.43
05/16/11 08:25:50	60.02002	0		0	0				-653	30562.43
05/16/11 08:25:52	60.02002	0		0	0				-653	30562.43
05/16/11 08:25:54	60.02069	0		0	0				-653	30573.32
05/16/11 08:25:56	60.02133	0		0	0				-653	30573.32
05/16/11 08:25:58	60.021	0		0	0				-653	30573.32
05/16/11 08:26:00	60.02036	0		0	0				-653	30573.32
05/16/11 08:26:02	60.01938	0		0	0				-653	30567
05/16/11 08:26:04	60.01938	0		0	0				-653	30567
05/16/11 08:26:06	60.01938	0		0	0				-653	30567.04
05/16/11 08:26:08	60.01971	0		0	0				-653	30567.04
05/16/11 08:26:10	60.01971	0		0	0				-653	30567.04
05/16/11 08:26:12	60.01907	0		0	0				-653	30567.04
05/16/11 08:26:14	60.01938	0		0	0				-653	30556.49
05/16/11 08:26:16	60.02036	0		0	0				-653	30556.49
05/16/11 08:26:18	60.02036	0		0	0				-653	30556.49
05/16/11 08:26:20	60.01907	0		0	0				-653	30556.49
05/16/11 08:26:22	60.01712	0		0	0				-653	30530.19
05/16/11 08:26:24	60.01584	0		0	0				-653	30530.19
05/16/11 08:26:26	60.0152	0		0	0				-653	30530.04
05/16/11 08:26:28	60.0155	0		0	0				-653	30530.04
05/16/11 08:26:30	60.01614	0		0	0				-653	30530.04
05/16/11 08:26:32	60.01746	0		0	0				-653	30530.04
05/16/11 08:26:34	60.0181	0		0	0				-653	30542.27
05/16/11 08:26:36	60.01746	0		0	0				-653	30542.27
05/16/11 08:26:38	60.01712	0		0	0				-653	30542.27

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:26:40	60.01648	0		0	0				-653	30542.27
05/16/11 08:26:42	60.01486	0		0	0				-653	30559.64
05/16/11 08:26:44	60.01227	0		0	0				-653	30559.64
05/16/11 08:26:46	60.01035	0		0	0				-653	30559.67
05/16/11 08:26:48	60.00937	0		0	0				-653	30559.67
05/16/11 08:26:50	60.00903	0		0	0				-653	30559.67
05/16/11 08:26:52	60.00937	0		0	0				-653	30559.67
05/16/11 08:26:54	60.01065	0		0	0				-653	30552.02
05/16/11 08:26:56	60.01163	0		0	0				-653	30552.02
05/16/11 08:26:58	60.01227	0		0	0				-653	30552.02
05/16/11 08:27:00	60.01163	0		0	0				-653	30552.02
05/16/11 08:27:02	60.00873	0		0	0				-653	30556.78
05/16/11 08:27:04	60.00647	0		0	0				-653	30556.78
05/16/11 08:27:06	60.00583	0		0	0				-653	30550.7
05/16/11 08:27:08	60.00613	0		0	0				-653	30550.7
05/16/11 08:27:10	60.00613	0		0	0				-653	30550.7
05/16/11 08:27:12	60.00711	0		0	0				-653	30550.7
05/16/11 08:27:14	60.00903	0		0	0				-653	30559.76
05/16/11 08:27:16	60.01099	0		0	0				-653	30559.76
05/16/11 08:27:18	60.01099	0		0	0				-653	30559.76
05/16/11 08:27:20	60.01035	0		0	0				-653	30559.76
05/16/11 08:27:22	60.0097	0		0	0				-653	30563.61
05/16/11 08:27:24	60.00873	0		0	0				-653	30563.61
05/16/11 08:27:26	60.00711	0		0	0				-653	30556.57
05/16/11 08:27:28	60.00613	0		0	0				-653	30556.57
05/16/11 08:27:30	60.00583	0		0	0				-653	30556.57
05/16/11 08:27:32	60.00711	0		0	0				-653	30556.57
05/16/11 08:27:34	60.00809	0		0	0				-653	30556.7
05/16/11 08:27:36	60.00839	0		0	0				-653	30556.7
05/16/11 08:27:38	60.00809	0		0	0				-653	30556.7
05/16/11 08:27:40	60.00711	0		0	0				-653	30556.7
05/16/11 08:27:42	60.00677	0		0	0				-653	30544.52
05/16/11 08:27:44	60.00775	0		0	0				-653	30544.52
05/16/11 08:27:46	60.00711	0		0	0				-653	30543.34
05/16/11 08:27:48	60.00647	0		0	0				-653	30543.34
05/16/11 08:27:50	60.00388	0		0	0				-653	30543.34
05/16/11 08:27:52	60.00128	0		0	0				-653	30543.34
05/16/11 08:27:54	59.99936	0		0	0				-653	30554.42
05/16/11 08:27:56	59.99805	0		0	0				-653	30554.42
05/16/11 08:27:58	59.99741	0		0	0				-653	30554.42

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:28:00	59.9971	0		0	0				-653	30554.42
05/16/11 08:28:02	59.99677	0		0	0				-653	30534.33
05/16/11 08:28:04	59.9971	0		0	0				-653	30534.33
05/16/11 08:28:06	59.99646	0		0	0				-653	30533.84
05/16/11 08:28:08	59.99579	0		0	0				-653	30533.84
05/16/11 08:28:10	59.99451	0		0	0				-653	30533.84
05/16/11 08:28:12	59.99353	0		0	0				-653	30533.84
05/16/11 08:28:14	59.99289	0		0	0				-653	30557.2
05/16/11 08:28:16	59.99191	0		0	0				-653	30557.2
05/16/11 08:28:18	59.98901	0		0	0				-653	30557.2
05/16/11 08:28:20	59.98611	0		0	0				-653	30557.2
05/16/11 08:28:22	59.9845	0		0	0				-653	30560.91
05/16/11 08:28:24	59.98318	0		0	0				-653	30560.91
05/16/11 08:28:26	59.9819	0		0	0				-653	30560.56
05/16/11 08:28:28	59.98093	0		0	0				-653	30560.56
05/16/11 08:28:30	59.97964	0		0	0				-653	30560.56
05/16/11 08:28:32	59.97867	0		0	0				-653	30560.56
05/16/11 08:28:34	59.97964	0		0	0				-653	30560.08
05/16/11 08:28:36	59.97998	0		0	0				-653	30560.08
05/16/11 08:28:38	59.98062	0		0	0				-653	30560.08
05/16/11 08:28:40	59.98029	0		0	0				-653	30560.08
05/16/11 08:28:42	59.979	0		0	0				-653	30558.72
05/16/11 08:28:44	59.97739	0		0	0				-653	30558.72
05/16/11 08:28:46	59.97513	0		0	0				-653	30553.46
05/16/11 08:28:48	59.97351	0		0	0				-653	30553.46
05/16/11 08:28:50	59.97253	0		0	0				-653	30553.46
05/16/11 08:28:52	59.97189	0		0	0				-653	30553.46
05/16/11 08:28:54	59.97318	0		0	0				-653	30562.63
05/16/11 08:28:56	59.97415	0		0	0				-653	30562.63
05/16/11 08:28:58	59.97449	0		0	0				-653	30562.63
05/16/11 08:29:00	59.97513	0		0	0				-653	30562.63
05/16/11 08:29:02	59.97577	0		0	0				-653	30578.05
05/16/11 08:29:04	59.97641	0		0	0				-653	30578.05
05/16/11 08:29:06	59.97705	0		0	0				-653	30570.97
05/16/11 08:29:08	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:10	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:12	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:14	59.9761	0		0	0				-653	30593.17
05/16/11 08:29:16	59.9761	0		0	0				-653	30593.17
05/16/11 08:29:18	59.97641	0		0	0				-653	30593.17

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:29:20	59.97705	0		0	0				-653	30593.17
05/16/11 08:29:22	59.97803	0		0	0				-653	30575.07
05/16/11 08:29:24	59.98029	0		0	0				-653	30575.07
05/16/11 08:29:26	59.98318	0		0	0				-653	30575.07
05/16/11 08:29:28	59.98547	0		0	0				-653	30575.07
05/16/11 08:29:30	59.98709	0		0	0				-653	30575.07
05/16/11 08:29:32	59.98965	0		0	0				-653	30575.07
05/16/11 08:29:34	59.99225	0		0	0				-653	30575.72
05/16/11 08:29:36	59.99484	0		0	0				-653	30575.72
05/16/11 08:29:38	59.99646	0		0	0				-653	30575.72
05/16/11 08:29:40	59.99774	0		0	0				-653	30575.72
05/16/11 08:29:42	59.99966	0		0	0				-653	30583.84
05/16/11 08:29:44	60.00034	0		0	0				-653	30583.84
05/16/11 08:29:46	60.00128	0		0	0				-653	30586.4
05/16/11 08:29:48	60.00195	0		0	0				-653	30586.4
05/16/11 08:29:50	60.00226	0		0	0				-653	30586.4
05/16/11 08:29:52	60.0029	0		0	0				-653	30586.4
05/16/11 08:29:54	60.00354	0		0	0				-653	30589.72
05/16/11 08:29:56	60.00421	0		0	0				-653	30589.72
05/16/11 08:29:58	60.00452	0		0	0				-653	30589.72
05/16/11 08:30:00	60.00388	0		0	0				-653	30589.72
05/16/11 08:30:02	60.00388	0		0	0				-653	30590.3
05/16/11 08:30:04	60.00421	0		0	0				-653	30590.3
05/16/11 08:30:06	60.00421	0		0	0				-653	30590.22
05/16/11 08:30:08	60.00388	0		0	0				-653	30590.22
05/16/11 08:30:10	60.00195	0		0	0				-653	30590.22
05/16/11 08:30:12	59.99966	0		0	0				-653	30590.22
05/16/11 08:30:14	59.99387	0		0	0				-653	30600.12
05/16/11 08:30:16	59.99387	0		0	0				-653	30600.12
05/16/11 08:30:18	59.98999	0		0	0				-653	30600.12
05/16/11 08:30:20	59.98868	0		0	0				-653	30600.12
05/16/11 08:30:22	59.98709	0		0	0				-653	30603.38
05/16/11 08:30:24	59.98578	0		0	0				-653	30603.38
05/16/11 08:30:26	59.98578	0		0	0				-653	30597.09
05/16/11 08:30:28	59.98288	0		0	0				-653	30597.09
05/16/11 08:30:30	59.97964	0		0	0				-653	30597.09
05/16/11 08:30:32	59.97675	0		0	0				-653	30597.09
05/16/11 08:30:34	59.97479	0		0	0				-653	30603.96
05/16/11 08:30:36	59.97479	0		0	0				-653	30603.96
05/16/11 08:30:38	59.97641	0		0	0				-653	30603.96

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta	Absolute	
806	03:52 Event Length mm:ss		Hz	Delta Hz	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	0	1	-0.006	0.006	
1	0	1	0.000	0.000	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:30:40	59.97641	0		0	0				-653	30603.96
05/16/11 08:30:42	59.97543	0		0	0				-653	30607.96
05/16/11 08:30:44	59.97351	0		0	0				-653	30607.96
05/16/11 08:30:46	59.97318	0		0	0				-653	30601.98
05/16/11 08:30:48	59.97513	0		0	0				-653	30601.98
05/16/11 08:30:50	59.97641	0		0	0				-653	30597.09
05/16/11 08:30:52	59.97705	0		0	0				-653	30597.09
05/16/11 08:30:54	59.97867	0		0	0				-653	30607.96
05/16/11 08:30:56	59.97836	0		0	0				-653	30607.96
05/16/11 08:30:58	59.97803	0		0	0				-653	30607.96
05/16/11 08:31:00	59.97543	0		0	0				-653	30607.96
05/16/11 08:31:02	59.97415	0		0	0				-653	30607.96
05/16/11 08:31:04	59.97415	0		0	0				-653	30601.98
05/16/11 08:31:06	59.97479	0		0	0				-653	30601.98
05/16/11 08:31:08	59.97415	0		0	0				-653	30601.98
05/16/11 08:31:10	59.97351	0		0	0				-653	30601.98
05/16/11 08:31:12	59.97351	0		0	0				-653	30601.98
05/16/11 08:31:14	59.97543	0		0	0				-653	30632.79
05/16/11 08:31:16	59.97769	0		0	0				-653	30632.79
05/16/11 08:31:18	59.98062	0		0	0				-653	30632.79
05/16/11 08:31:20	59.98514	0		0	0				-653	30632.79
05/16/11 08:31:22	59.98773	0		0	0				-653	30632.79
05/16/11 08:31:24	59.98965	0		0	0				-653	30633.18
05/16/11 08:31:26	59.99097	0		0	0				-653	30633.18
05/16/11 08:31:28	59.99225	0		0	0				-653	30633.18
05/16/11 08:31:30	59.99323	0		0	0				-653	30633.18
05/16/11 08:31:32	59.99612	0		0	0				-653	30633.18
05/16/11 08:31:34	60.00034	0		0	0				-653	30620.6
05/16/11 08:31:36	60.00452	0		0	0				-653	30620.6
05/16/11 08:31:38	60.00809	0		0	0				-653	30620.6
05/16/11 08:31:40	60.01099	0		0	0				-653	30620.6
05/16/11 08:31:42	60.01389	0		0	0				-653	30620.6
05/16/11 08:31:44	60.01776	0		0	0				-653	30620.91
05/16/11 08:31:46	60.02069	0		0	0				-653	30620.91
05/16/11 08:31:48	60.02164	0		0	0				-653	30620.91
05/16/11 08:31:50	60.021	0		0	0				-653	30620.91
05/16/11 08:31:52	60.01907	0		0	0				-653	30620.91
05/16/11 08:31:54	60.0181	0		0	0				-653	30661.87
05/16/11 08:31:56	60.0184	0		0	0				-653	30661.87
05/16/11 08:31:58	60.02069	0		0	0				-653	30661.87

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.004	0.004	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:32:00	60.0239	0		0	0				-653	30661.87
05/16/11 08:32:02	60.02618	0		0	0				-653	30661.87
05/16/11 08:32:04	60.02682	0		0	0				-653	30663.73
05/16/11 08:32:06	60.02649	0		0	0				-653	30663.73
05/16/11 08:32:08	60.02585	0		0	0				-653	30663.73
05/16/11 08:32:10	60.02359	0		0	0				-653	30663.73
05/16/11 08:32:12	60.02359	0		0	0				-653	30663.73
05/16/11 08:32:14	60.02164	0		0	0				-653	30659.84
05/16/11 08:32:16	60.02231	0		0	0				-653	30659.84
05/16/11 08:32:18	60.02325	0		0	0				-653	30659.84
05/16/11 08:32:20	60.02359	0		0	0				-653	30659.84
05/16/11 08:32:22	60.02295	0		0	0				-653	30659.84
05/16/11 08:32:24	60.02133	0		0	0				-653	30653.46
05/16/11 08:32:26	60.021	0		0	0				-653	30653.46
05/16/11 08:32:28	60.021	0		0	0				-653	30653.46
05/16/11 08:32:30	60.02133	0		0	0				-653	30653.46
05/16/11 08:32:32	60.021	0		0	0				-653	30653.46
05/16/11 08:32:34	60.02036	0		0	0				-653	30661.6
05/16/11 08:32:36	60.02002	0		0	0				-653	30661.6
05/16/11 08:32:38	60.01938	0		0	0				-653	30661.6
05/16/11 08:32:40	60.0184	0		0	0				-653	30661.6
05/16/11 08:32:42	60.01712	0		0	0				-653	30661.6
05/16/11 08:32:44	60.01584	0		0	0				-653	30655.51
05/16/11 08:32:46	60.01486	0		0	0				-653	30655.51
05/16/11 08:32:48	60.01453	0		0	0				-653	30655.51
05/16/11 08:32:50	60.01486	0		0	0				-653	30655.51
05/16/11 08:32:52	60.01453	0		0	0				-653	30655.51
05/16/11 08:32:54	60.01486	0		0	0				-653	30648.14
05/16/11 08:32:56	60.0152	0		0	0				-653	30648.14
05/16/11 08:32:58	60.01486	0		0	0				-653	30648.14
05/16/11 08:33:00	60.0152	0		0	0				-653	30648.14
05/16/11 08:33:02	60.0152	0		0	0				-653	30648.14
05/16/11 08:33:04	60.01648	0		0	0				-653	30648.29
05/16/11 08:33:06	60.01614	0		0	0				-653	30648.29
05/16/11 08:33:08	60.0152	0		0	0				-653	30648.29
05/16/11 08:33:10	60.01486	0		0	0				-653	30648.29
05/16/11 08:33:12	60.01453	0		0	0				-653	30648.29
05/16/11 08:33:14	60.01291	0		0	0				-653	30652.04
05/16/11 08:33:16	60.01099	0		0	0				-653	30652.04
05/16/11 08:33:18	60.00775	0		0	0				-653	30652.04

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:33:20	60.00421	0		0	0				-653	30652.04
05/16/11 08:33:22	60.00162	0		0	0				-653	30652.04
05/16/11 08:33:24	60	0		0	0				-653	30651.84
05/16/11 08:33:26	59.99774	0		0	0				-653	30651.84
05/16/11 08:33:28	59.99515	0		0	0				-653	30651.84
05/16/11 08:33:30	59.99255	0		0	0				-653	30651.84
05/16/11 08:33:32	59.9903	0		0	0				-653	30651.84
05/16/11 08:33:34	59.98676	0		0	0				-653	30633.8
05/16/11 08:33:36	59.98352	0		0	0				-653	30633.8
05/16/11 08:33:38	59.98062	0		0	0				-653	30633.8
05/16/11 08:33:40	59.97964	0		0	0				-653	30633.8
05/16/11 08:33:42	59.97867	0		0	0				-653	30633.8
05/16/11 08:33:44	59.97705	0		0	0				-653	30627.71
05/16/11 08:33:46	59.97641	0		0	0				-653	30627.71
05/16/11 08:33:48	59.97675	0		0	0				-653	30627.71
05/16/11 08:33:50	59.97641	0		0	0				-653	30627.71
05/16/11 08:33:52	59.97577	0		0	0				-653	30627.71
05/16/11 08:33:54	59.97479	0		0	0				-653	30634.13
05/16/11 08:33:56	59.97415	0		0	0				-653	30634.13
05/16/11 08:33:58	59.97287	0		0	0				-653	30634.13
05/16/11 08:34:00	59.97125	0		0	0				-653	30634.13
05/16/11 08:34:02	59.97092	0		0	0				-653	30634.13
05/16/11 08:34:04	59.97125	0		0	0				-653	30627.05
05/16/11 08:34:06	59.97061	0		0	0				-653	30627.05
05/16/11 08:34:08	59.97092	0		0	0				-653	30627.05
05/16/11 08:34:10	59.97125	0		0	0				-653	30627.05
05/16/11 08:34:12	59.97156	0		0	0				-653	30627.05
05/16/11 08:34:14	59.97253	0		0	0				-653	30662.72
05/16/11 08:34:16	59.97449	0		0	0				-653	30662.72
05/16/11 08:34:18	59.97577	0		0	0				-653	30662.72
05/16/11 08:34:20	59.97641	0		0	0				-653	30662.72
05/16/11 08:34:22	59.97641	0		0	0				-653	30662.72
05/16/11 08:34:24	59.97513	0		0	0				-653	30656.52
05/16/11 08:34:26	59.9761	0		0	0				-653	30656.52
05/16/11 08:34:28	59.979	0		0	0				-653	30656.52
05/16/11 08:34:30	59.98126	0		0	0				-653	30656.52
05/16/11 08:34:32	59.98224	0		0	0				-653	30656.52
05/16/11 08:34:34	59.98254	0		0	0				-653	30642.25
05/16/11 08:34:36	59.98254	0		0	0				-653	30642.25
05/16/11 08:34:38	59.9816	0		0	0				-653	30642.25

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.004	0.004	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:34:40	59.98029	0		0	0				-653	30642.25
05/16/11 08:34:42	59.97964	0		0	0				-653	30642.25
05/16/11 08:34:44	59.98062	0		0	0				-653	30642.49
05/16/11 08:34:46	59.98093	0		0	0				-653	30642.49
05/16/11 08:34:48	59.98029	0		0	0				-653	30642.49
05/16/11 08:34:50	59.97931	0		0	0				-653	30642.49
05/16/11 08:34:52	59.97836	0		0	0				-653	30642.49
05/16/11 08:34:54	59.97803	0		0	0				-653	30645.72
05/16/11 08:34:56	59.97803	0		0	0				-653	30645.72
05/16/11 08:34:58	59.97867	0		0	0				-653	30645.72
05/16/11 08:35:00	59.97964	0		0	0				-653	30645.72
05/16/11 08:35:02	59.98062	0		0	0				-653	30645.72
05/16/11 08:35:04	59.98126	0		0	0				-653	30648.55
05/16/11 08:35:06	59.98224	0		0	0				-653	30648.55
05/16/11 08:35:08	59.98416	0		0	0				-653	30648.55
05/16/11 08:35:10	59.98547	0		0	0				-653	30648.55
05/16/11 08:35:12	59.98578	0		0	0				-653	30648.55
05/16/11 08:35:14	59.98578	0		0	0				-653	30661.06
05/16/11 08:35:16	59.98676	0		0	0				-653	30661.06
05/16/11 08:35:18	59.99063	0		0	0				-653	30661.06
05/16/11 08:35:20	59.99417	0		0	0				-653	30661.06
05/16/11 08:35:22	59.99805	0		0	0				-653	30661.06
05/16/11 08:35:24	59.99966	0		0	0				-653	30661.06
05/16/11 08:35:26	60.00226	0		0	0				-653	30661.06
05/16/11 08:35:28	60.00195	0		0	0				-653	30661.06
05/16/11 08:35:30	60.00098	0		0	0				-653	30661.06
05/16/11 08:35:32	59.99936	0		0	0				-653	30661.06
05/16/11 08:35:34	59.99872	0		0	0				-653	30684.31
05/16/11 08:35:36	59.99774	0		0	0				-653	30684.31
05/16/11 08:35:38	59.99741	0		0	0				-653	30684.31
05/16/11 08:35:40	59.99741	0		0	0				-653	30684.31
05/16/11 08:35:42	59.99838	0		0	0				-653	30684.31
05/16/11 08:35:44	59.99966	0		0	0				-653	30686.83
05/16/11 08:35:46	60.00064	0		0	0				-653	30686.83
05/16/11 08:35:48	60.00098	0		0	0				-653	30686.83
05/16/11 08:35:50	60.00064	0		0	0				-653	30686.83
05/16/11 08:35:52	60	0		0	0				-653	30686.83
05/16/11 08:35:54	59.99936	0		0	0				-653	30678.05
05/16/11 08:35:56	59.99741	0		0	0				-653	30678.05
05/16/11 08:35:58	59.99484	0		0	0					30678.05

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:36:00	59.99289	0		0	0					30678.05
05/16/11 08:36:02	59.99097	0		0	0					30678.05
05/16/11 08:36:04	59.98965	0		0	0					30679.19
05/16/11 08:36:06	59.98804	0		0	0					30679.19
05/16/11 08:36:08	59.98773	0		0	0					30679.19
05/16/11 08:36:10	59.98804	0		0	0					30679.19
05/16/11 08:36:12	59.98901	0		0	0					30679.19
05/16/11 08:36:14	59.99063	0		0	0					30684.85
05/16/11 08:36:16	59.99255	0		0	0					30684.85
05/16/11 08:36:18	59.99484	0		0	0					30684.85
05/16/11 08:36:20	59.99677	0		0	0					30684.85
05/16/11 08:36:22	59.99838	0		0	0					30684.85
05/16/11 08:36:24	59.99872	0		0	0					30684.99
05/16/11 08:36:26	59.99872	0		0	0					30684.99
05/16/11 08:36:28	59.99936	0		0	0					30684.99
05/16/11 08:36:30	60.00195	0		0	0					30684.99
05/16/11 08:36:32	60.00485	0		0	0					30684.99
05/16/11 08:36:34	60.00809	0		0	0					30687.29
05/16/11 08:36:36	60.01099	0		0	0					30687.29
05/16/11 08:36:38	60.01324	0		0	0					30687.29
05/16/11 08:36:40	60.01422	0		0	0					30687.29
05/16/11 08:36:42	60.01486	0		0	0					30687.29
05/16/11 08:36:44	60.01453	0		0	0					30687.59
05/16/11 08:36:46	60.01227	0		0	0					30687.59
05/16/11 08:36:48	60.01099	0		0	0					30687.59
05/16/11 08:36:50	60.01099	0		0	0					30687.59
05/16/11 08:36:52	60.01227	0		0	0					30687.59
05/16/11 08:36:54	60.01227	0		0	0					30726.76
05/16/11 08:36:56	60.01163	0		0	0					30726.76
05/16/11 08:36:58	60.01132	0		0	0					30726.76
05/16/11 08:37:00	60.01132	0		0	0					30726.76
05/16/11 08:37:02	60.01065	0		0	0					30726.76
05/16/11 08:37:04	60.00903	0		0	0					30726.82
05/16/11 08:37:06	60.00839	0		0	0					30726.82
05/16/11 08:37:08	60.00809	0		0	0					30726.82
05/16/11 08:37:10	60.00809	0		0	0					30726.82
05/16/11 08:37:12	60.00937	0		0	0					30726.82
05/16/11 08:37:14	60.01099	0		0	0					30720.93
05/16/11 08:37:16	60.01227	0		0	0					30720.93
05/16/11 08:37:18	60.01291	0		0	0					30720.93

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:37:20	60.0126	0		0	0					30720.93
05/16/11 08:37:22	60.01132	0		0	0					30720.93
05/16/11 08:37:24	60.0097	0		0	0					30720.53
05/16/11 08:37:26	60.00613	0		0	0					30720.53
05/16/11 08:37:28	60.00259	0		0	0					30720.53
05/16/11 08:37:30	59.99936	0		0	0					30720.53
05/16/11 08:37:32	59.99902	0		0	0					30720.53
05/16/11 08:37:34	60.00034	0		0	0					30720.62
05/16/11 08:37:36	60.00064	0		0	0					30720.62
05/16/11 08:37:38	59.99936	0		0	0					30720.62
05/16/11 08:37:40	59.99741	0		0	0					30720.62
05/16/11 08:37:42	59.99579	0		0	0					30720.62
05/16/11 08:37:44	59.99387	0		0	0					30721.15
05/16/11 08:37:46	59.99255	0		0	0					30721.15
05/16/11 08:37:48	59.99191	0		0	0					30721.15
05/16/11 08:37:50	59.99255	0		0	0					30721.15
05/16/11 08:37:52	59.99548	0		0	0					30721.15
05/16/11 08:37:54	60	0		0	0					30726.87
05/16/11 08:37:56	60.00323	0		0	0					30726.87
05/16/11 08:37:58	60.00516	0		0	0					30726.87
05/16/11 08:38:00	60.00485	0		0	0					30726.87
05/16/11 08:38:02	60.00354	0		0	0					30726.87
05/16/11 08:38:04	60.00226	0		0	0					30734.84
05/16/11 08:38:06	60.00098	0		0	0					30734.84
05/16/11 08:38:08	60	0		0	0					30734.84
05/16/11 08:38:10	59.99966	0		0	0					30734.84
05/16/11 08:38:12	59.99966	0		0	0					30734.84
05/16/11 08:38:14	59.99774	0		0	0					30757.45
05/16/11 08:38:16	59.9971	0		0	0					30757.45
05/16/11 08:38:18	59.99741	0		0	0					30757.45
05/16/11 08:38:20	59.99805	0		0	0					30757.45
05/16/11 08:38:22	59.99872	0		0	0					30757.45
05/16/11 08:38:24	59.99936	0		0	0					30757.92
05/16/11 08:38:26	60	0		0	0					30757.92
05/16/11 08:38:28	60.00162	0		0	0					30757.92
05/16/11 08:38:30	60.00323	0		0	0					30757.92
05/16/11 08:38:32	60.00388	0		0	0					30757.92
05/16/11 08:38:34	60.00485	0		0	0					30752.27
05/16/11 08:38:36	60.00549	0		0	0					30752.27
05/16/11 08:38:38	60.00613	0		0	0					30752.27

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.004	0.004	
1	1	1	-0.004	0.004	
1	1	1	-0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	1	1	0.005	0.005	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:38:40	60.00647	0		0	0					30752.27
05/16/11 08:38:42	60.00677	0		0	0					30752.27
05/16/11 08:38:44	60.00677	0		0	0					30752.33
05/16/11 08:38:46	60.00613	0		0	0					30752.33
05/16/11 08:38:48	60.00549	0		0	0					30752.33
05/16/11 08:38:50	60.00485	0		0	0					30752.33
05/16/11 08:38:52	60.00485	0		0	0					30752.33
05/16/11 08:38:54	60.00613	0		0	0					30755.63
05/16/11 08:38:56	60.01001	0		0	0					30755.63
05/16/11 08:38:58	60.01324	0		0	0					30755.63
05/16/11 08:39:00	60.01614	0		0	0					30755.63
05/16/11 08:39:02	60.0184	0		0	0					30755.63
05/16/11 08:39:04	60.01971	0		0	0					30755.66
05/16/11 08:39:06	60.021	0		0	0					30755.66
05/16/11 08:39:08	60.02133	0		0	0					30755.66
05/16/11 08:39:10	60.02197	0		0	0					30755.66
05/16/11 08:39:12	60.02359	0		0	0					30755.66
05/16/11 08:39:14	60.02682	0		0	0					30784.89
05/16/11 08:39:16	60.0307	0		0	0					30784.89
05/16/11 08:39:18	60.0336	0		0	0					30784.89
05/16/11 08:39:20	60.03424	0		0	0					30784.89
05/16/11 08:39:22	60.03326	0		0	0					30784.89
05/16/11 08:39:24	60.0307	0		0	0					30786.98
05/16/11 08:39:26	60.02875	0		0	0					30786.98
05/16/11 08:39:28	60.02875	0		0	0					30786.98
05/16/11 08:39:30	60.02939	0		0	0					30786.98
05/16/11 08:39:32	60.02908	0		0	0					30786.98
05/16/11 08:39:34	60.02844	0		0	0					30796.28
05/16/11 08:39:36	60.02777	0		0	0					30796.28
05/16/11 08:39:38	60.02811	0		0	0					30796.28
05/16/11 08:39:40	60.02777	0		0	0					30796.28
05/16/11 08:39:42	60.02777	0		0	0					30796.28
05/16/11 08:39:44	60.02777	0		0	0					30792.94
05/16/11 08:39:46	60.02747	0		0	0					30792.94
05/16/11 08:39:48	60.02713	0		0	0					30792.94
05/16/11 08:39:50	60.02618	0		0	0					30792.94
05/16/11 08:39:52	60.02521	0		0	0					30792.94
05/16/11 08:39:54	60.02457	0		0	0					30803.58
05/16/11 08:39:56	60.02487	0		0	0					30803.58
05/16/11 08:39:58	60.02551	0		0	0					30803.58

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:40:00	60.02618	0		0	0					30803.58

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	Rows of data to shift to align T(0)
	59.999	0.078	-0.078	0.009	1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
1	1	1	0.001	0.001	

Balancing Authority Name: MyBA

MyBA_110516_0806_FRS_Form2.9.xlsm

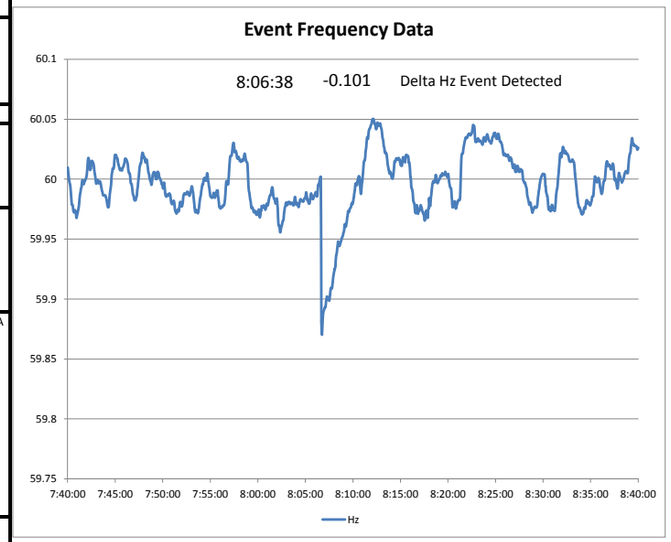
Interconnection Prevailing UFLS First Step Relay trip point 59.300 Hz

Interconnection High Relay trip point 60.700 Hz

Note: See "Instruction" tab for more detailed instructions.

	Auto	Event Detection	Auto
8:06:38	1245	Manually selected row number of the Event Starting Time.	Manual
8:10:30	1442	Manually selected row number of the Event Ending Time.	

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



11/05/16 Date yymmdd

8:06 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_110516_0806_FRS_Form2.9.xlsm

Date:	Monday, May 16, 2011	
Time of T(0)	8:06:38	
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30	
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999	Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101	Hz
Value A Pre-Perturbation Average Contingent MW [T(-2) to T(-16)]	471.09	MW
Value B Post-Perturbation Average Contingent MW [T(+20 to T(+52)]	0.00	MW
Pre to Post Perturbation Contingent Delta MW Actual	-471.09	MW
Initial Performance Ramp Magnitude Adjustment	-0.06	MW
EPFR Pre-Perturbation Average	8.97	MW
EPFR Post-Perturbation Average	671.54	MW
EPFR Delta	662.57	MW

Balancing Authority	MyBA	
Grid Nominal Frequency	60.000	Hz
Droop Setting	5.00%	3.00000 Hz
Deadband Setting	0.000	Hz
Hz Span	3.00000	Hz
TC (frequency response filter constant)	0.350	Time Constant for delayed delivery of PFR during Sustained Measure

A Point	8:06:36	
FPointA	60.00195313	8:06:36
A Value	59.99862671	
C Value	59.87011337	
Delta FC		

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-"

Low Hz	Delta Hz Event
0.00	Actual Interchange MW Average during frequency recovery period
617.52	Target Interchange MW Average during frequency recovery period
226.52	Interchange Average Ramp MW during frequency recovery period
470.90	Actual MW @ T(-4)
-494.59	Starting and Ending Difference in Interchange MW during frequency recovery period (indicates ramp direction during recovery period)
0:03:52	Event Duration (h:mm:ss)
No	Target MW Average minus MW @ T(-4) less than zero
641.21	Interchange Target Relative Average Change - MW (Low Frequency Event)
23.69	Interchange Actual Relative Average Change - MW (Low Frequency Event)
Yes	Interchange Actual Average minus MW @ T(-4) less than zero
No	Interchange Average MW minus MW @ T(-4) greater than zero
Yes	Interchange Target MW Average minus MW @ T(-4) greater than zero
146.62	Interchange Target Relative Average Change - MW (High Frequency Event)
-470.90	Interchange Actual Relative Average Change - MW (High Frequency Event)
Down	Ramp Direction during frequency recovery period

EPFR = Expected Primary Frequency Response — EPFR(Final) 662.51 MW

MW Response in right direction for frequency delta — Yes

Initial Response P.U. Performance 0.711 P.U. — 0.738 P.U. Sustained Response P.U. Performance

T		Frequency Hz	Contingent Resource Lost MW	Value B 20 to 52 sec Average Frequency	Average MW		Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW
T-72 sec	8:05:26	59.98029	471.000			19590	128.735	45.057							
T-70 sec	8:05:28	59.98224	471.000			19590	115.981	69.880							
T-68 sec	8:05:30	59.98352	471.000			19590	107.611	83.086							
T-66 sec	8:05:32	59.98578	471.000			19590	92.864	86.509							
T-64 sec	8:05:34	59.9874	471.000			19590	82.303	85.036							
T-62 sec	8:05:36	59.98804	471.000			19590	78.118	82.615							
T-60 sec	8:05:38	59.9874	471.000			19590	82.303	82.506		2.947	471.000				
T-58 sec	8:05:40	59.98611	471.000			19590	90.672	85.364		2.947	476.805				
T-56 sec	8:05:42	59.9848	471.000			19590	99.241	90.221		2.947	484.609				
T-54 sec	8:05:44	59.98352	471.000			19590	107.611	96.308		2.947	493.643				
T-52 sec	8:05:46	59.98318	471.000			19590	109.803	101.031		2.947	501.313				
T-50 sec	8:05:48	59.98352	471.000			19590	107.611	103.334		2.947	506.563				
T-48 sec	8:05:50	59.98416	471.300			19590	103.426	103.366		2.947	509.542				
T-46 sec	8:05:52	59.98514	471.300			19590	97.049	101.155		2.947	510.278				
T-44 sec	8:05:54	59.98547	471.300			19590	94.857	98.951		2.947	511.020				
T-42 sec	8:05:56	59.98642	471.300			19590	88.680	95.356		2.947	510.372				
T-40 sec	8:05:58	59.98676	471.900			19590	86.487	92.252		2.947	510.215				
T-38 sec	8:06:00	59.9874	471.900			19590	82.303	88.770		2.947	509.680				
T-36 sec	8:06:02	59.98773	471.900			19590	80.110	85.739		2.947	509.596				
T-34 sec	8:06:04	59.98901	471.900			19590	71.741	80.840		2.947	507.643				
T-32 sec	8:06:06	59.98901	471.900			19590	71.741	77.655		2.947	507.406				
T-30 sec	8:06:08	59.98804	471.400			19590	78.118	77.817		2.947	510.515				
T-28 sec	8:06:10	59.98642	471.400			19590	88.680	81.619		2.947	517.263				
T-26 sec	8:06:12	59.98547	471.400			19590	94.857	86.252		2.947	524.844				
T-24 sec	8:06:14	59.98642	471.400			19590	88.680	87.102		2.947	528.640				
T-22 sec	8:06:16	59.98935	471.400			19590	69.549	80.958		2.947	525.443				
T-20 sec	8:06:18	59.99225	471.400			19590	50.617	70.339		2.947	517.771				
T-18 sec	8:06:20	59.99515	471.400			19590	31.685	56.810		2.947	507.189				
T-16 sec	8:06:22	59.99579	471.400	59.999	471.09	19590	27.501	46.552		2.947	499.878				
T-14 sec	8:06:24	59.99515	471.400	59.999	471.09	19590	31.685	41.349		2.947	497.621				
T-12 sec	8:06:26	59.99548	471.400	59.999	471.09	19590	29.493	37.199		2.947	496.419				
T-10 sec	8:06:28	59.99741	470.900	59.999	471.09	19590	16.939	30.108		2.947	492.275				
T-08 sec	8:06:30	60	470.900	59.999	471.09	19590	0.000	19.570		2.947	484.684				
T-06 sec	8:06:32	60.00162	470.900	59.999	471.09	19590	-10.562	9.024		2.947	477.084				
T-04 sec	8:06:34	60.00162	470.900	59.999	471.09	19590	-10.562	2.169		2.947	473.176				
T-02 sec	8:06:36	60.00195	470.900	59.999	471.09	19590	-12.754	-3.054		2.947	470.900				
T+0 sec	8:06:38	59.95963	0.000			19590	263.647	90.291		0.000	564.245				
T+02 sec	8:06:40	59.88144	0.000			19590	774.227	329.669		-4.264	799.359	0.000	681.802	471.678	471.678
T+04 sec	8:06:42	59.87237	0.000			19590	833.413	505.979		-4.264	971.406	0.000	778.337	467.414	469.546
T+06 sec	8:06:44	59.87011	0.000			19590	848.160	625.742		-4.264	1086.905	0.000	855.479	463.151	467.414
T+08 sec	8:06:46	59.87011	0.000			19590	848.160	703.588		-4.264	1160.488	0.000	916.481	458.887	465.282
T+10 sec	8:06:48	59.87432	0.000			19590	820.659	744.563		-4.264	1197.199	0.000	963.267	454.623	463.151
T+12 sec	8:06:50	59.88076	0.000			19590	778.611	756.480		-4.264	1204.852	0.000	997.779	450.360	461.019
T+14 sec	8:06:52	59.88531	0.000			19590	748.918	753.833		-4.264	1197.942	0.000	1022.800	446.096	458.887
T+16 sec	8:06:54	59.88787	0.000			19590	732.179	746.254		-4.264	1186.099	0.000	1040.944	441.832	456.755
T+18 sec	8:06:56	59.88949	0.000			19590	721.617	737.631		-4.264	1173.212	0.000	1054.171	437.568	454.623
T+20 sec	8:06:58	59.8908	0.000	59.897	0.00	19590	713.048	729.027	653.00	-4.264	1160.344	0.000	1063.823	433.305	452.491
T+22 sec	8:07:00	59.89175	0.000	59.897	0.00	19590	706.870	721.272	653.00	-4.264	1148.326	0.000	1070.865	429.041	450.360
T+24 sec	8:07:02	59.89242	0.000	59.897	0.00	19590	702.486	714.697	653.00	-4.264	1137.487	0.000	1075.990	424.777	448.228
T+26 sec	8:07:04	59.89306	0.000	59.897	0.00	19590	698.301	708.959	653.00	-4.264	1127.485	0.000	1079.668	420.514	446.096
T+28 sec	8:07:06	59.89306	0.000	59.897	0.00	19590	698.301	705.229	653.00	-4.264	1119.491	0.000	1082.323	416.250	443.964
T+30 sec	8:07:08	59.89306	0.000	59.897	0.00	19590	698.301	702.804	653.00	-4.264	1112.803	0.000	1084.228	411.986	441.832
T+32 sec	8:07:10	59.89532	0.000	59.897	0.00	19590	683.555	696.067	653.00	-4.264	1101.802	0.000	1085.261	407.723	439.700
T+34 sec	8:07:12	59.89788	0.000	59.897	0.00	19590	666.815	685.829	653.00	-4.264	1087.300	0.000	1085.375	403.459	437.568
T+36 sec	8:07:14	59.8995	0.000	59.897	0.00	19590	656.253	675.477	653.00	-4.264	1072.685	0.000	1084.707	399.195	435.437
T+38 sec	8:07:16	59.90081	0.000	59.897	0.00	19590	647.684	665.750	653.00	-4.264	1058.694	0.000	1083.406	394.932	433.305
T+40 sec	8:07:18	59.9021	0.000	59.897	0.00	19590	639.314	656.497	653.00	-4.264	1045.178	0.000	1081.586	390.668	431.173
T+42 sec	8:07:20	59.90179	0.000	59.897	0.00	19590	641.307	651.181	653.00	-4.264	1035.598	0.000	1079.495	386.404	429.041
T+44 sec	8:07:22	59.90081	0.000	59.897	0.00	19590	647.684	649.957	653.00	-4.264	1030.110	0.000	1077.348	382.141	426.909
T+46 sec	8:07:24	59.90081	0.000	59.897	0.00	19590	647.684	649.162	653.00	-4.264	1025.051	0.000	1075.169	377.877	424.777
T+48 sec	8:07:26	59.90048	0.000	59.897	0.00	19590	649.876	649.412	653.00	-4.264	1021.037	0.000	1073.004	373.613	422.646
T+50 sec	8:07:28	59.8992	0.000	59.897	0.00	19590	658.246	652.504	653.00	-4.264	1019.866	0.000	1070.960	369.350	420.514
T+52 sec	8:07:30	59.89886	0.000	59.897	0.00	19590	660.438	655.281	653.00	-4.264	1018.379	0.000	1069.013	365.086	418.382
T+54 sec	8:07:32	59.89856	0.000			19590	662.431	657.783		-4.264	1016.618	0.000	1067.141	360.822	416.250
T+56 sec	8:07:34	59.90017	0.000			19590	651.869	655.713		-4.264	1010.284	0.000	1065.181	356.559	414.118
T+58 sec	8:07:36	59.90243	0.000			19590	637.122	649.207		-4.264	999.514	0.000	1062.992	352.295	411.986
T+60 sec	8:07:38	59.90469	0.000			19590	622.376	639.816		-4.264	985.859	0.000	1060.504	348.031	409.855
T+62 sec	8:07:40	59.90695	0.000			19590	607.629	628.550		-4.264	970.330	0.000	1057.686	343.768	407.723
T+64 sec	8:07:42	59.90887	0.000			19590	595.074	616.834		-4.264	954.350	0.000	1054.555	339.504	405.591
T+66 sec	8:07:44	59.90921	0.000			19590	592.882	608.451		-4.264	941.703	0.000	1051.235	335.240	403.459
T+68 sec	8:07:46	59.90857	0.000			19590	597.067	604.466		-4.264	933.456	0.000	1047.870	330.977	401.327
T+70 sec	8:07:48	59.90887	0.000			19590	595.074	601.179		-4.264	925.905	0.000	1044.482	326.713	399.195
T+72 sec	8:07:50	59.91018	0.000			19590	586.505	596.043		-4.264	916.505	0.000	1041.023	322.449	397.064
T+74 sec	8:07:52	59.91244	0.000			19590	571.759	587.544		-4.264	903.742	0.000	1037.411	318.186	394.932
T+76 sec	8:07:54	59.9147	0.000			19590	557.012	576.858		-4.264	888.792	0.000	1033.600	313.922	392.800
T+78 sec	8:07:56	59.9176	0.000			19590	538.080	563.286		-4.264	870.956	0.000	1029.534	309.658	390.668
T+80 sec	8:07:58	59.91922	0.000			19590	527.519	550.767		-4.264	854.174	0.000	1025.257	305.395	388.536
T+82 sec	8:08:00	59.92083	0.000			19590	516.957	538.933		-4.264	838.077	0.000	1020.800	301.131	386.404
T+84 sec	8:08:02	59.92215	0.000			19590	508.388	528.242		-4.264	823.122	0.000	1016.203	296.867	384.273
T+86 sec	8:08:04	59.92309	0.000			19590	502.210	519.131		-4.264	809.747	0.000	1011.511	292.603	382.141
T+88 sec	8:08:06	59.92505	0.000			19590	489.456	508.745		-4.264	795.097	0.000	1006.702	288.340	380.009
T+90 sec	8:08:08	59.92505	0.000			19590	489.456	501.994		-4.264	784.082	0.000	1001.862	284.076	377.877
T+92 sec	8:08:10	59.9273	0.000			19590	474.709	492.444		-4.264	770.269	0.000	996.935	279.812	375.745
T+94 sec	8:08:12	59.93246	0.000			19590	441.031	474.450		-4.264	748.011	0.000	991.749	275.549	373.613
T+96 sec	8:08:14	59.93505	0.000			19590	424.092	456.825		-4.264	726.122	0.000	986.328	271.285	371.481
T+98 sec	8:08:16	59.93701	0.000			19590	411.338	440.904		-4.264	705.938	0.000	980.720	267.021	369.350
T+100 sec	8:08:18	59.93765	0.000			19590	407.129	429.083		-4.264	689.853	0.000	975.017	262.758	367.218
T+102 sec	8:08:20	59.93927	0.000			19590	396.567	417.702		-4.264	674.209	0.000	969.232	258.494	365.086
T+104 sec	8:08:22	59.94183	0.000			19590	379.827	404.446		-4.264	656.689	0.000	963.335	254.230	362.954
T+106 sec	8:08:24	59.94409	0.000			19590	365.081	390.668		-4.264	638.647	0.000	957.322	249.967	360.822
T+108 sec	8:08:26	59.94571	0.000			19590	354.519	378.016		-4.264	621.731	0.000	951.220	245.703	358.690
T+110 sec	8:08:28	59.94797	0.000			19590	339.772	364.630		-4.264	604.082	0.000	945.022	241.439	356.559
T+112 sec	8:08:30	59.94766	0.000			19590	341.765	356.628		-4.264	591.816	0.000	938.825	237.176	354.427
T+114 sec	8:08:32	59.9454	0.000			19590	356.512	356.587		-4.264	587.511	0.000	932.768	232.912	352.295
T+116 sec	8:08:34	59.94443	0.000			19590	362.888	358.792		-4.264	585.453	0.000	926.881	228.648	350.163
T+118 sec	8:08:36	59.94409	0.000			19590	365.081	360.993		-4.264	583.390	0.000	921.156	224.385	348.031
T+120 sec	8:08:38	59.94507	0.000			19590	358.704	360.192		-4.264	578.325	0.000	915.536	220.121	345.899
T+122 sec	8:08:40	59.94604	0.000			19590	352.327	357.439		-4.264	571.309	0.000	909.984	215.857	343.768
T+124 sec	8:08:42	59.94638	0.000			19590	350.135	354.883		-4.264	564.489	0.000	904.500	211.594	341.636
T+126 sec	8:08:44	59.94733	0.000			19590	343.957	351.059		-4.264	556.401	0.000	899.061	207.330	339.504
T+128 sec	8:08:46	59.9483	0.000			19590	337.580	346.341		-4.264	547.420	0.000	893.651	203.066	337.372
T+130 sec	8:08:48	59.94894	0.000			19590	333.395	341.810		-4.264	538.625	0.000	888.272	198.803	335.240
T+132 sec	8:08:50	59.94992	0.000			19590	327.018	336.633		-4.264	529.184	0.000	882.912	194.539	333.108
T+134 sec	8:08:52	59.9509	0.000			19590	320.641	331.036		-4.264	519.323	0.000	877.566	190.275	330.977
T+136 sec	8:08:54	59.95154	0.000			19590	316.456	325.933		-4.264	509.957	0.000	872.238	186.012	328.845
T+138 sec	8:08:56	59.95187	0.000			19590	314.264	321.849		-4.264	501.609	0.000	866.943	181.748	326.713
T+140 sec	8:08:58	59.95346	0.000			19590	303.902	315.567		-4.264	491.064	0.000	861.649	177.484	324.581
T+142 sec	8:09:00	59.95508	0.000			19590	293.340	307.788		-4.264	479.021	0.000	856.335	173.221	322.449
T+144 sec	8:09:02	59.95575	0.000			19590	288.956	301.197		-4.264	468.166	0.000	851.017	168.957	320.317
T+146 sec	8:09:04	59.95639	0.000			19590	284.771	295.448		-4.264	458.153	0.000	845.708	164.693	318.186
T+148 sec	8:09:06	59.95801	0.000			19590	274.209	288.014		-4.264	446.456	0.000	840.385	160.430	316.054
T+150 sec	8:09:08	59.96124	0.000			19590	253.085	275.789		-4.264	429.967	0.000	834.985	156.166	313.922

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

T		Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW
T-72 sec	8:05:26	59.980	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	128.735
T-70 sec	8:05:28	59.982	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	115.981
T-68 sec	8:05:30	59.984	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	107.611
T-66 sec	8:05:32	59.986	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	92.864
T-64 sec	8:05:34	59.987	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30142.79	82.303

Date:	Monday, May 16, 2011	
Time of T(0)	8:06:38	
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30	
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999	Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101	Hz
Value A Pre-Perturbation Contingency MW [T(-2) to T(-16)]	471.09	MW
Value B Post-Perturbation Average Contingency MW [T(+20 to T(+52)]	0.00	MW
Pre to Post Perturbation Contingency Delta MW Actual	471.09	MW
EPFR Pre-Perturbation Average	8.97	MW
EPFR Post-Perturbation Average	671.54	MW
EPFR Unadjusted	662.57	MW
EPFR Adjusted	662.57	MW
Pre Load Resources MW	0.00	MW
Pre Non-Conforming Load MW	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Sum of Pre Perturbation Adjustments	0.00	MW
Post Load Resources MW	0.00	MW
Post Non-Conforming Load MW	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Sum of Post Perturbation Adjustments	0.00	MW
Net Total Adjustments MW	0.00	MW

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

Frequency @ T(+46)	59.901 Hz									
Frequency @ T(+76)	59.915 Hz	Actual		Load	Non-					
Frequency @ T(+106)	59.944 Hz	Primary	Un-adjusted	Resources	Conforming					Adjusted
Frequency @ T(+136)	59.952 Hz	Freq Response	P.U.	Tripped	Load	Spare	Spare		Spare	P.U.
Frequency @ T(+166)	59.967 Hz	MW/0.1 Hz	Performance	Adjustment	Adjustment	Adjustment	Adjustment		Adjustment	Performance
EPFR @ T(+46)	-653.00 MW/0.1 Hz	-481.62	0.738	0.00	0.00	0.00	0.00		0.00	0.738
EPFR @ T(+76)	-653.00 MW/0.1 Hz	-561.31	0.860	0.00	0.00	0.00	0.00		0.00	0.860
EPFR @ T(+106)	-653.00 MW/0.1 Hz	-863.83	1.323	0.00	0.00	0.00	0.00		0.00	1.323
EPFR @ T(+136)	-653.00 MW/0.1 Hz	-1000.43	1.532	0.00	0.00	0.00	0.00		0.00	1.532
EPFR @ T(+166)	-653.00 MW/0.1 Hz	-1507.48	2.309	0.00	0.00	0.00	0.00		0.00	2.309

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-653.00	MW/0.1 Hz
Post-Perturbation Bias Setting	-653.00	MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	8.97	MW
EPFR for Bias Setting Post-Perturbation Average	671.54	MW
EPFR for Bias Setting Delta	662.57	MW
Primary Frequency Response Delivery % of Bias	71.10%	
Pre-Perturbation BA Load	30202.7	MW
Post-Perturbation BA Load	30136.8	MW
Pre to Post Perturbation BA Load Change	-65.973	MW
Load Dampening Frequency Response	-65.020	MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	14.00%	
Average Bias Setting when Hz is greater than +/-0.036 Hz	-653.00	MW/0.1 Hz

20 to 52 second Average Period Evaluation

Initial P.U. Performance for FRO	0.711	P.U.
Initial P.U. Performance Adjusted for FRO	0.711	P.U.

T		Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected MW/0.1 Hz Response MW/0.1 Hz	Actual Average Primary Freq Response MW/0.1 Hz	Actual Primary Freq Response Beta MW/0.1 Hz

T+152 sec	8:09:10	59.96252	0.000	19590	244.716	264.913	-4.264	414.828	0.000	829.528	151.902	311.790
T+154 sec	8:09:12	59.96188	0.000	19590	248.900	259.309	-4.264	404.960	0.000	824.085	147.638	309.658
T+156 sec	8:09:14	59.96124	0.000	19590	253.085	257.131	-4.264	398.518	0.000	818.698	143.375	307.526
T+158 sec	8:09:16	59.96027	0.000	19590	259.462	257.947	-4.264	395.070	0.000	813.403	139.111	305.395
T+160 sec	8:09:18	59.96057	0.000	19590	257.469	257.780	-4.264	390.640	0.000	808.184	134.847	303.263
T+162 sec	8:09:20	59.96219	0.000	19590	246.908	253.974	-4.264	382.571	0.000	802.993	130.584	301.131
T+164 sec	8:09:22	59.96512	0.000	19590	227.777	244.805	-4.264	369.138	0.000	797.766	126.320	298.999
T+166 sec	8:09:24	59.96738	0.000	19590	213.030	233.684	-4.264	353.753	0.000	792.480	122.056	296.867
T+168 sec	8:09:26	59.96899	0.000	19590	202.468	222.758	-4.264	338.564	0.000	787.140	117.793	294.735
T+170 sec	8:09:28	59.97061	0.000	19590	191.906	211.960	-4.264	323.502	0.000	781.749	113.529	292.603
T+172 sec	8:09:30	59.97318	0.000	19590	175.167	199.083	-4.264	306.360	0.000	776.284	109.265	290.472
T+174 sec	8:09:32	59.97351	0.000	19590	172.975	189.945	-4.264	292.959	0.000	770.792	105.002	288.340
T+176 sec	8:09:34	59.97287	0.000	19590	177.160	185.470	-4.264	284.221	0.000	765.325	100.738	286.208
T+178 sec	8:09:36	59.97253	0.000	19590	179.352	183.329	-4.264	277.815	0.000	759.908	96.474	284.076
T+180 sec	8:09:38	59.97318	0.000	19590	175.167	180.472	-4.264	270.695	0.000	754.532	92.211	281.944
	8:09:40	59.97415	0.000	19590	168.790	176.383	-4.264	262.343	0.000	749.182	87.947	279.812
	8:09:42	59.97543	0.000	19590	160.420	170.796	-4.264	252.492	0.000	743.842	83.683	277.681
	8:09:44	59.97577	0.000	19590	158.228	166.397	-4.264	243.830	0.000	738.522	79.420	275.549
	8:09:46	59.9761	0.000	19590	156.036	162.771	-4.264	235.939	0.000	733.232	75.156	273.417
	8:09:48	59.97675	0.000	19590	151.851	158.949	-4.264	227.854	0.000	727.968	70.892	271.285
	8:09:50	59.97803	0.000	19590	143.481	153.535	-4.264	218.176	0.000	722.712	66.629	269.153
	8:09:52	59.97931	0.000	19590	135.112	147.087	-4.264	207.464	0.000	717.454	62.365	267.021
	8:09:54	59.97998	0.000	19590	130.728	141.361	-4.264	197.475	0.000	712.202	58.101	264.890
	8:09:56	59.97964	0.000	19590	132.920	138.407	-4.264	190.257	0.000	706.983	53.838	262.758
	8:09:58	59.979	0.000	19590	137.104	137.951	-4.264	185.537	0.000	701.820	49.574	260.626
	8:10:00	59.97964	0.000	19590	132.920	136.190	-4.264	179.513	0.000	696.699	45.310	258.494
	8:10:02	59.98093	0.000	19590	124.550	132.116	-4.264	171.175	0.000	691.597	41.047	256.362
	8:10:04	59.98224	0.000	19590	115.981	126.469	-4.264	161.264	0.000	686.498	36.783	254.230
	8:10:06	59.98386	0.000	19590	105.419	119.101	-4.264	149.633	0.000	681.385	32.519	252.099
	8:10:08	59.98514	0.000	19590	97.049	111.383	-4.264	137.651	0.000	676.255	28.256	249.967
	8:10:10	59.98773	0.000	19590	80.110	100.438	-4.264	122.442	0.000	671.079	23.992	247.835
	8:10:12	59.9903	0.000	19590	63.371	87.464	-4.264	105.205	0.000	665.840	19.728	245.703
	8:10:14	59.99289	0.000	19590	46.432	73.103	-4.264	86.580	0.000	660.525	15.465	243.571
	8:10:16	59.99579	0.000	19590	27.501	57.142	-4.264	66.355	0.000	655.124	11.201	241.439
	8:10:18	59.99646	0.000	19590	23.116	45.233	-4.264	50.183	0.000	649.674	6.937	239.308
	8:10:20	59.99579	0.000	19590	27.501	39.027	-4.264	39.713	0.000	644.228	2.673	237.176
	8:10:22	59.99612	0.000	19590	25.309	34.225	-4.264	30.648	0.000	638.798	-1.590	235.044
	8:10:24	59.99579	0.000	19590	27.501	31.872	-4.264	24.030	0.000	633.405	-5.854	232.912
	8:10:26	59.99484	0.000	19590	33.678	32.504	-4.264	20.399	0.000	628.075	-10.118	230.780
	8:10:28	59.99484	0.000	19590	33.678	32.915	-4.264	16.546	0.000	622.803	-14.381	228.648
	8:10:30	59.99805	0.000	19590	12.754	25.859	-4.264	5.226	0.000	617.525	-18.645	226.516
	8:10:32	59.99872	0.000	19590	8.370	19.738	0.000	-0.895	0.000	612.284	-18.645	224.421
	8:10:34	60.00034	0.000	19590	-2.192	12.062	0.000	-8.570	0.000	607.066	-18.645	222.361
	8:10:36	60.00195	0.000	19590	-12.754	3.377	0.000	-17.256	0.000	601.864	-18.645	220.336
	8:10:38	60.00259	0.000	19590	-16.939	-3.734	0.000	-24.366	0.000	596.688	-18.645	218.344
	8:10:40	60.00226	0.000	19590	-14.747	-7.588	0.000	-28.221	0.000	591.566	-18.645	216.386
	8:10:42	60.00195	0.000	19590	-12.754	-9.396	0.000	-30.029	0.000	586.512	-18.645	214.459
	8:10:44	60.00064	0.000	19590	-4.185	-7.572	0.000	-28.205	0.000	581.555	-18.645	212.564
	8:10:46	59.99646	0.000	19590	23.116	3.169	0.000	-17.464	0.000	576.763	-18.645	210.700
	8:10:48	59.99191	0.000	19590	52.809	20.543	0.000	-0.090	0.000	572.185	-18.645	208.865
	8:10:50	59.98901	0.000	19590	71.741	38.462	0.000	17.830	0.000	567.820	-18.645	207.059
	8:10:52	59.98773	0.000	19590	80.110	53.039	0.000	32.407	0.000	563.637	-18.645	205.282
	8:10:54	59.98901	0.000	19590	71.741	59.585	0.000	38.952	0.000	559.570	-18.645	203.533
	8:10:56	59.99255	0.000	19590	48.624	55.749	0.000	35.116	0.000	555.535	-18.645	201.810
	8:10:58	59.99579	0.000	19590	27.501	45.862	0.000	25.229	0.000	551.487	-18.645	200.114
	8:11:00	59.99902	0.000	19590	6.377	32.042	0.000	11.410	0.000	547.396	-18.645	198.445
	8:11:02	60.00195	0.000	19590	-12.754	16.363	0.000	-4.269	0.000	543.248	-18.645	196.800
	8:11:04	60.00485	0.000	19590	-31.685	-0.454	0.000	-21.086	0.000	539.036	-18.645	195.180
	8:11:06	60.00809	0.000	19590	-52.809	-18.778	0.000	-39.411	0.000	534.752	-18.645	193.584
	8:11:08	60.01163	0.000	19590	-75.926	-38.780	0.000	-59.412	0.000	530.383	-18.645	192.012
	8:11:10	60.01422	0.000	19590	-92.864	-57.709	0.000	-78.342	0.000	525.939	-18.645	190.463
	8:11:12	60.0152	0.000	19590	-99.241	-72.246	0.000	-92.878	0.000	521.455	-18.645	188.937
	8:11:14	60.0155	0.000	19590	-101.234	-82.392	0.000	-103.024	0.000	516.963	-18.645	187.433
	8:11:16	60.0155	0.000	19590	-101.234	-88.986	0.000	-109.619	0.000	512.487	-18.645	185.950
	8:11:18	60.01682	0.000	19590	-109.803	-96.272	0.000	-116.905	0.000	508.023	-18.645	184.489
	8:11:20	60.01907	0.000	19590	-124.550	-106.169	0.000	-126.802	0.000	503.553	-18.645	183.048
	8:11:22	60.02295	0.000	19590	-149.858	-121.461	0.000	-142.093	0.000	499.038	-18.645	181.628
	8:11:24	60.02618	0.000	19590	-170.982	-138.793	0.000	-159.426	0.000	494.465	-18.645	180.227
	8:11:26	60.02972	0.000	19590	-194.099	-158.150	0.000	-178.782	0.000	489.822	-18.645	178.846
	8:11:28	60.03262	0.000	19590	-213.030	-177.358	0.000	-197.990	0.000	485.111	-18.645	177.484
	8:11:30	60.03458	0.000	19590	-225.784	-194.307	0.000	-214.940	0.000	480.349	-18.645	176.141
	8:11:32	60.03522	0.000	19590	-229.969	-206.789	0.000	-227.421	0.000	475.566	-18.645	174.816
	8:11:34	60.03424	0.000	19590	-223.592	-212.670	0.000	-233.302	0.000	470.809	-18.645	173.509
	8:11:36	60.0336	0.000	19590	-219.407	-215.028	0.000	-235.660	0.000	466.099	-18.645	172.219
	8:11:38	60.03522	0.000	19590	-229.969	-220.257	0.000	-240.890	0.000	461.417	-18.645	170.947
	8:11:40	60.03812	0.000	19590	-248.900	-230.282	0.000	-250.915	0.000	456.731	-18.645	169.691
	8:11:42	60.04037	0.000	19590	-263.647	-241.960	0.000	-262.592	0.000	452.029	-18.645	168.452
	8:11:44	60.04105	0.000	19590	-268.031	-251.085	0.000	-271.717	0.000	447.330	-18.645	167.229
	8:11:46	60.04199	0.000	19590	-274.209	-259.178	0.000	-279.811	0.000	442.638	-18.645	166.022
	8:11:48	60.04233	0.000	19590	-276.401	-265.206	0.000	-285.839	0.000	437.969	-18.645	164.831
	8:11:50	60.0433	0.000	19590	-282.778	-271.356	0.000	-291.989	0.000	433.319	-18.645	163.655
	8:11:52	60.04425	0.000	19590	-288.956	-277.516	0.000	-298.149	0.000	428.690	-18.645	162.493
	8:11:54	60.04492	0.000	19590	-293.340	-283.054	0.000	-303.687	0.000	424.083	-18.645	161.347
	8:11:56	60.04556	0.000	19590	-297.525	-288.119	0.000	-308.751	0.000	419.503	-18.645	160.215
	8:11:58	60.04587	0.000	19590	-299.518	-292.109	0.000	-312.741	0.000	414.955	-18.645	159.097
	8:12:00	60.04654	0.000	19590	-303.902	-296.236	0.000	-316.869	0.000	410.438	-18.645	157.993
	8:12:02	60.0488	0.000	19590	-318.648	-304.080	0.000	-324.713	0.000	405.928	-18.645	156.903
	8:12:04	60.04974	0.000	19590	-324.826	-311.341	0.000	-331.974	0.000	401.428	-18.645	155.826
	8:12:06	60.0491	0.000	19590	-320.641	-314.596	0.000	-335.229	0.000	396.964	-18.645	154.762
	8:12:08	60.0491	0.000	19590	-320.641	-316.712	0.000	-337.344	0.000	392.540	-18.645	153.711
	8:12:10	60.05042	0.000	19590	-329.210	-321.086	0.000	-341.719	0.000	388.143	-18.645	152.673
	8:12:12	60.04974	0.000	19590	-324.826	-322.395	0.000	-343.028	0.000	383.791	-18.645	151.647
	8:12:14	60.04846	0.000	19590	-316.456	-320.317	0.000	-340.949	0.000	379.503	-18.645	150.633
	8:12:16	60.04718	0.000	19590	-308.087	-316.036	0.000	-336.669	0.000	375.290	-18.645	149.632
	8:12:18	60.04587	0.000	19590	-299.518	-310.255	0.000	-330.887	0.000	371.160	-18.645	148.642
	8:12:20	60.04587	0.000	19590	-299.518	-306.497	0.000	-327.129	0.000	367.100	-18.645	147.663
	8:12:22	60.04556	0.000	19590	-297.525	-303.356	0.000	-323.989	0.000	363.106	-18.645	146.697
	8:12:24	60.04425	0.000	19590	-288.956	-298.316	0.000	-318.949	0.000	359.186	-18.645	145.741
	8:12:26	60.04297	0.000	19590	-280.586	-292.111	0.000	-312.743	0.000	355.346	-18.645	144.796
	8:12:28	60.04169	0.000	19590	-272.216	-285.148	0.000	-305.780	0.000	351.590	-18.645	143.862
	8:12:30	60.04233	0.000	19590	-276.401	-282.086	0.000	-302.719	0.000	347.893	-18.645	142.939
	8:12:32	60.04459	0.000	19590	-291.148	-285.258	0.000	-305.890	0.000	344.220	-18.645	142.026
	8:12:34	60.04654	0.000	19590	-303.902	-291.783	0.000	-312.416	0.000	340.552	-18.645	141.123
	8:12:36	60.04718	0.000	19590	-308.087	-297.489	0.000	-318.122	0.000	336.893	-18.645	140.231
	8:12:38	60.0462	0.000	19590	-301.710	-298.966	0.000	-319.599	0.000	333.266	-18.645	139.348
	8:12:40	60.04425	0.000	19590	-288.956	-295.463	0.000	-316.095	0.000	329.698	-18.645	138.475
	8:12:42	60.04492	0.000	19590	-293.340	-294.720	0.000	-315.352	0.000	326.173	-18.645	137.612
	8:12:44	60.04523	0.000	19590	-295.333	-294.934	0.000	-315.567	0.000	322.685	-18.645	136.758
	8:12:46	60.04523	0.000	19590	-295.333	-295.074	0.000	-315.706	0.000	319.234	-18.645	135.913
	8:12:48	60.04556	0.000	19590	-297.525	-295.932	0.000	-316.564	0.000	315.816	-18.645	135.078
	8:12:50	60.0462	0.000	19590	-301.710	-297.954	0.000	-318.586	0.000	312.423	-18.645	134.251
	8:12:52	60.04654	0.000	19590	-303.902	-300.036	0.000	-320.668	0.000	309.056	-18.645	133.434
	8:12:54	60.04654	0.000	19590	-303.902	-301.389	0.000	-322.021	0.000	305.717	-18.645	132.625
	8:12:56	60.04523	0.000	19590	-295.333	-299.269	0.000	-319.902	0.000	302.424	-18.645	131.825
	8:12:58	60.04361	0.000	19590	-284.771	-294.195	0.000	-314.827	0.000	299.193	-18.645	131.033
	8:13:00	60.04199	0.000	19590	-274.209	-287.200	0.000	-307.832	0.000	296.031	-18.645	130.249
	8:13:02	60.04071	0.000	19590	-265.839	-279.724	0.000	-300.356	0.000	292.941	-18.645	129.473
	8:13:04	60.03876	0.000	19590	-253.085	-270.400	0.000	-291.033	0.000	289.931	-18.645	128.706
	8:13:06	60.03586	0.000	19590	-234.154	-257.714	0.000	-278.346	0.000	287.016	-18.645	127.946
	8:13:08	60.03394	0.000	19590	-221.599	-245.074	0.000	-265.706	0.000	284.196	-18.645	127.195
	8:13:10	60.0336	0.000	19590	-219.407	-236.090	0.000	-256.723	0.000	281.451	-18.645	126.451
	8:13:12	60.03262	0.000	19590	-213.030	-228.019	0.000	-248.652	0.000	278.773	-18.645	125.714
	8:13:14	60.03006	0.000	19590	-196.291	-216.914	0.000	-237.547	0.000	276.179	-18.645	124.985
	8:13:16	60.02747	0.000	19590	-179.352	-203.767	0.000	-224.400	0.000	273.676	-18.645	124.263
	8:13:18	60.02682	0.000	19590	-175.167	-193.757	0.000	-214.390	0.000	271.248	-18.645	123.549
	8:13:20	60.02585	0.000	19590	-168.790	-185.019	0.000	-205.651	0.000	268.887	-18.645	122.841
	8:13:22	60.02359	0.000	19590	-154.043	-174.177	0.000	-194.810	0.000	266.603	-18.645	122.141
	8:13:24	60.02197	0.000	19590	-143.481	-163.434	0.000	-184.066	0.000	264.393	-18.645	121.447
	8:13:26	60.02164	0.000	19590	-141.289	-155.683	0.000	-176.316	0.000	262.244	-18.645	120.761
	8:13:28	60.02231	0.000	19590	-145.674	-152.180	0.000	-172.812	0.000	260.132	-18.645	120.081
	8:13:30	60.02133	0.000	19590	-139.297	-147.671	0.000	-168.303	0.000	258.062	-18.645	119.407
	8:13:32	60.02133	0.000	19590	-139.297	-144.740	0.000	-165.372	0.000	256.026	-18.645	118.740
	8:13:34	60.02002	0.000	19590	-130.728	-139.835	0.000	-160.468	0.000	254.033	-18.645	118.080
	8:13:36	60.01776	0.000	19590	-115.981	-131.486	0.000	-152.119	0.000	252.099	-18.645	117.426
	8:13:38	60.01584	0.000	19590	-103.426	-121.665	0.000	-142.298	0.000	250.230	-18.645	116.778
	8:13:40	60.01291	0.000	19590	-84.295	-108.586	0.000	-129.218	0.000	248.440	-18.645	116.136
	8:13:42	60.01132	0.000	19590	-73.933	-96.457	0.000	-117.090	0.000	246.724	-18.645	115.500
	8:13:44	60.01001	0.000	19590	-65.364	-85.575	0.000	-106.207	0.000	245.075	-18.645	114.870
	8:13:46	60.00937	0.000	19590	-61.179	-77.036	0.000	-97.669	0.000	243.481	-18.645	114.246
	8:13:48	60.00775	0.000	19590	-50.617	-67.789	0.000	-88.422	0.000	241.944	-18.645	113.628
	8:13:50	60.00516	0.000	19590	-33.678	-55.851	0.000	-76.483	0.000	240.477	-18.645	113.016
	8:13:52	60.00452	0.000	19590	-29.493	-46.626	0.000	-67.258	0.000	239.065	-18.645	112.409
	8:13:54	60.00613	0.000	19590	-40.055	-44.326	0.000	-64.958	0.000	237.677	-18.645	111.808
	8:13:56	60.00613	0.000	19590	-40.055	-42.831	0.000	-63.464	0.000	236.308	-18.645	111.212
	8:13:58	60.00549	0.000	19590	-35.870	-40.395	0.000	-61.027	0.000	234.963	-18.645	110.622
	8:14:00	60.00516	0.000	19590	-33.678	-38.044	0.000	-58.677	0.000	233.640	-18.645	110.037
	8:14:02	60.00388	0.000	19590	-25.309	-33.587	0.000	-54.219	0.000	232.349	-18.645	109.457
	8:14:04	60.00259	0.000	19590	-16.939	-27.760	0.000	-48.392	0.000	231.096	-18.645	108.883
	8:14:06	60.00128	0.000	19590	-8.370	-20.973	0.000	-41.606	0.000	229.884	-18.645	108.314
	8:14:08	60.00128	0.000	19590	-8.370	-16.562	0.000	-37.195	0.000	228.702	-18.645	107.749
	8:14:10	60.00064	0.000	19590	-4.185	-12.230	0.000	-32.863	0.000	227.550	-18.645	107.190
	8:14:12	60.00034	0.000	19590	-2.192	-8.717	0.000	-29.349	0.000	226.423	-18.645	106.636
	8:14:14	60.00226	0.000	19590	-14.747	-10.827	0.000	-31.460	0.000	225.297	-18.645	106.086
	8:14:16	60.00421	0.000	19590	-27.501	-16.663	0.000	-37.295	0.000	224.155	-18.645	105.542

T+152 sec	8:09:10	59.963	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	244.716	T+152 sec	8:09:10
T+154 sec	8:09:12	59.962	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	248.900	T+154 sec	8:09:12
T+156 sec	8:09:14	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	253.085	T+156 sec	8:09:14
T+158 sec	8:09:16	59.960	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	259.462	T+158 sec	8:09:16
T+160 sec	8:09:18	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	257.469	T+160 sec	8:09:18
T+162 sec	8:09:20	59.962	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	246.908	T+162 sec	8:09:20
T+164 sec	8:09:22	59.965	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	227.777	T+164 sec	8:09:22
T+166 sec	8:09:24	59.967	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.99	213.030	T+166 sec	8:09:24
T+168 sec	8:09:26	59.969	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.99	202.468	T+168 sec	8:09:26
T+170 sec	8:09:28	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	191.906	T+170 sec	8:09:28
T+172 sec	8:09:30	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	175.167	T+172 sec	8:09:30
T+174 sec	8:09:32	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	172.975	T+174 sec	8:09:32
T+176 sec	8:09:34	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	177.160	T+176 sec	8:09:34
T+178 sec	8:09:36	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	179.352	T+178 sec	8:09:36
T+180 sec	8:09:38	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	175.167	T+180 sec	8:09:38
	8:09:40	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	168.790		
	8:09:42	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	160.420		
	8:09:44	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.63	158.228		
	8:09:46	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.63	156.036		
	8:09:48	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	151.851		
	8:09:50	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	143.481		
	8:09:52	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	135.112		
	8:09:54	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	130.728		
	8:09:56	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	132.920		
	8:09:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	137.104		
	8:10:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	132.920		
	8:10:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	124.550		
	8:10:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30260.67	115.981		
	8:10:06	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30260.67	105.419		
	8:10:08	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	97.049		
	8:10:10	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	80.110		
	8:10:12	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	63.371		
	8:10:14	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	46.432		
	8:10:16	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	27.501		
	8:10:18	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	23.116		
	8:10:20	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	27.501		
	8:10:22	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	25.309		
	8:10:24	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.68	27.501		
	8:10:26	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.68	33.678		
	8:10:28	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	33.678		
	8:10:30	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	12.754		
	8:10:32	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	8.370		
	8:10:34	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	-2.192		
	8:10:36	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-12.754		
	8:10:38	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-16.939		
	8:10:40	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-14.747		
	8:10:42	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-12.754		
	8:10:44	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30314.84	-4.185		
	8:10:46	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30314.84	23.116		
	8:10:48	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	52.809		
	8:10:50	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	71.741		
	8:10:52	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	80.110		
	8:10:54	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	71.741		
	8:10:56	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	48.624		
	8:10:58	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	27.501		
	8:11:00	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	6.377		
	8:11:02	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	-12.754		
	8:11:04	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.21	-31.685		
	8:11:06	60.008	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.21	-52.809		
	8:11:08	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-75.926		
	8:11:10	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-92.864		
	8:11:12	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-99.241		
	8:11:14	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-101.234		
	8:11:16	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-101.234		
	8:11:18	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-109.803		
	8:11:20	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-124.550		
	8:11:22	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-149.858		
	8:11:24	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.48	-170.982		
	8:11:26	60.030	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.48	-194.099		
	8:11:28	60.033	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-213.030		
	8:11:30	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-225.784		
	8:11:32	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-229.969		
	8:11:34	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-223.592		
	8:11:36	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-219.407		
	8:11:38	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-229.969		
	8:11:40	60.038	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-248.900		
	8:11:42	60.040	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-263.647		
	8:11:44	60.041	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.79	-268.031		
	8:11:46	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.79	-274.209		
	8:11:48	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-276.401		
	8:11:50	60.043	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-282.778		
	8:11:52	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-288.956		
	8:11:54	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-293.340		
	8:11:56	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-297.525		
	8:11:58	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-299.518		
	8:12:00	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-303.902		
	8:12:02	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-318.648		
	8:12:04	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30343.46	-324.826		
	8:12:06	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30343.46	-320.641		
	8:12:08	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-320.641		
	8:12:10	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-329.210		
	8:12:12	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-324.826		
	8:12:14	60.048	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-316.456		
	8:12:16	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-308.087		
	8:12:18	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-299.518		
	8:12:20	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-299.518		
	8:12:22	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-297.525		
	8:12:24	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.20	-288.956		
	8:12:26	60.043	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.20	-280.586		
	8:12:28	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-272.216		
	8:12:30	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-276.401		
	8:12:32	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-291.148		
	8:12:34	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-303.902		
	8:12:36	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-308.087		
	8:12:38	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-301.710		
	8:12:40	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-288.956		
	8:12:42	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-293.340		
	8:12:44	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-295.333		
	8:12:46	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-295.333		
	8:12:48	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-297.525		
	8:12:50	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-301.710		
	8:12:52	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-303.902		
	8:12:54	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-303.902		
	8:12:56	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-295.333		
	8:12:58	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-284.771		
	8:13:00	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-274.209		
	8:13:02	60.041	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-265.839		
	8:13:04	60.039	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.65	-253.085		
	8:13:06	60.036	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.65	-234.154		
	8:13:08	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-221.599		
	8:13:10	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-219.407		
	8:13:12	60.033	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-213.030		
	8:13:14	60.030	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-196.291		
	8:13:16	60.027	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-179.352		
	8:13:18	60.027	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-175.167		
	8:13:20	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-168.790		
	8:13:22	60.024	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-154.043		
	8:13:24	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.33	-143.481		
	8:13:26	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.33	-141.289		
	8:13:28	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-145.674		
	8:13:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-139.297		
	8:13:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-139.297		
	8:13:34	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-130.728		
	8:13:36	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-115.981		
	8:13:38	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-103.426		
	8:13:40	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-84.295		
	8:13:42	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-73.933		
	8:13:44	60.010	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.69	-65.364		
	8:13:46	60.009	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.69	-61.179		
	8:13:48	60.008	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-50.617		
	8:13:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-33.678		
	8:13:52	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-29.493		
	8:13:54	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-40.055		
	8:13:56	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-40.055		
	8:13:58	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-35.870		
	8:14:00	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-33.678		
	8:14:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-25.309		
	8:14:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.31	-16.939		
	8:14:06	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.31	-8.370		
	8:14:08	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-8.370		
	8:14:10	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-4.185		
	8:14:12	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-2.192		
	8:14:14	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-14.747		
	8:14:16	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-27.501		

1304.87	0.0375	-653
1282.11	0.0381	-653
1260.13	0.0388	-653
1228.05	0.0397	-653
1237.90	0.0394	-653
1292.85	0.0378	-653
1405.88	0.0349	
1507.48	0.0326	
1589.76	0.0310	
1681.55	0.0294	
1850.91	0.0268	
1875.65	0.0265	
1828.98	0.0271	
1805.45	0.0275	
1850.91	0.0268	
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2060.96	0.0242	
2091.68	0.0239	
2152.94	0.0233	
2286.90	0.0220	
2438.64	0.0207	
2526.45	0.0200	
2481.77	0.0204	
2400.71	0.0210	
2481.77	0.0204	
2661.48	0.0191	
2874.60	0.0178	
3189.38	0.0161	
3492.44	0.0149	
4323.98	0.0123	
5654.43	0.0097	
8210.95	0.0071	
16598.49	0.0042	
21741.68	0.0035	
16598.49	0.0042	
18825.12	0.0039	
16598.49	0.0042	
12448.87	0.0052	
12448.87	0.0052	
81245.24	0.0020	
	0.0013	
	0.0003	
	0.0020	
	0.0026	
	0.0023	
	0.0020	
	0.0006	
21741.68	0.0035	
7016.63	0.0081	
4900.51	0.0110	
4323.98	0.0123	
4900.51	0.0110	
7757.08	0.0074	
16598.49	0.0042	
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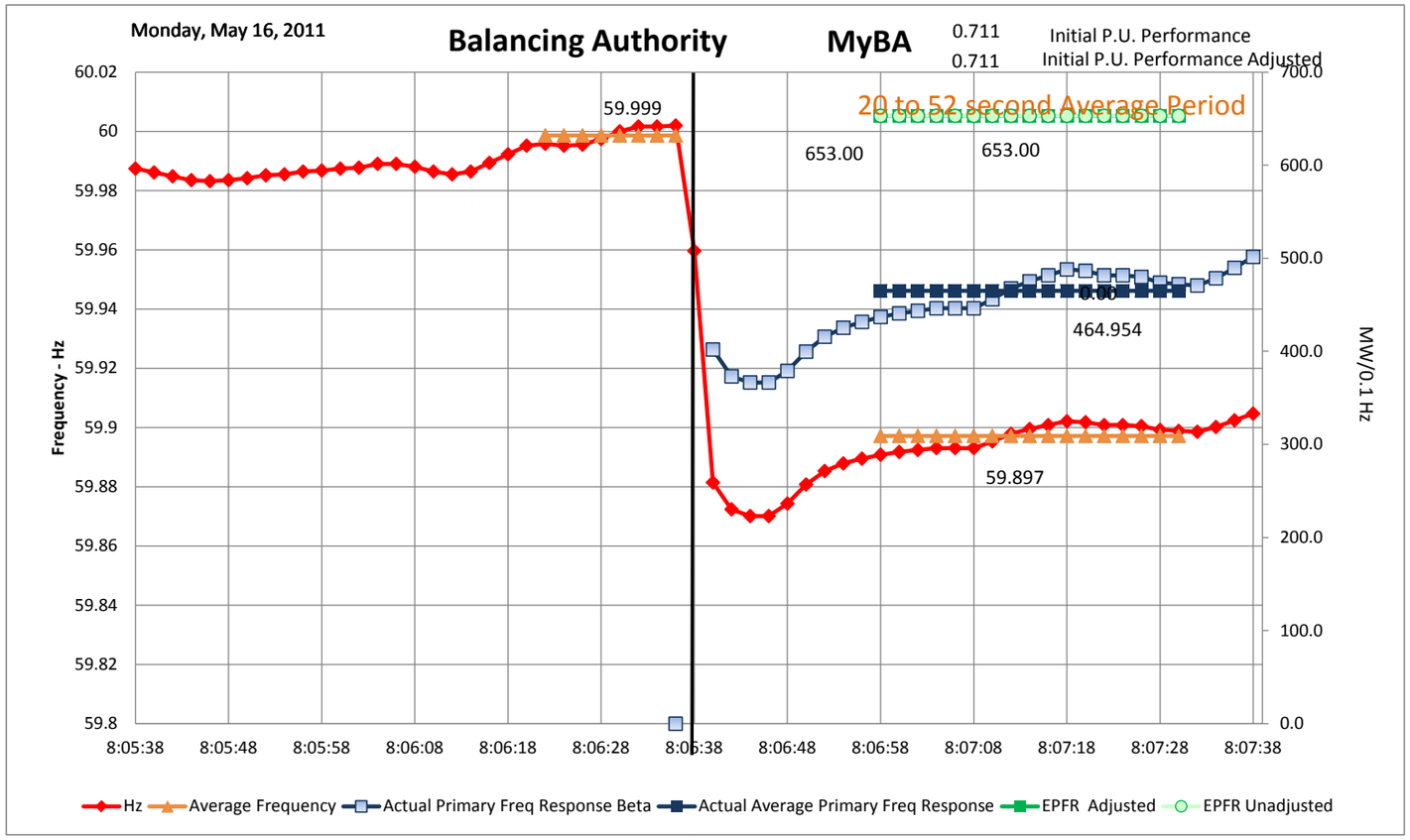
	0.0013	
	0.0013	
	0.0006	
	0.0003	
	0.0023	
	0.0042	

8:19:26	60.00485	0.000	19590	-31.685	-24.257	0.000	-44.890	0.000	137.743	-18.645	55.414	8:19:26	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-31.685		0.0049
8:19:28	60.00452	0.000	19590	-29.493	-26.090	0.000	-46.722	0.000	137.265	-18.645	55.222	8:19:28	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-29.493		0.0045
8:19:30	60.00354	0.000	19590	-23.116	-25.049	0.000	-45.682	0.000	136.792	-18.645	55.031	8:19:30	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:32	60.00354	0.000	19590	-23.116	-24.373	0.000	-45.005	0.000	136.324	-18.645	54.840	8:19:32	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:34	60.00354	0.000	19590	-23.116	-23.933	0.000	-44.565	0.000	135.859	-18.645	54.651	8:19:34	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:36	60.00354	0.000	19590	-23.116	-23.647	0.000	-44.280	0.000	135.397	-18.645	54.462	8:19:36	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:38	60.00354	0.000	19590	-23.116	-23.461	0.000	-44.094	0.000	134.938	-18.645	54.275	8:19:38	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:40	60.00354	0.000	19590	-23.116	-23.341	0.000	-43.973	0.000	134.481	-18.645	54.088	8:19:40	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:42	60.00354	0.000	19590	-23.116	-23.262	0.000	-43.895	0.000	134.027	-18.645	53.903	8:19:42	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:44	60.00613	0.000	19590	-40.055	-29.140	0.000	-49.772	0.000	133.561	-18.645	53.718	8:19:44	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-40.055		0.0061
8:19:46	60.00485	0.000	19590	-31.685	-30.031	0.000	-50.663	0.000	133.094	-18.645	53.535	8:19:46	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-31.685		0.0049
8:19:48	60.00452	0.000	19590	-29.493	-29.843	0.000	-50.475	0.000	132.631	-18.645	53.352	8:19:48	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493		0.0045
8:19:50	60.00452	0.000	19590	-29.493	-29.720	0.000	-50.353	0.000	132.170	-18.645	53.170	8:19:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493		0.0045
8:19:52	60.00354	0.000	19590	-23.116	-27.409	0.000	-48.041	0.000	131.717	-18.645	52.989	8:19:52	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-23.116		0.0035
8:19:54	60.0029	0.000	19590	-18.932	-24.442	0.000	-45.074	0.000	131.274	-18.645	52.809	8:19:54	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-18.932		0.0029
8:19:56	60.00162	0.000	19590	-10.562	-19.584	0.000	-40.216	0.000	130.845	-18.645	52.630	8:19:56	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562		0.0016
8:19:58	60.00162	0.000	19590	-10.562	-16.426	0.000	-37.059	0.000	130.427	-18.645	52.452	8:19:58	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562		0.0016
8:20:00	60.00421	0.000	19590	-27.501	-20.302	0.000	-40.935	0.000	130.000	-18.645	52.275	8:20:00	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501		0.0042
8:20:02	60.00421	0.000	19590	-27.501	-22.822	0.000	-43.454	0.000	129.570	-18.645	52.098	8:20:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501		0.0042
8:20:04	60.0029	0.000	19590	-18.932	-21.460	0.000	-42.093	0.000	129.145	-18.645	51.923	8:20:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-18.932		0.0029
8:20:06	60.00034	0.000	19590	-2.192	-14.716	0.000	-35.349	0.000	128.739	-18.645	51.748	8:20:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-2.192		0.0003
8:20:08	59.99805	0.000	19590	12.754	-5.102	0.000	-25.734	0.000	128.358	-18.645	51.574	8:20:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	12.754	81245.24	0.0020
8:20:10	59.99646	0.000	19590	23.116	4.775	0.000	-15.858	0.000	128.004	-18.645	51.401	8:20:10	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	23.116	21741.68	0.0035
8:20:12	59.99515	0.000	19590	31.685	14.193	0.000	-6.439	0.000	127.675	-18.645	51.229	8:20:12	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	31.685	13540.87	0.0049
8:20:14	59.99387	0.000	19590	40.055	23.245	0.000	2.613	0.000	127.369	-18.645	51.058	8:20:14	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	40.055	9895.25	0.0061
8:20:16	59.99289	0.000	19590	46.432	31.361	0.000	10.728	0.000	127.084	-18.645	50.887	8:20:16	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	46.432	8210.95	0.0071
8:20:18	59.99255	0.000	19590	48.624	37.403	0.000	16.770	0.000	126.816	-18.645	50.718	8:20:18	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	48.624	7757.08	0.0074
8:20:20	59.99225	0.000	19590	50.617	42.028	0.000	21.395	0.000	126.560	-18.645	50.549	8:20:20	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	50.617	7385.93	0.0078
8:20:22	59.98965	0.000	19590	67.556	50.963	0.000	30.330	0.000	126.327	-18.645	50.381	8:20:22	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	67.556	5250.54	0.0103
8:20:24	59.98514	0.000	19590	97.049	67.093	0.000	46.461	0.000	126.134	-18.645	50.214	8:20:24	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	97.049	3492.44	0.0149
8:20:26	59.98254	0.000	19590	113.988	83.506	0.000	62.874	0.000	125.982	-18.645	50.048	8:20:26	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	113.988	2929.15	0.0175
8:20:28	59.97836	0.000	19590	141.289	103.730	0.000	83.098	0.000	125.879	-18.645	49.882	8:20:28	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	141.289	2324.79	0.0216
8:20:30	59.97641	0.000	19590	154.043	121.340	0.000	100.707	0.000	125.818	-18.645	49.717	8:20:30	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	154.043	2120.41	0.0236
8:20:32	59.97705	0.000	19590	149.858	131.321	0.000	110.689	0.000	125.782	-18.645	49.553	8:20:32	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858	2183.39	0.0229
8:20:34	59.97705	0.000	19590	149.858	137.809	0.000	117.177	0.000	125.762	-18.645	49.390	8:20:34	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858	2183.39	0.0229
8:20:36	59.97705	0.000	19590	149.858	142.026	0.000	121.394	0.000	125.751	-18.645	49.228	8:20:36	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	149.858	2183.39	0.0229
8:20:38	59.97803	0.000	19590	143.481	142.536	0.000	121.903	0.000	125.742	-18.645	49.066	8:20:38	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	143.481	2286.90	0.0220
8:20:40	59.97964	0.000	19590	132.920	139.170	0.000	118.538	0.000	125.725	-18.645	48.906	8:20:40	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	132.920	2481.77	0.0204
8:20:42	59.9816	0.000	19590	120.166	132.519	0.000	111.886	0.000	125.692	-18.645	48.745	8:20:42	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	120.166	2766.41	0.0184
8:20:44	59.98126	0.000	19590	122.358	128.962	0.000	108.330	0.000	125.651	-18.645	48.586	8:20:44	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	122.358	2712.93	0.0187
8:20:46	59.97931	0.000	19590	135.112	131.115	0.000	110.482	0.000	125.616	-18.645	48.428	8:20:46	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	135.112	2438.64	0.0207
8:20:48	59.9761	0.000	19590	156.036	139.837	0.000	119.205	0.000	125.600	-18.645	48.270	8:20:48	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	156.036	2091.68	0.0239
8:20:50	59.97543	0.000	19590	160.420	147.041	0.000	126.409	0.000	125.602	-18.645	48.113	8:20:50	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	160.420	2031.13	0.0246
8:20:52	59.97577	0.000	19590	158.228	150.957	0.000	130.324	0.000	125.613	-18.645	47.956	8:20:52	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	158.228	2060.96	0.0242
8:20:54	59.97675	0.000	19590	151.851	151.270	0.000	130.637	0.000	125.625	-18.645	47.801	8:20:54	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	151.851	2152.94	0.0233
8:20:56	59.97803	0.000	19590	143.481	148.544	0.000	127.911	0.000	125.630	-18.645	47.646	8:20:56	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	143.481	2286.90	0.0220
8:20:58	59.979	0.000	19590	137.104	144.540	0.000	123.908	0.000	125.626	-18.645	47.492	8:20:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	137.104	2400.71	0.0210
8:21:00	59.97964	0.000	19590	132.920	140.473	0.000	119.840	0.000	125.613	-18.645	47.338	8:21:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	132.920	2481.77	0.0204
8:21:02	59.98062	0.000	19590	126.543	135.597	0.000	114.965	0.000	125.588	-18.645	47.185	8:21:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	126.543	2616.37	0.0194
8:21:04	59.9819	0.000	19590	118.173	129.499	0.000	108.866	0.000	125.550	-18.645	47.033	8:21:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	118.173	2816.90	0.0181
8:21:06	59.98224	0.000	19590	115.981	124.767	0.000	104.135	0.000	125.501	-18.645	46.882	8:21:06	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	115.981	2874.60	0.0178
8:21:08	59.98254	0.000	19590	113.988	120.995	0.000	100.362	0.000	125.443	-18.645	46.731	8:21:08	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:10	59.98288	0.000	19590	111.796	117.775	0.000	97.143	0.000	125.378	-18.645	46.582	8:21:10	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	111.796	2991.59	0.0171
8:21:12	59.98254	0.000	19590	113.988	116.450	0.000	95.817	0.000	125.311	-18.645	46.432	8:21:12	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:14	59.98254	0.000	19590	113.988	115.588	0.000	94.956	0.000	125.242	-18.645	46.284	8:21:14	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:16	59.98288	0.000	19590	111.796	114.261	0.000	93.628	0.000	125.170	-18.645	46.136	8:21:16	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	111.796	2991.59	0.0171
8:21:18	59.98611	0.000	19590	90.672	106.005	0.000	85.372	0.000	125.080	-18.645	45.989	8:21:18	59.986	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	90.672	3765.02	0.0139
8:21:20	59.99387	0.000	19590	40.055	82.922	0.000	62.290	0.000	124.937	-18.645	45.842	8:21:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	40.055	9895.25	0.0061
8:21:22	60.00226	0.000	19590	-14.747	48.738	0.000	28.106	0.000	124.719	-18.645	45.696	8:21:22	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	-14.747		0.0023
8:21:24	60.01099	0.000	19590	-71.741	6.571	0.000	-14.062	0.000	124.406	-18.645	45.551	8:21:24	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-71.741		0.0110
8:21:26	60.01712	0.000	19590	-111.796	-34.858	0.000	-55.490	0.000	124.002	-18.645	45.406	8:21:26	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-111.796		0.0171
8:21:28	60.02069	0.000	19590	-135.112	-69.947	0.000	-90.579	0.000	123.521	-18.645	45.262	8:21:28	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-135.112		0.0207
8:21:30	60.02133	0.000	19590	-139.297	-94.219	0.000	-114.852	0.000	122.988	-18.645	45.119	8:21:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:32	60.02133	0.000	19590	-139.297	-109.996	0.000	-130.629	0.000	122.422	-18.645	44.976	8:21:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:34	60.02133	0.000	19590	-139.297	-120.251	0.000	-140.884	0.000	121.835	-18.645	44.834	8:21:34	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:36	60.02325	0.000	19590	-151.851	-131.311	0.000	-151.944	0.000	121.227	-18.645	44.693	8:21:36	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-151.851		0.0233
8:21:38	60.02551	0.000	19590	-166.598	-143.662	0.000	-164.294	0.000	120.594	-18.645	44.552	8:21:38	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-166.598		0.0255



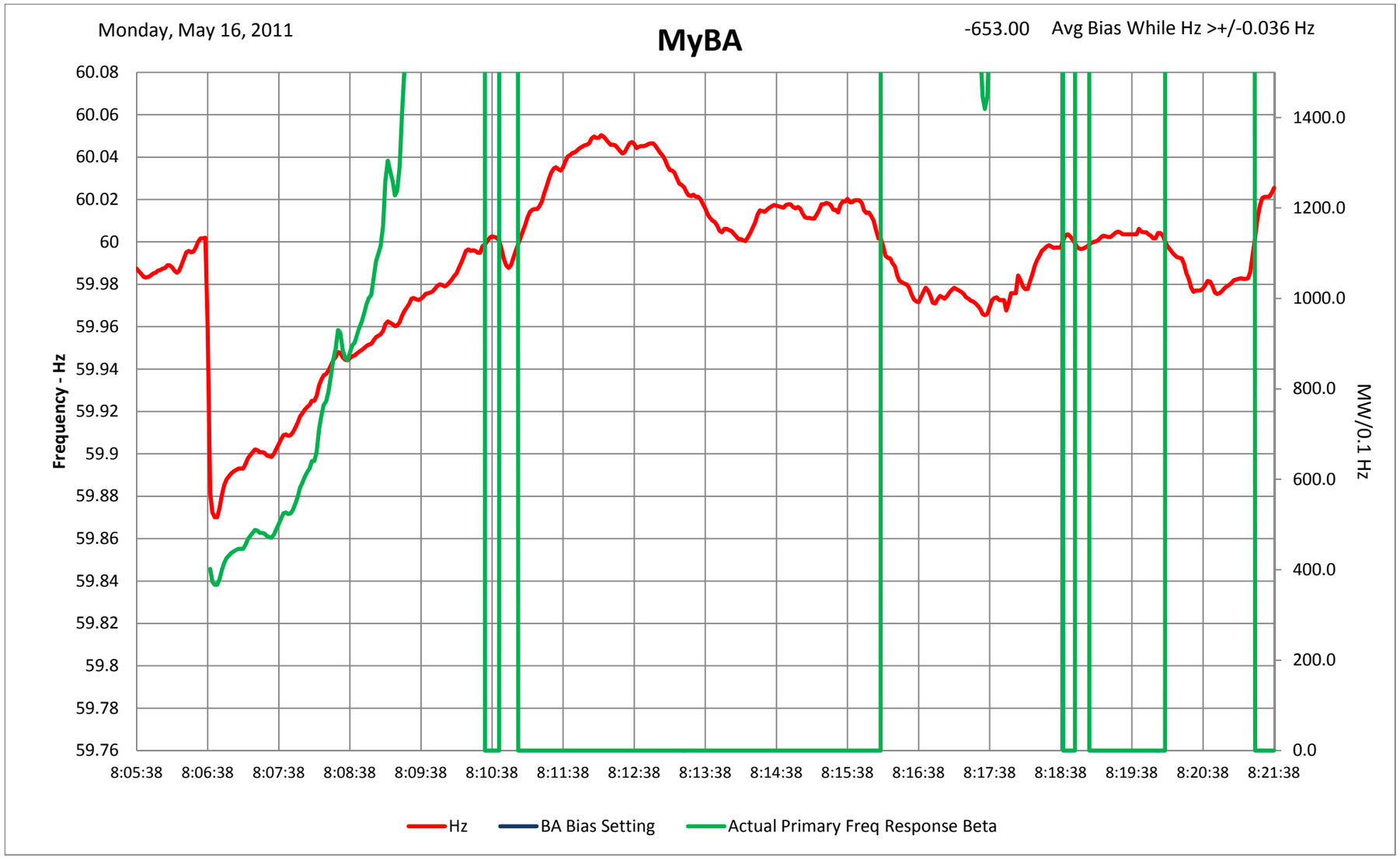
"Auto" Event Detection adjustment of T(0).
# of rows to shift T(0)
1
A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.

T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.


Monday, May 16, 2011
MyBA
-653.00 Avg Bias While Hz >+/-0.036 Hz
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Bias Setting
Actual Primary Freq Response Beta

						Value A Data	BA Performance											Value B	20 to 52 second Average Period Evaluation														Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
Monday, May 16, 2011	8:06:38	60.002	59.999	8:06:38	59.870	59.999	471.09	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30202.74	8.97	59.897	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.711	0.711	0.738	-653.00	30136.77	671.54	-653.00	0.738	0.860	1.323	1.532	2.309	0.738	0.860	1.323	1.532	2.309	-653.00	-653.00

Steps **To be completed for each event evaluated.**

1 Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order:
Column A: Date and Time in this format, mm/dd/yy HH:MM:SS
Column B: Frequency Hz
Column C: Contingent Resouce Lost MW or Lost Load
Column D: Load Resources tripped during the event.
Column E: Non Conforming Load
Column F: Spare
Column G: Not Used
Column H: Spare
Column I: Spare
Column J: BA Bias Setting
Column K: BA Load

2 Note: Columns D & E are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.

3 Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.

4 Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data.
Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time.
If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.

5 Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet.
If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.

6 Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary.
To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).

7 If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.

8 The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events)
This value controls the end of the "Sustained Frequency Response" evaluation period.
Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.

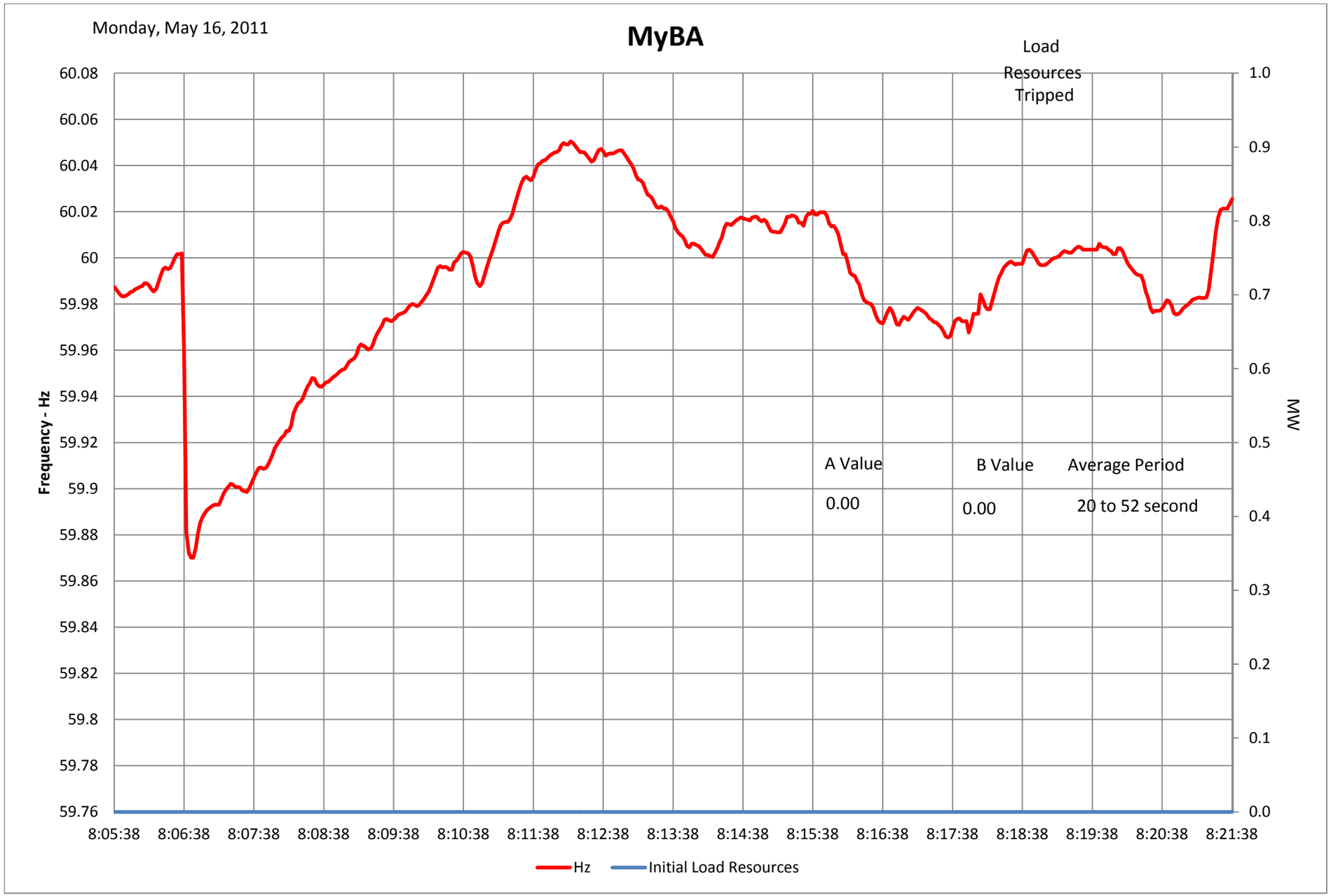
9 Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".

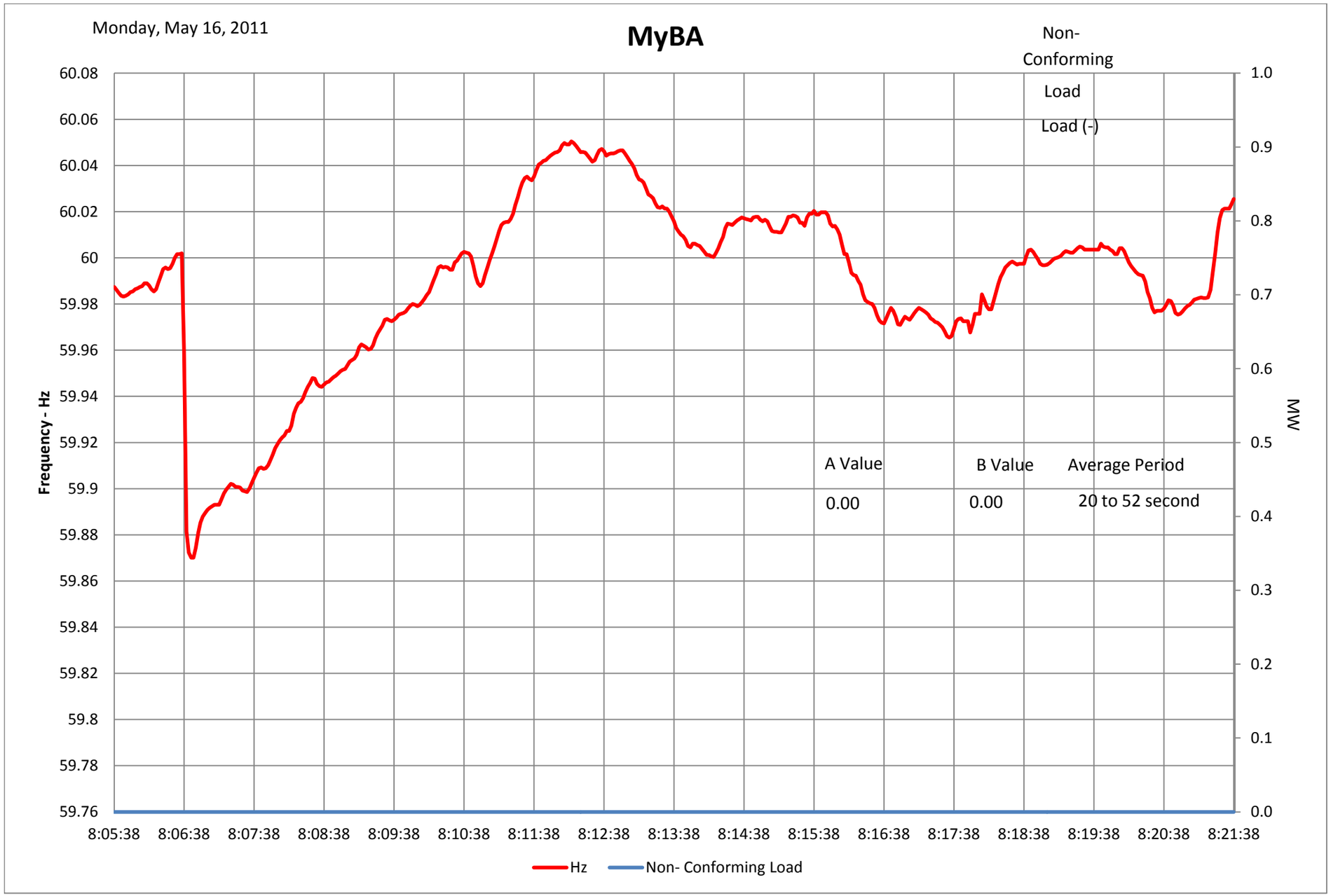
10 Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.

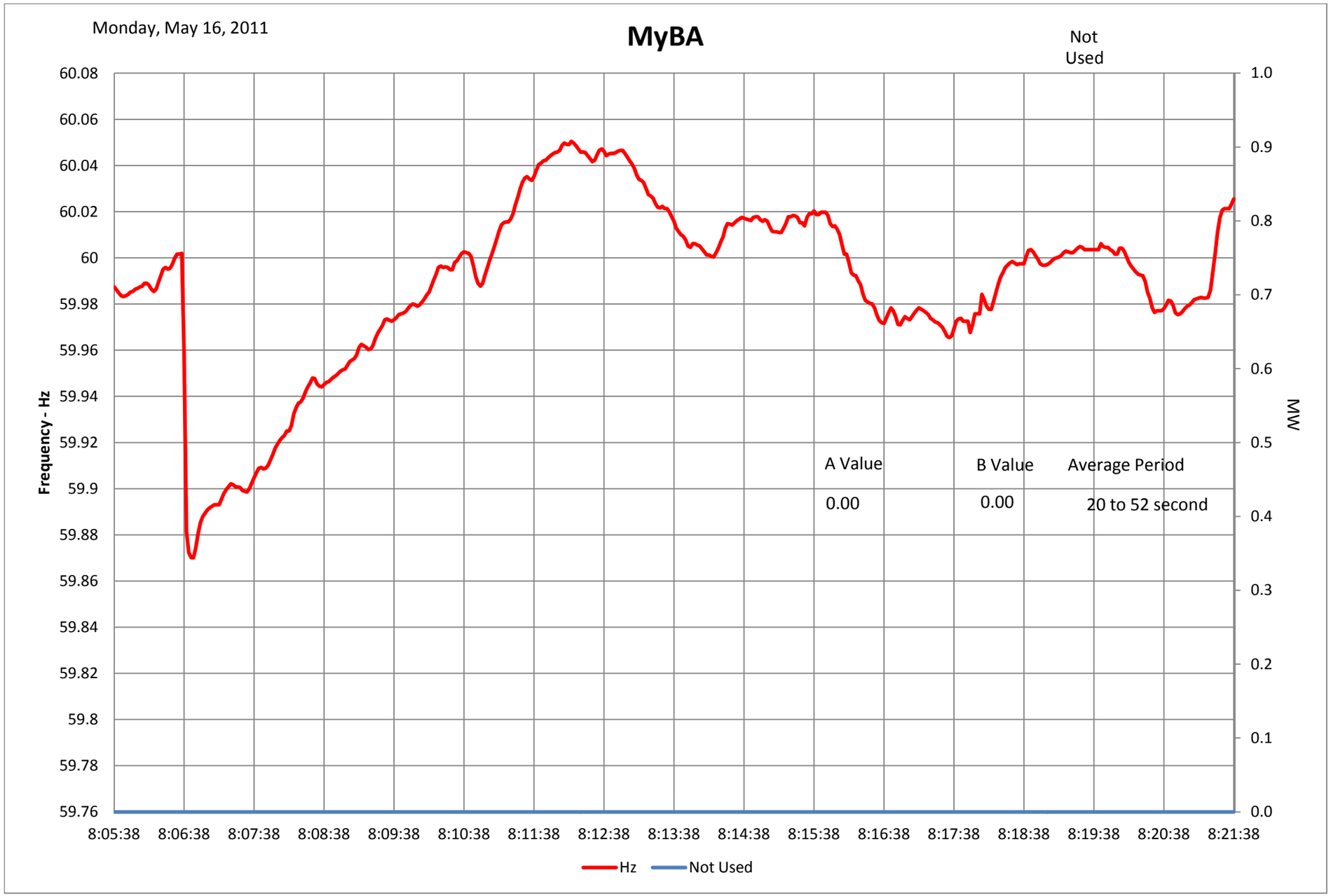
11 Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

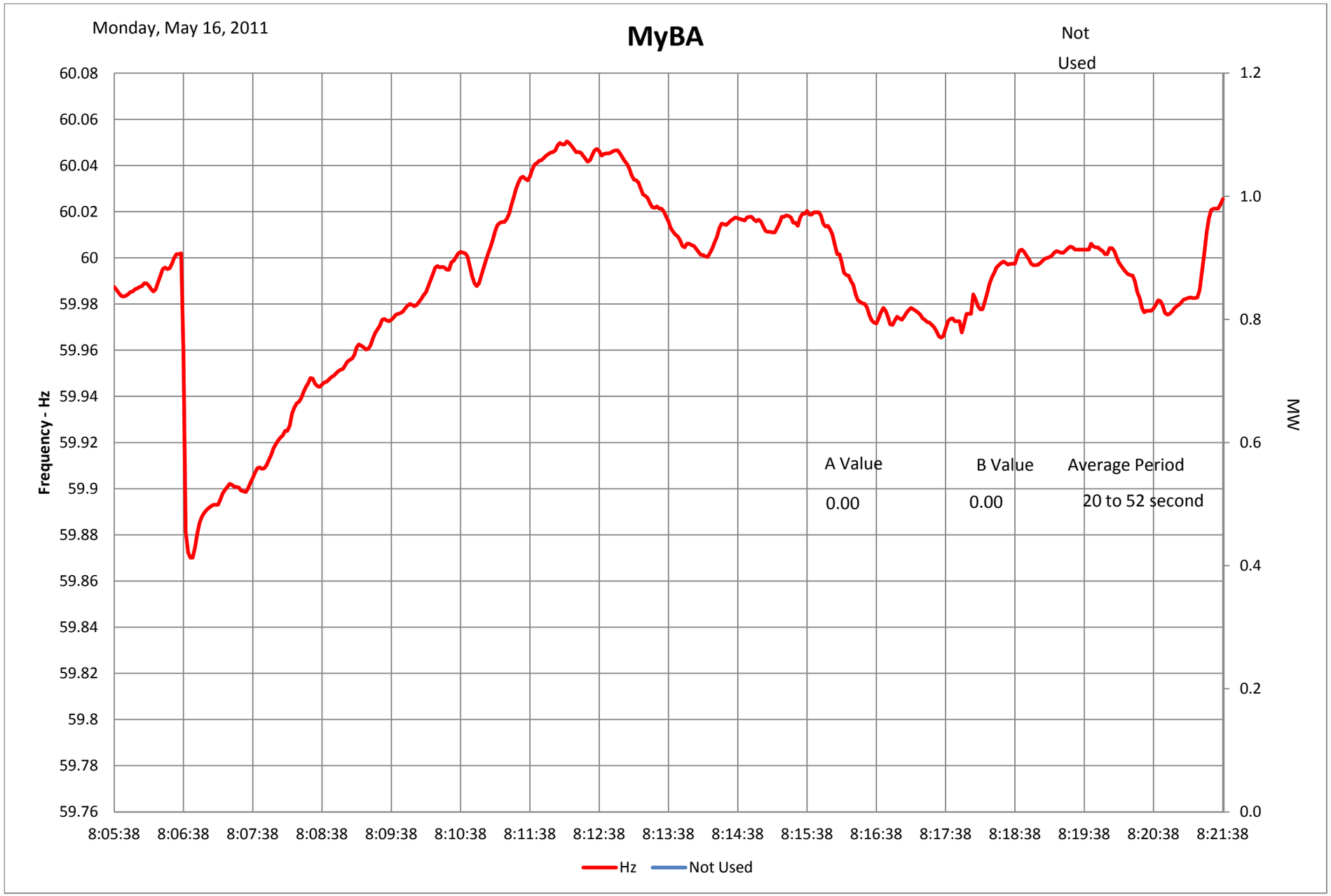
Steps **To be completed the first time you use Form 2 for your BA.**

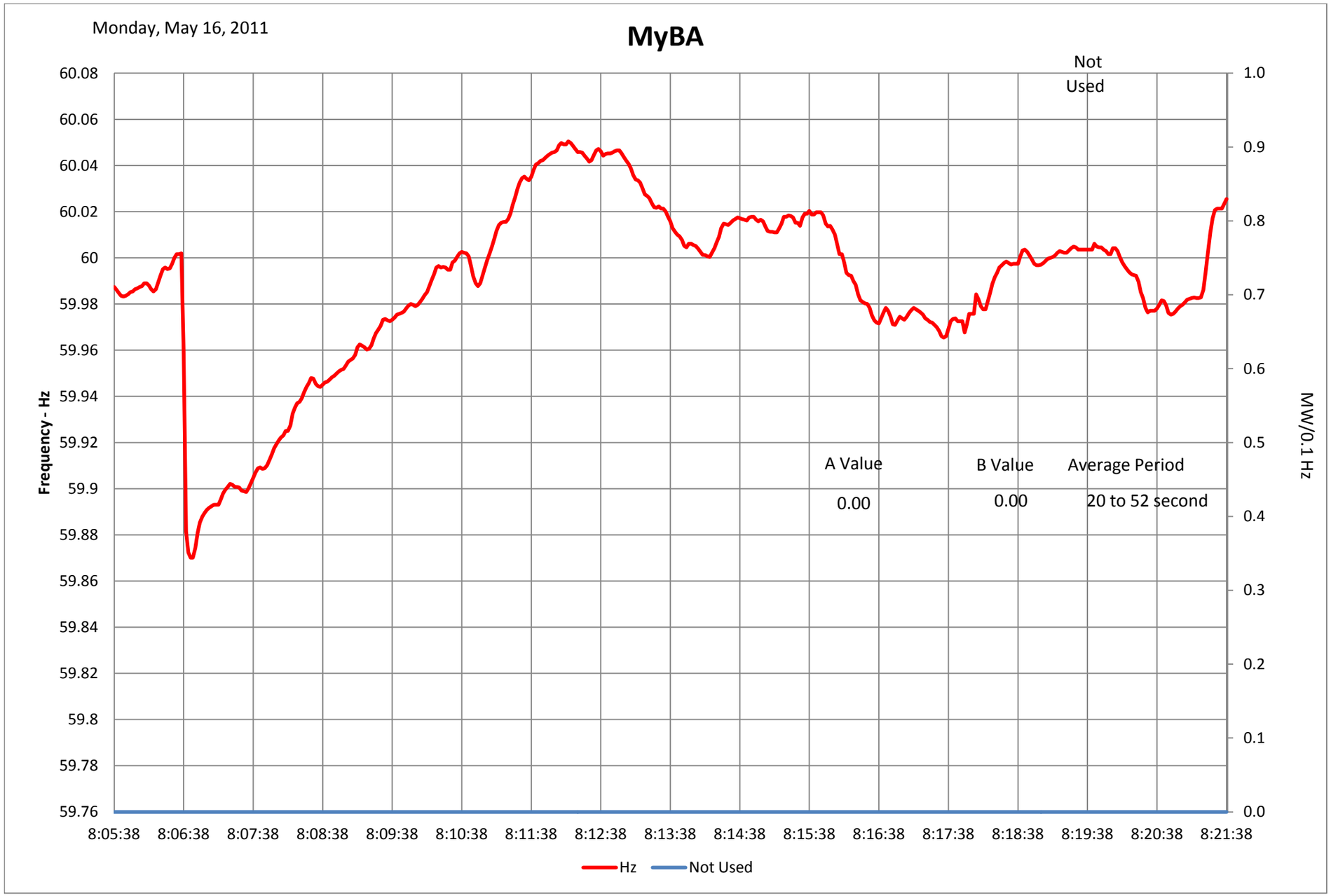
A Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "ERCOT".

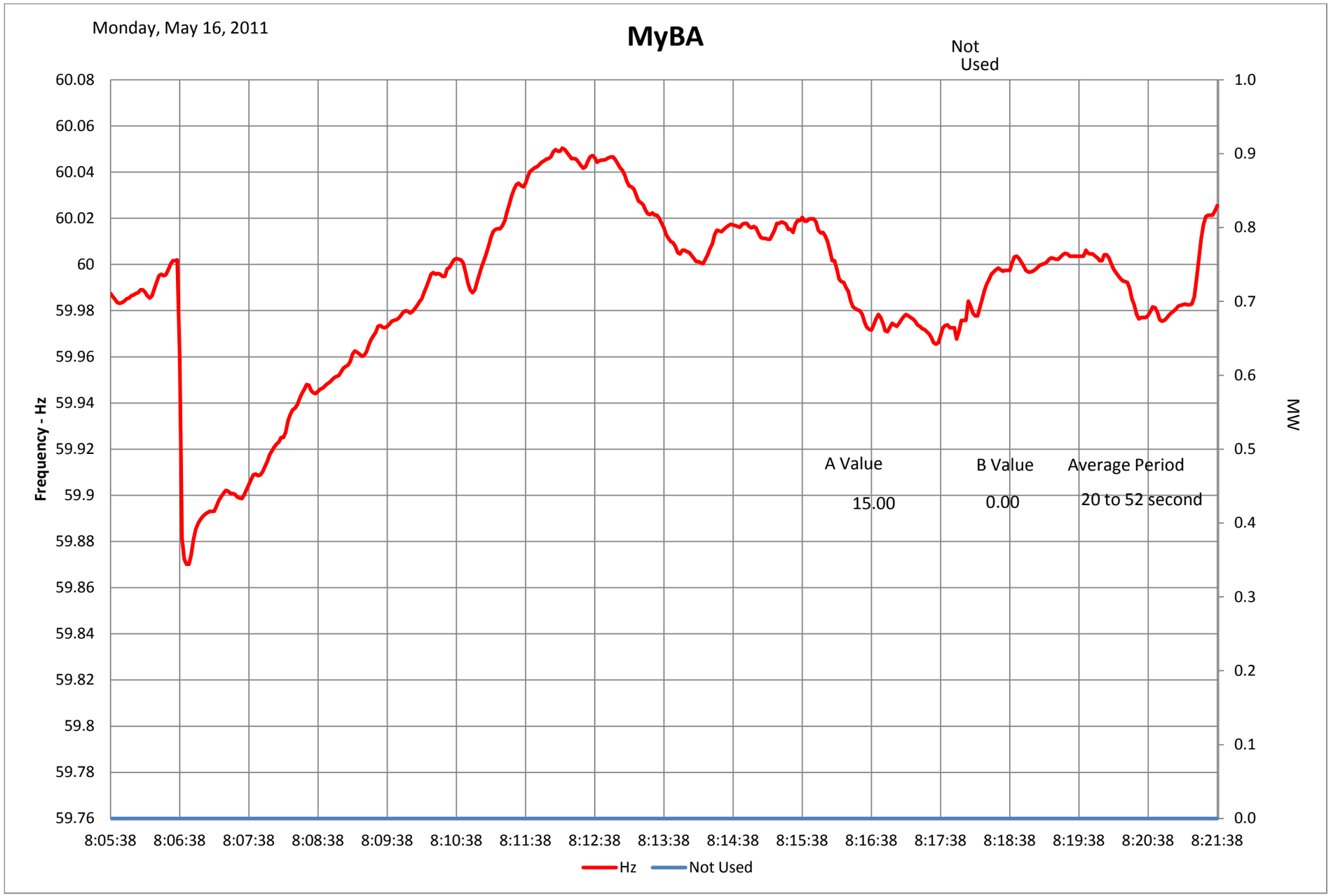

Monday, May 16, 2011
MyBA
Load Resources Tripped
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Hz
Initial Load Resources

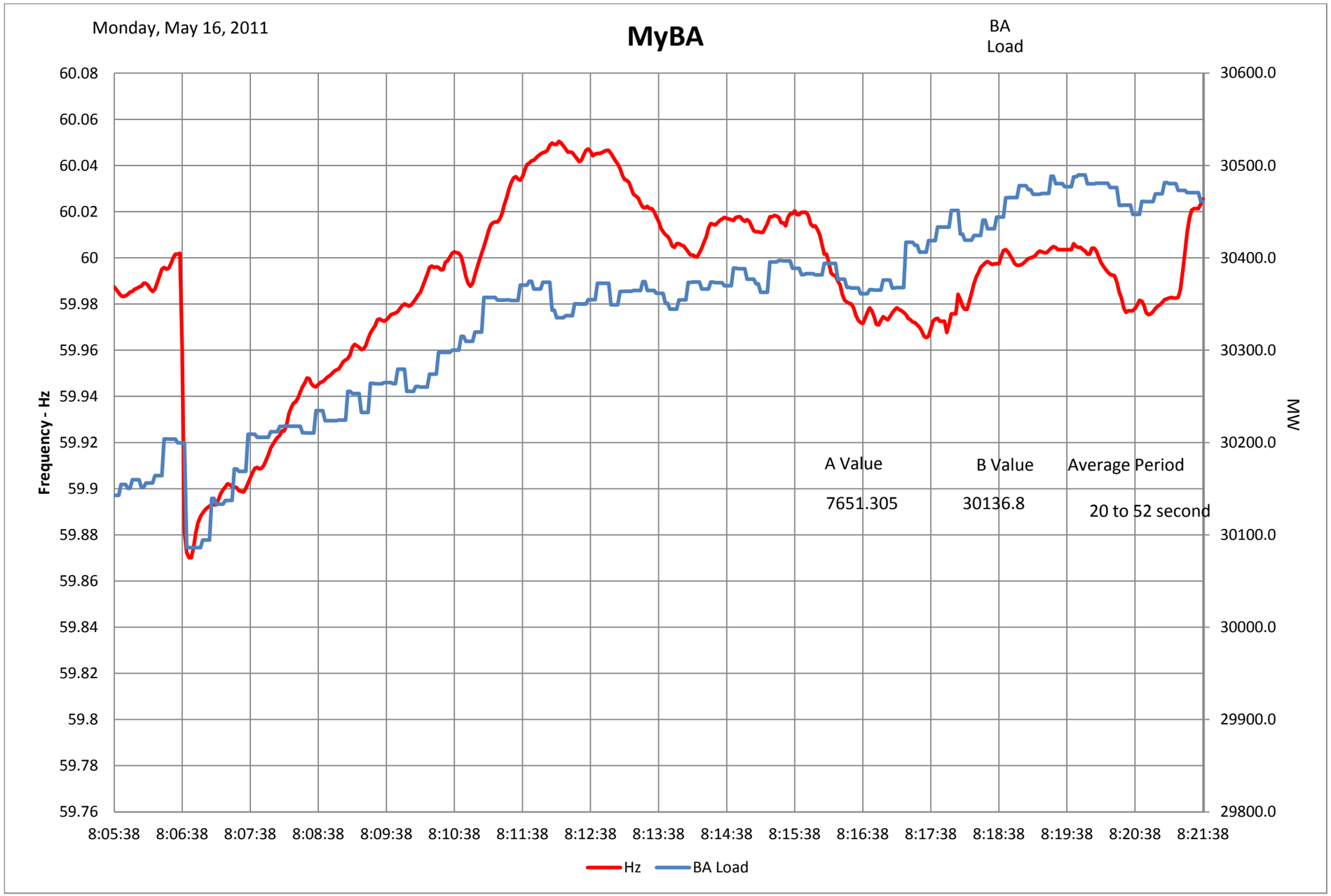

Monday, May 16, 2011
MyBA
Non-Conforming Load
Load (-)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Non- Conforming Load

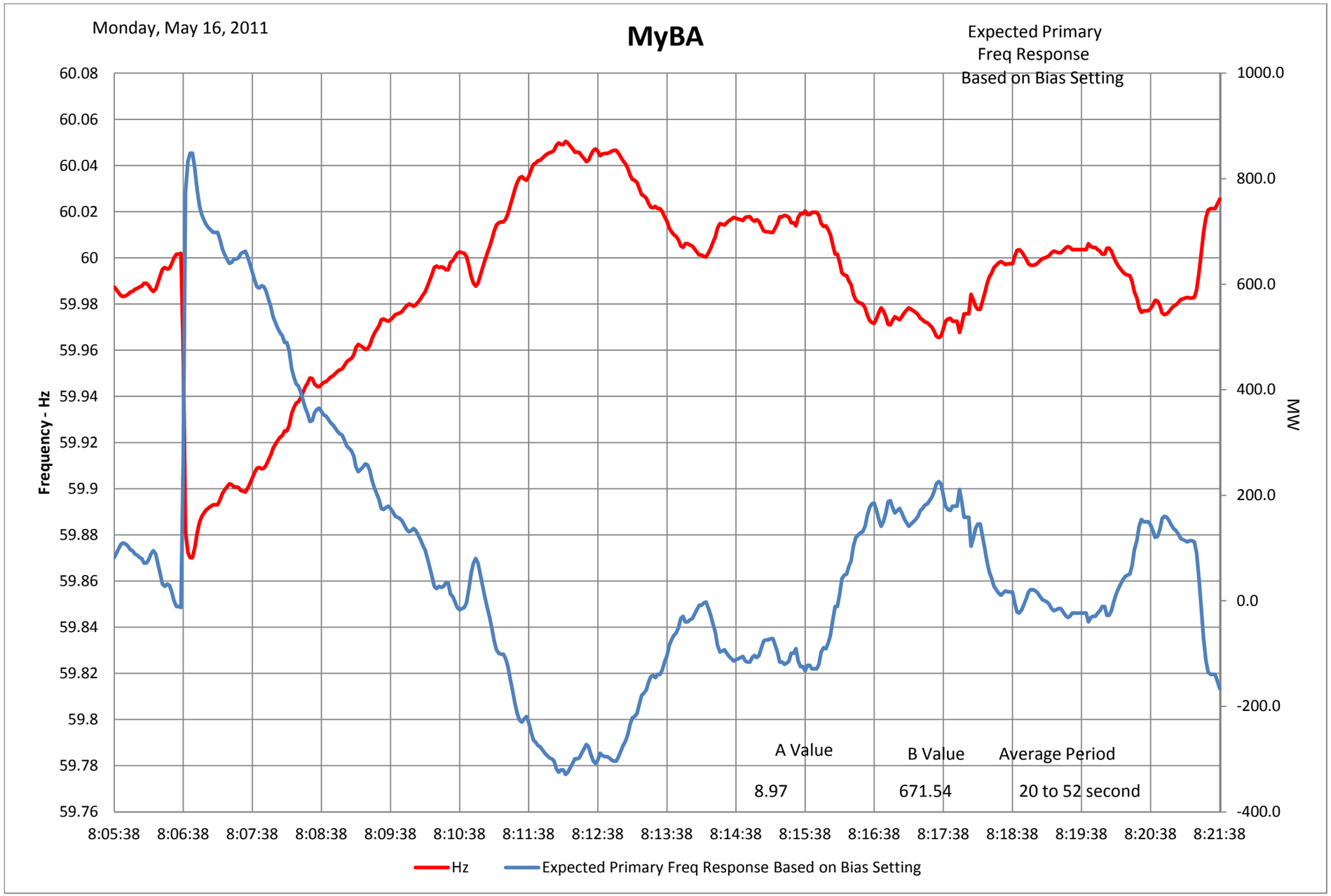

Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.2
1.0
0.8
0.6
0.4
0.2
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
15.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
BA Load
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
30600.0
30500.0
30400.0
30300.0
30200.0
30100.0
30000.0
29900.0
29800.0
MW
A Value
7651.305
B Value
30136.8
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Load


Monday, May 16, 2011
MyBA
Expected Primary Freq Response Based on Bias Setting
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
8.97
B Value
671.54
Average Period
20 to 52 second
Hz
Expected Primary Freq Response Based on Bias Setting

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 07:40:00	60.0097	471		0	0				-653	29756.85		0				
05/16/11 07:40:02	60.00745	471		0	0				-653	29756.85	0	0	0	-0.002	0.002	
05/16/11 07:40:04	60.00452	471		0	0				-653	29756.82	0	0	0	-0.003	0.003	
05/16/11 07:40:06	60.00259	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:08	60.00034	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:10	59.99872	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:12	59.9971	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:14	59.99548	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:16	59.99353	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:18	59.99063	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:20	59.9874	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:22	59.98416	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:24	59.98093	471		0	0				-653	29766.37	0	0	0	-0.003	0.003	
05/16/11 07:40:26	59.97867	471		0	0				-653	29766.37	0	0	0	-0.002	0.002	
05/16/11 07:40:28	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:30	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:32	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:34	59.97577	471		0	0				-653	29780.98	0	0	0	-0.003	0.003	
05/16/11 07:40:36	59.97382	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:38	59.97223	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:40	59.97223	471		0	0				-653	29780.98	0	0	0	0.000	0.000	
05/16/11 07:40:42	59.97318	471		0	0				-653	29780.98	0	0	0	0.001	0.001	
05/16/11 07:40:44	59.97351	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:46	59.97415	471		0	0				-653	29780.95	0	0	0	0.001	0.001	
05/16/11 07:40:48	59.97287	471		0	0				-653	29780.95	0	0	0	-0.001	0.001	
05/16/11 07:40:50	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:52	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:54	59.96832	471		0	0				-653	29770.34	0	0	0	-0.005	0.005	
05/16/11 07:40:56	59.96768	471		0	0				-653	29770.34	0	0	0	-0.001	0.001	
05/16/11 07:40:58	59.96899	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:00	59.97028	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:02	59.97223	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:04	59.97382	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:06	59.97479	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:08	59.9761	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:10	59.97769	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:12	59.97998	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:14	59.98318	471		0	0				-653	29782.73	0	0	0	0.003	0.003	
05/16/11 07:41:16	59.98578	471		0	0				-653	29782.73	0	0	0	0.003	0.003	
05/16/11 07:41:18	59.9874	471		0	0				-653	29782.73	0	0	0	0.002	0.002	
05/16/11 07:41:20	59.98868	471		0	0				-653	29782.73	0	0	0	0.001	0.001	

05/16/11 07:41:22	59.98999	471	0	0	-653	29782.73	0	0	0	0.001	0.001
05/16/11 07:41:24	59.99191	471	0	0	-653	29782.82	0	0	0	0.002	0.002
05/16/11 07:41:26	59.99353	471	0	0	-653	29782.82	0	0	0	0.002	0.002
05/16/11 07:41:28	59.99612	471	0	0	-653	29782.82	0	0	0	0.003	0.003
05/16/11 07:41:30	59.99805	471	0	0	-653	29782.82	0	0	0	0.002	0.002
05/16/11 07:41:32	59.99902	471	0	0	-653	29782.82	0	0	0	0.001	0.001
05/16/11 07:41:34	59.99902	471	0	0	-653	29786.15	0	0	0	0.000	0.000
05/16/11 07:41:36	59.99774	471	0	0	-653	29786.15	0	0	0	-0.001	0.001
05/16/11 07:41:38	59.99646	471	0	0	-653	29786.15	0	0	0	-0.001	0.001
05/16/11 07:41:40	59.99579	471	0	0	-653	29786.15	0	0	0	-0.001	0.001
05/16/11 07:41:42	59.99612	471	0	0	-653	29786.15	0	0	0	0.000	0.000
05/16/11 07:41:44	59.9971	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:46	59.99774	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:48	59.99838	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:50	59.99936	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:52	60	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:54	60.00064	471	0	0	-653	29778.98	0	0	0	0.001	0.001
05/16/11 07:41:56	60.00128	471	0	0	-653	29778.98	0	0	0	0.001	0.001
05/16/11 07:41:58	60.00226	471	0	0	-653	29778.98	0	0	0	0.001	0.001
05/16/11 07:42:00	60.00388	471	0	0	-653	29778.98	0	0	0	0.002	0.002
05/16/11 07:42:02	60.00647	471	0	0	-653	29778.98	0	0	0	0.003	0.003
05/16/11 07:42:04	60.0097	471	0	0	-653	29778.92	0	0	0	0.003	0.003
05/16/11 07:42:06	60.01358	471	0	0	-653	29778.92	0	0	0	0.004	0.004
05/16/11 07:42:08	60.01614	471	0	0	-653	29778.92	0	0	0	0.003	0.003
05/16/11 07:42:10	60.01776	471	0	0	-653	29778.92	0	0	0	0.002	0.002
05/16/11 07:42:12	60.01776	471	0	0	-653	29778.92	0	0	0	0.000	0.000
05/16/11 07:42:14	60.01486	471	0	0	-653	29787.9	0	0	0	-0.003	0.003
05/16/11 07:42:16	60.01163	471	0	0	-653	29787.9	0	0	0	-0.003	0.003
05/16/11 07:42:18	60.00903	471	0	0	-653	29787.9	0	0	0	-0.003	0.003
05/16/11 07:42:20	60.00775	471	0	0	-653	29787.9	0	0	0	-0.001	0.001
05/16/11 07:42:22	60.00775	471	0	0	-653	29787.9	0	0	0	0.000	0.000
05/16/11 07:42:24	60.00903	471	0	0	-653	29787.84	0	0	0	0.001	0.001
05/16/11 07:42:26	60.00903	471	0	0	-653	29787.84	0	0	0	0.000	0.000
05/16/11 07:42:28	60.01324	471	0	0	-653	29787.84	0	0	0	0.004	0.004
05/16/11 07:42:30	60.01486	471	0	0	-653	29787.84	0	0	0	0.002	0.002
05/16/11 07:42:32	60.0152	471	0	0	-653	29787.84	0	0	0	0.000	0.000
05/16/11 07:42:34	60.0152	471	0	0	-653	29813.39	0	0	0	0.000	0.000
05/16/11 07:42:36	60.01486	471	0	0	-653	29813.39	0	0	0	0.000	0.000
05/16/11 07:42:38	60.01422	471	0	0	-653	29813.39	0	0	0	-0.001	0.001
05/16/11 07:42:40	60.01358	471	0	0	-653	29813.39	0	0	0	-0.001	0.001
05/16/11 07:42:42	60.01227	471	0	0	-653	29813.39	0	0	0	-0.001	0.001
05/16/11 07:42:44	60.01099	471	0	0	-653	29813.33	0	0	0	-0.001	0.001
05/16/11 07:42:46	60.00873	471	0	0	-653	29813.33	0	0	0	-0.002	0.002
05/16/11 07:42:48	60.00647	471	0	0	-653	29813.33	0	0	0	-0.002	0.002
05/16/11 07:42:50	60.00485	471	0	0	-653	29813.33	0	0	0	-0.002	0.002
05/16/11 07:42:52	60.00354	471	0	0	-653	29813.33	0	0	0	-0.001	0.001
05/16/11 07:42:54	60.00195	471	0	0	-653	29797.46	0	0	0	-0.002	0.002
05/16/11 07:42:56	60	471	0	0	-653	29797.46	0	0	0	-0.002	0.002
05/16/11 07:42:58	59.99774	471	0	0	-653	29797.46	0	0	0	-0.002	0.002

05/16/11 07:43:00	59.99612	471	0	0	-653	29797.46	0	0	0	-0.002	0.002
05/16/11 07:43:02	59.99646	471	0	0	-653	29797.46	0	0	0	0.000	0.000
05/16/11 07:43:04	59.99741	471	0	0	-653	29797.52	0	0	0	0.001	0.001
05/16/11 07:43:06	59.99838	471	0	0	-653	29797.52	0	0	0	0.001	0.001
05/16/11 07:43:08	59.99936	471	0	0	-653	29797.52	0	0	0	0.001	0.001
05/16/11 07:43:10	59.99902	471	0	0	-653	29797.52	0	0	0	0.000	0.000
05/16/11 07:43:12	59.99872	471	0	0	-653	29797.52	0	0	0	0.000	0.000
05/16/11 07:43:14	59.99774	471	0	0	-653	29780.33	0	0	0	-0.001	0.001
05/16/11 07:43:16	59.99646	471	0	0	-653	29780.33	0	0	0	-0.001	0.001
05/16/11 07:43:18	59.99677	471	0	0	-653	29780.33	0	0	0	0.000	0.000
05/16/11 07:43:20	59.99677	471	0	0	-653	29780.33	0	0	0	0.000	0.000
05/16/11 07:43:22	59.99774	471	0	0	-653	29780.33	0	0	0	0.001	0.001
05/16/11 07:43:24	59.99805	471	0	0	-653	29780.27	0	0	0	0.000	0.000
05/16/11 07:43:26	59.99774	471	0	0	-653	29780.27	0	0	0	0.000	0.000
05/16/11 07:43:28	59.99579	471	0	0	-653	29780.27	0	0	0	-0.002	0.002
05/16/11 07:43:30	59.99387	471	0	0	-653	29780.27	0	0	0	-0.002	0.002
05/16/11 07:43:32	59.99255	471	0	0	-653	29780.27	0	0	0	-0.001	0.001
05/16/11 07:43:34	59.99127	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:36	59.98999	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:38	59.98965	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:40	59.98837	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:42	59.98709	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:44	59.98642	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:46	59.98642	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:48	59.98642	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:50	59.98676	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:52	59.98676	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:54	59.98642	471	0	0	-653	29787.12	0	0	0	0.000	0.000
05/16/11 07:43:56	59.98611	471	0	0	-653	29787.12	0	0	0	0.000	0.000
05/16/11 07:43:58	59.98611	471	0	0	-653	29787.12	0	0	0	0.000	0.000
05/16/11 07:44:00	59.98514	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:02	59.98416	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:04	59.98352	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:06	59.98224	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:08	59.98029	471	0	0	-653	29787.12	0	0	0	-0.002	0.002
05/16/11 07:44:10	59.979	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:12	59.97769	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:14	59.97675	471	0	0	-653	29780.67	0	0	0	-0.001	0.001
05/16/11 07:44:16	59.97641	471	0	0	-653	29780.67	0	0	0	0.000	0.000
05/16/11 07:44:18	59.97739	471	0	0	-653	29780.67	0	0	0	0.001	0.001
05/16/11 07:44:20	59.97998	471	0	0	-653	29780.67	0	0	0	0.003	0.003
05/16/11 07:44:22	59.98318	471	0	0	-653	29780.67	0	0	0	0.003	0.003
05/16/11 07:44:24	59.98611	471	0	0	-653	29780.76	0	0	0	0.003	0.003
05/16/11 07:44:26	59.98837	471	0	0	-653	29780.76	0	0	0	0.002	0.002
05/16/11 07:44:28	59.9903	471	0	0	-653	29780.76	0	0	0	0.002	0.002
05/16/11 07:44:30	59.99191	471	0	0	-653	29780.76	0	0	0	0.002	0.002
05/16/11 07:44:32	59.99353	471	0	0	-653	29780.76	0	0	0	0.002	0.002
05/16/11 07:44:34	59.99579	471	0	0	-653	29777.7	0	0	0	0.002	0.002
05/16/11 07:44:36	60	471	0	0	-653	29777.7	0	0	0	0.004	0.004

05/16/11 07:44:38	60.00354	471	0	0	-653	29777.7	0	0	0	0.004	0.004
05/16/11 07:44:40	60.00647	471	0	0	-653	29777.7	0	0	0	0.003	0.003
05/16/11 07:44:42	60.00839	471	0	0	-653	29777.7	0	0	0	0.002	0.002
05/16/11 07:44:44	60.00903	471	0	0	-653	29777.7	0	0	0	0.001	0.001
05/16/11 07:44:46	60.00873	471	0	0	-653	29777.7	0	0	0	0.000	0.000
05/16/11 07:44:48	60.00873	471	0	0	-653	29777.7	0	0	0	0.000	0.000
05/16/11 07:44:50	60.00937	471	0	0	-653	29777.7	0	0	0	0.001	0.001
05/16/11 07:44:52	60.01099	471	0	0	-653	29777.7	0	0	0	0.002	0.002
05/16/11 07:44:54	60.01453	471	0	0	-653	29788.63	0	0	0	0.004	0.004
05/16/11 07:44:56	60.0181	471	0	0	-653	29788.63	0	0	0	0.004	0.004
05/16/11 07:44:58	60.02002	471	0	0	-653	29788.63	0	0	0	0.002	0.002
05/16/11 07:45:00	60.02036	471	0	0	-653	29788.63	0	0	0	0.000	0.000
05/16/11 07:45:02	60.02002	471	0	0	-653	29788.63	0	0	0	0.000	0.000
05/16/11 07:45:04	60.02002	471	0	0	-653	29788.63	0	0	0	0.000	0.000
05/16/11 07:45:06	60.01907	471	0	0	-653	29788.63	0	0	0	-0.001	0.001
05/16/11 07:45:08	60.0181	471	0	0	-653	29788.63	0	0	0	-0.001	0.001
05/16/11 07:45:10	60.01712	471	0	0	-653	29788.63	0	0	0	-0.001	0.001
05/16/11 07:45:12	60.01712	471	0	0	-653	29788.63	0	0	0	0.000	0.000
05/16/11 07:45:14	60.01712	471	0	0	-653	29788.51	0	0	0	0.000	0.000
05/16/11 07:45:16	60.01453	471	0	0	-653	29788.51	0	0	0	-0.003	0.003
05/16/11 07:45:18	60.01358	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:20	60.01227	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:22	60.01163	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:24	60.01065	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:26	60.0097	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:28	60.00839	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:30	60.00745	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:32	60.00775	471	0	0	-653	29788.51	0	0	0	0.000	0.000
05/16/11 07:45:34	60.00839	471	0	0	-653	29780.62	0	0	0	0.001	0.001
05/16/11 07:45:36	60.00839	471	0	0	-653	29780.62	0	0	0	0.000	0.000
05/16/11 07:45:38	60.00809	471	0	0	-653	29780.62	0	0	0	0.000	0.000
05/16/11 07:45:40	60.00745	471	0	0	-653	29780.62	0	0	0	-0.001	0.001
05/16/11 07:45:42	60.00711	471	0	0	-653	29780.62	0	0	0	0.000	0.000
05/16/11 07:45:44	60.00839	471	0	0	-653	29780.56	0	0	0	0.001	0.001
05/16/11 07:45:46	60.00937	471	0	0	-653	29780.56	0	0	0	0.001	0.001
05/16/11 07:45:48	60.0097	471	0	0	-653	29780.56	0	0	0	0.000	0.000
05/16/11 07:45:50	60.01001	471	0	0	-653	29780.56	0	0	0	0.000	0.000
05/16/11 07:45:52	60.01065	471	0	0	-653	29780.56	0	0	0	0.001	0.001
05/16/11 07:45:54	60.01196	471	0	0	-653	29784.96	0	0	0	0.001	0.001
05/16/11 07:45:56	60.01324	471	0	0	-653	29784.96	0	0	0	0.001	0.001
05/16/11 07:45:58	60.01453	471	0	0	-653	29784.96	0	0	0	0.001	0.001
05/16/11 07:46:00	60.01614	471	0	0	-653	29784.96	0	0	0	0.002	0.002
05/16/11 07:46:02	60.01712	471	0	0	-653	29784.96	0	0	0	0.001	0.001
05/16/11 07:46:04	60.01712	471	0	0	-653	29784.93	0	0	0	0.000	0.000
05/16/11 07:46:06	60.01614	471	0	0	-653	29784.93	0	0	0	-0.001	0.001
05/16/11 07:46:08	60.01584	471	0	0	-653	29784.93	0	0	0	0.000	0.000
05/16/11 07:46:10	60.01614	471	0	0	-653	29784.93	0	0	0	0.000	0.000
05/16/11 07:46:12	60.01584	471	0	0	-653	29784.93	0	0	0	0.000	0.000
05/16/11 07:46:14	60.01486	471	0	0	-653	29760.42	0	0	0	-0.001	0.001

05/16/11 07:46:16	60.01422	471	0	0	-653	29760.42	0	0	0	-0.001	0.001
05/16/11 07:46:18	60.01227	471	0	0	-653	29760.42	0	0	0	-0.002	0.002
05/16/11 07:46:20	60.0097	471	0	0	-653	29760.42	0	0	0	-0.003	0.003
05/16/11 07:46:22	60.00711	471	0	0	-653	29760.42	0	0	0	-0.003	0.003
05/16/11 07:46:24	60.00583	471	0	0	-653	29760.42	0	0	0	-0.001	0.001
05/16/11 07:46:26	60.00516	471	0	0	-653	29760.42	0	0	0	-0.001	0.001
05/16/11 07:46:28	60.00516	471	0	0	-653	29760.42	0	0	0	0.000	0.000
05/16/11 07:46:30	60.00485	471	0	0	-653	29760.42	0	0	0	0.000	0.000
05/16/11 07:46:32	60.00388	471	0	0	-653	29760.42	0	0	0	-0.001	0.001
05/16/11 07:46:34	60.00259	471	0	0	-653	29782.35	0	0	0	-0.001	0.001
05/16/11 07:46:36	59.99902	471	0	0	-653	29782.35	0	0	0	-0.004	0.004
05/16/11 07:46:38	59.9971	471	0	0	-653	29782.35	0	0	0	-0.002	0.002
05/16/11 07:46:40	59.99646	471	0	0	-653	29782.35	0	0	0	-0.001	0.001
05/16/11 07:46:42	59.99579	471	0	0	-653	29782.35	0	0	0	-0.001	0.001
05/16/11 07:46:44	59.99417	471	0	0	-653	29782.44	0	0	0	-0.002	0.002
05/16/11 07:46:46	59.99225	471	0	0	-653	29782.44	0	0	0	-0.002	0.002
05/16/11 07:46:48	59.9903	471	0	0	-653	29782.44	0	0	0	-0.002	0.002
05/16/11 07:46:50	59.98804	471	0	0	-653	29782.44	0	0	0	-0.002	0.002
05/16/11 07:46:52	59.98709	471	0	0	-653	29782.44	0	0	0	-0.001	0.001
05/16/11 07:46:54	59.98676	471	0	0	-653	29785.52	0	0	0	0.000	0.000
05/16/11 07:46:56	59.98578	471	0	0	-653	29785.52	0	0	0	-0.001	0.001
05/16/11 07:46:58	59.9845	471	0	0	-653	29785.52	0	0	0	-0.001	0.001
05/16/11 07:47:00	59.98288	471	0	0	-653	29785.52	0	0	0	-0.002	0.002
05/16/11 07:47:02	59.98224	471	0	0	-653	29785.52	0	0	0	-0.001	0.001
05/16/11 07:47:04	59.98224	471	0	0	-653	29785.55	0	0	0	0.000	0.000
05/16/11 07:47:06	59.98224	471	0	0	-653	29785.55	0	0	0	0.000	0.000
05/16/11 07:47:08	59.98254	471	0	0	-653	29785.55	0	0	0	0.000	0.000
05/16/11 07:47:10	59.98386	471	0	0	-653	29785.55	0	0	0	0.001	0.001
05/16/11 07:47:12	59.9848	471	0	0	-653	29785.55	0	0	0	0.001	0.001
05/16/11 07:47:14	59.98578	471	0	0	-653	29788.21	0	0	0	0.001	0.001
05/16/11 07:47:16	59.98642	471	0	0	-653	29788.21	0	0	0	0.001	0.001
05/16/11 07:47:18	59.98999	471	0	0	-653	29788.21	0	0	0	0.004	0.004
05/16/11 07:47:20	59.99225	471	0	0	-653	29788.21	0	0	0	0.002	0.002
05/16/11 07:47:22	59.99323	471	0	0	-653	29788.21	0	0	0	0.001	0.001
05/16/11 07:47:24	59.99646	471	0	0	-653	29788.06	0	0	0	0.003	0.003
05/16/11 07:47:26	59.99902	471	0	0	-653	29788.06	0	0	0	0.003	0.003
05/16/11 07:47:28	60.00064	471	0	0	-653	29788.06	0	0	0	0.002	0.002
05/16/11 07:47:30	60.00647	471	0	0	-653	29788.06	0	0	0	0.006	0.006
05/16/11 07:47:32	60.00903	471	0	0	-653	29788.06	0	0	0	0.003	0.003
05/16/11 07:47:34	60.01099	471	0	0	-653	29776.11	0	0	0	0.002	0.002
05/16/11 07:47:36	60.01132	471	0	0	-653	29776.11	0	0	0	0.000	0.000
05/16/11 07:47:38	60.01291	471	0	0	-653	29776.11	0	0	0	0.002	0.002
05/16/11 07:47:40	60.01324	471	0	0	-653	29776.11	0	0	0	0.000	0.000
05/16/11 07:47:42	60.01324	471	0	0	-653	29776.11	0	0	0	0.000	0.000
05/16/11 07:47:44	60.01422	471	0	0	-653	29776.17	0	0	0	0.001	0.001
05/16/11 07:47:46	60.0181	471	0	0	-653	29776.17	0	0	0	0.004	0.004
05/16/11 07:47:48	60.01907	471	0	0	-653	29776.17	0	0	0	0.001	0.001
05/16/11 07:47:50	60.02133	471	0	0	-653	29776.17	0	0	0	0.002	0.002
05/16/11 07:47:52	60.02197	471	0	0	-653	29776.17	0	0	0	0.001	0.001

05/16/11 07:47:54	60.02164	471	0	0	-653	29794.69	0	0	0	0.000	0.000
05/16/11 07:47:56	60.01971	471	0	0	-653	29794.69	0	0	0	-0.002	0.002
05/16/11 07:47:58	60.01907	471	0	0	-653	29794.69	0	0	0	-0.001	0.001
05/16/11 07:48:00	60.01746	471	0	0	-653	29794.69	0	0	0	-0.002	0.002
05/16/11 07:48:02	60.01776	471	0	0	-653	29794.69	0	0	0	0.000	0.000
05/16/11 07:48:04	60.0184	471	0	0	-653	29794.66	0	0	0	0.001	0.001
05/16/11 07:48:06	60.01776	471	0	0	-653	29794.66	0	0	0	-0.001	0.001
05/16/11 07:48:08	60.0152	471	0	0	-653	29794.66	0	0	0	-0.003	0.003
05/16/11 07:48:10	60.01389	471	0	0	-653	29794.66	0	0	0	-0.001	0.001
05/16/11 07:48:12	60.01422	471	0	0	-653	29794.66	0	0	0	0.000	0.000
05/16/11 07:48:14	60.0152	471	0	0	-653	29804.78	0	0	0	0.001	0.001
05/16/11 07:48:16	60.01614	471	0	0	-653	29804.78	0	0	0	0.001	0.001
05/16/11 07:48:18	60.01614	471	0	0	-653	29804.78	0	0	0	0.000	0.000
05/16/11 07:48:20	60.01422	471	0	0	-653	29804.78	0	0	0	-0.002	0.002
05/16/11 07:48:22	60.01196	471	0	0	-653	29804.78	0	0	0	-0.002	0.002
05/16/11 07:48:24	60.01035	471	0	0	-653	29804.86	0	0	0	-0.002	0.002
05/16/11 07:48:26	60.00809	471	0	0	-653	29804.86	0	0	0	-0.002	0.002
05/16/11 07:48:28	60.00613	471	0	0	-653	29804.86	0	0	0	-0.002	0.002
05/16/11 07:48:30	60.00516	471	0	0	-653	29804.86	0	0	0	-0.001	0.001
05/16/11 07:48:32	60.00452	471	0	0	-653	29804.86	0	0	0	-0.001	0.001
05/16/11 07:48:34	60.00354	471	0	0	-653	29800.12	0	0	0	-0.001	0.001
05/16/11 07:48:36	60.00128	471	0	0	-653	29800.12	0	0	0	-0.002	0.002
05/16/11 07:48:38	60	471	0	0	-653	29800.12	0	0	0	-0.001	0.001
05/16/11 07:48:40	59.99936	471	0	0	-653	29800.12	0	0	0	-0.001	0.001
05/16/11 07:48:42	59.99838	471	0	0	-653	29800.12	0	0	0	-0.001	0.001
05/16/11 07:48:44	59.99741	471	0	0	-653	29800.18	0	0	0	-0.001	0.001
05/16/11 07:48:46	59.99579	471	0	0	-653	29800.18	0	0	0	-0.002	0.002
05/16/11 07:48:48	59.99515	471	0	0	-653	29800.18	0	0	0	-0.001	0.001
05/16/11 07:48:50	59.99646	471	0	0	-653	29800.18	0	0	0	0.001	0.001
05/16/11 07:48:52	59.99872	471	0	0	-653	29800.18	0	0	0	0.002	0.002
05/16/11 07:48:54	60.00128	471	0	0	-653	29799.82	0	0	0	0.003	0.003
05/16/11 07:48:56	60.00323	471	0	0	-653	29799.82	0	0	0	0.002	0.002
05/16/11 07:48:58	60.00421	471	0	0	-653	29799.82	0	0	0	0.001	0.001
05/16/11 07:49:00	60.00485	471	0	0	-653	29799.82	0	0	0	0.001	0.001
05/16/11 07:49:02	60.00549	471	0	0	-653	29799.82	0	0	0	0.001	0.001
05/16/11 07:49:04	60.00583	471	0	0	-653	29799.79	0	0	0	0.000	0.000
05/16/11 07:49:06	60.00583	471	0	0	-653	29799.79	0	0	0	0.000	0.000
05/16/11 07:49:08	60.00549	471	0	0	-653	29799.79	0	0	0	0.000	0.000
05/16/11 07:49:10	60.00388	471	0	0	-653	29799.79	0	0	0	-0.002	0.002
05/16/11 07:49:12	60.00226	471	0	0	-653	29799.79	0	0	0	-0.002	0.002
05/16/11 07:49:14	60.00226	471	0	0	-653	29795.67	0	0	0	0.000	0.000
05/16/11 07:49:16	60	471	0	0	-653	29795.67	0	0	0	-0.002	0.002
05/16/11 07:49:18	60	471	0	0	-653	29795.67	0	0	0	0.000	0.000
05/16/11 07:49:20	60	471	0	0	-653	29795.67	0	0	0	0.000	0.000
05/16/11 07:49:22	60	471	0	0	-653	29795.67	0	0	0	0.000	0.000
05/16/11 07:49:24	60.00452	471	0	0	-653	29795.55	0	0	0	0.005	0.005
05/16/11 07:49:26	60.00583	471	0	0	-653	29795.55	0	0	0	0.001	0.001
05/16/11 07:49:28	60.00613	471	0	0	-653	29795.55	0	0	0	0.000	0.000
05/16/11 07:49:30	60.00583	471	0	0	-653	29795.55	0	0	0	0.000	0.000

05/16/11 07:49:32	60.00516	471	0	0	-653	29795.55	0	0	0	-0.001	0.001
05/16/11 07:49:34	60.00388	471	0	0	-653	29783.53	0	0	0	-0.001	0.001
05/16/11 07:49:36	60.00195	471	0	0	-653	29783.53	0	0	0	-0.002	0.002
05/16/11 07:49:38	60.00128	471	0	0	-653	29783.53	0	0	0	-0.001	0.001
05/16/11 07:49:40	60.00098	471	0	0	-653	29783.53	0	0	0	0.000	0.000
05/16/11 07:49:42	60.00034	471	0	0	-653	29783.53	0	0	0	-0.001	0.001
05/16/11 07:49:44	60	471	0	0	-653	29783.47	0	0	0	0.000	0.000
05/16/11 07:49:46	59.99902	471	0	0	-653	29783.47	0	0	0	-0.001	0.001
05/16/11 07:49:48	59.99872	471	0	0	-653	29783.47	0	0	0	0.000	0.000
05/16/11 07:49:50	59.99838	471	0	0	-653	29783.47	0	0	0	0.000	0.000
05/16/11 07:49:52	59.99612	471	0	0	-653	29783.47	0	0	0	-0.002	0.002
05/16/11 07:49:54	59.99579	471	0	0	-653	29788.38	0	0	0	0.000	0.000
05/16/11 07:49:56	59.99515	471	0	0	-653	29788.38	0	0	0	-0.001	0.001
05/16/11 07:49:58	59.99387	471	0	0	-653	29788.38	0	0	0	-0.001	0.001
05/16/11 07:50:00	59.99225	471	0	0	-653	29788.38	0	0	0	-0.002	0.002
05/16/11 07:50:02	59.99225	471	0	0	-653	29788.38	0	0	0	0.000	0.000
05/16/11 07:50:04	59.99484	471	0	0	-653	29788.38	0	0	0	0.003	0.003
05/16/11 07:50:06	59.99646	471	0	0	-653	29788.38	0	0	0	0.002	0.002
05/16/11 07:50:08	59.9971	471	0	0	-653	29788.38	0	0	0	0.001	0.001
05/16/11 07:50:10	59.99548	471	0	0	-653	29788.38	0	0	0	-0.002	0.002
05/16/11 07:50:12	59.99289	471	0	0	-653	29788.38	0	0	0	-0.003	0.003
05/16/11 07:50:14	59.98999	471	0	0	-653	29790.16	0	0	0	-0.003	0.003
05/16/11 07:50:16	59.98773	471	0	0	-653	29790.16	0	0	0	-0.002	0.002
05/16/11 07:50:18	59.98642	471	0	0	-653	29790.16	0	0	0	-0.001	0.001
05/16/11 07:50:20	59.98547	471	0	0	-653	29790.16	0	0	0	-0.001	0.001
05/16/11 07:50:22	59.98547	471	0	0	-653	29790.16	0	0	0	0.000	0.000
05/16/11 07:50:24	59.98611	471	0	0	-653	29790.07	0	0	0	0.001	0.001
05/16/11 07:50:26	59.98611	471	0	0	-653	29790.07	0	0	0	0.000	0.000
05/16/11 07:50:28	59.98676	471	0	0	-653	29790.07	0	0	0	0.001	0.001
05/16/11 07:50:30	59.98709	471	0	0	-653	29790.07	0	0	0	0.000	0.000
05/16/11 07:50:32	59.9874	471	0	0	-653	29790.07	0	0	0	0.000	0.000
05/16/11 07:50:34	59.98676	471	0	0	-653	29777.49	0	0	0	-0.001	0.001
05/16/11 07:50:36	59.98611	471	0	0	-653	29777.49	0	0	0	-0.001	0.001
05/16/11 07:50:38	59.98642	471	0	0	-653	29777.49	0	0	0	0.000	0.000
05/16/11 07:50:40	59.9874	471	0	0	-653	29777.49	0	0	0	0.001	0.001
05/16/11 07:50:42	59.98804	471	0	0	-653	29777.49	0	0	0	0.001	0.001
05/16/11 07:50:44	59.9874	471	0	0	-653	29777.49	0	0	0	-0.001	0.001
05/16/11 07:50:46	59.98676	471	0	0	-653	29777.49	0	0	0	-0.001	0.001
05/16/11 07:50:48	59.9848	471	0	0	-653	29777.49	0	0	0	-0.002	0.002
05/16/11 07:50:50	59.98288	471	0	0	-653	29777.49	0	0	0	-0.002	0.002
05/16/11 07:50:52	59.98062	471	0	0	-653	29777.49	0	0	0	-0.002	0.002
05/16/11 07:50:54	59.97998	471	0	0	-653	29782.49	0	0	0	-0.001	0.001
05/16/11 07:50:56	59.97931	471	0	0	-653	29782.49	0	0	0	-0.001	0.001
05/16/11 07:50:58	59.979	471	0	0	-653	29782.49	0	0	0	0.000	0.000
05/16/11 07:51:00	59.97931	471	0	0	-653	29782.49	0	0	0	0.000	0.000
05/16/11 07:51:02	59.98093	471	0	0	-653	29782.49	0	0	0	0.002	0.002
05/16/11 07:51:04	59.98126	471	0	0	-653	29782.46	0	0	0	0.000	0.000
05/16/11 07:51:06	59.98126	471	0	0	-653	29782.46	0	0	0	0.000	0.000
05/16/11 07:51:08	59.9819	471	0	0	-653	29782.46	0	0	0	0.001	0.001

05/16/11 07:51:10	59.98126	471	0	0	-653	29782.46	0	0	0	-0.001	0.001
05/16/11 07:51:12	59.97964	471	0	0	-653	29782.46	0	0	0	-0.002	0.002
05/16/11 07:51:14	59.97705	471	0	0	-653	29756.13	0	0	0	-0.003	0.003
05/16/11 07:51:16	59.97479	471	0	0	-653	29756.13	0	0	0	-0.002	0.002
05/16/11 07:51:18	59.97351	471	0	0	-653	29756.13	0	0	0	-0.001	0.001
05/16/11 07:51:20	59.97287	471	0	0	-653	29756.13	0	0	0	-0.001	0.001
05/16/11 07:51:22	59.97223	471	0	0	-653	29756.13	0	0	0	-0.001	0.001
05/16/11 07:51:24	59.97189	471	0	0	-653	29756.18	0	0	0	0.000	0.000
05/16/11 07:51:26	59.97125	471	0	0	-653	29756.18	0	0	0	-0.001	0.001
05/16/11 07:51:28	59.97156	471	0	0	-653	29756.18	0	0	0	0.000	0.000
05/16/11 07:51:30	59.97318	471	0	0	-653	29756.18	0	0	0	0.002	0.002
05/16/11 07:51:32	59.97415	471	0	0	-653	29756.18	0	0	0	0.001	0.001
05/16/11 07:51:34	59.97479	471	0	0	-653	29777.58	0	0	0	0.001	0.001
05/16/11 07:51:36	59.97382	471	0	0	-653	29777.58	0	0	0	-0.001	0.001
05/16/11 07:51:38	59.97287	471	0	0	-653	29777.58	0	0	0	-0.001	0.001
05/16/11 07:51:40	59.97318	471	0	0	-653	29777.58	0	0	0	0.000	0.000
05/16/11 07:51:42	59.97449	471	0	0	-653	29777.58	0	0	0	0.001	0.001
05/16/11 07:51:44	59.97675	471	0	0	-653	29777.4	0	0	0	0.002	0.002
05/16/11 07:51:46	59.97803	471	0	0	-653	29777.4	0	0	0	0.001	0.001
05/16/11 07:51:48	59.97998	471	0	0	-653	29777.4	0	0	0	0.002	0.002
05/16/11 07:51:50	59.98093	471	0	0	-653	29777.4	0	0	0	0.001	0.001
05/16/11 07:51:52	59.98093	471	0	0	-653	29777.4	0	0	0	0.000	0.000
05/16/11 07:51:54	59.97964	471	0	0	-653	29802.24	0	0	0	-0.001	0.001
05/16/11 07:51:56	59.97803	471	0	0	-653	29802.24	0	0	0	-0.002	0.002
05/16/11 07:51:58	59.97705	471	0	0	-653	29802.24	0	0	0	-0.001	0.001
05/16/11 07:52:00	59.97739	471	0	0	-653	29802.24	0	0	0	0.000	0.000
05/16/11 07:52:02	59.97836	471	0	0	-653	29802.24	0	0	0	0.001	0.001
05/16/11 07:52:04	59.97931	471	0	0	-653	29802.18	0	0	0	0.001	0.001
05/16/11 07:52:06	59.98126	471	0	0	-653	29802.18	0	0	0	0.002	0.002
05/16/11 07:52:08	59.98416	471	0	0	-653	29802.18	0	0	0	0.003	0.003
05/16/11 07:52:10	59.98611	471	0	0	-653	29802.18	0	0	0	0.002	0.002
05/16/11 07:52:12	59.98709	471	0	0	-653	29802.18	0	0	0	0.001	0.001
05/16/11 07:52:14	59.9874	471	0	0	-653	29802.29	0	0	0	0.000	0.000
05/16/11 07:52:16	59.98804	471	0	0	-653	29802.29	0	0	0	0.001	0.001
05/16/11 07:52:18	59.98804	471	0	0	-653	29802.29	0	0	0	0.000	0.000
05/16/11 07:52:20	59.98773	471	0	0	-653	29802.29	0	0	0	0.000	0.000
05/16/11 07:52:22	59.9874	471	0	0	-653	29802.29	0	0	0	0.000	0.000
05/16/11 07:52:24	59.9874	471	0	0	-653	29802.32	0	0	0	0.000	0.000
05/16/11 07:52:26	59.9874	471	0	0	-653	29802.32	0	0	0	0.000	0.000
05/16/11 07:52:28	59.9874	471	0	0	-653	29802.32	0	0	0	0.000	0.000
05/16/11 07:52:30	59.98773	471	0	0	-653	29802.32	0	0	0	0.000	0.000
05/16/11 07:52:32	59.98901	471	0	0	-653	29802.32	0	0	0	0.001	0.001
05/16/11 07:52:34	59.98965	471	0	0	-653	29795.02	0	0	0	0.001	0.001
05/16/11 07:52:36	59.98935	471	0	0	-653	29795.02	0	0	0	0.000	0.000
05/16/11 07:52:38	59.98837	471	0	0	-653	29795.02	0	0	0	-0.001	0.001
05/16/11 07:52:40	59.98868	471	0	0	-653	29795.02	0	0	0	0.000	0.000
05/16/11 07:52:42	59.98868	471	0	0	-653	29795.02	0	0	0	0.000	0.000
05/16/11 07:52:44	59.9874	471	0	0	-653	29795.05	0	0	0	-0.001	0.001
05/16/11 07:52:46	59.98611	471	0	0	-653	29795.05	0	0	0	-0.001	0.001

05/16/11 07:52:48	59.98611	471	0	0	-653	29795.05	0	0	0	0.000	0.000
05/16/11 07:52:50	59.98709	471	0	0	-653	29795.05	0	0	0	0.001	0.001
05/16/11 07:52:52	59.98837	471	0	0	-653	29795.05	0	0	0	0.001	0.001
05/16/11 07:52:54	59.98935	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:52:56	59.98999	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:52:58	59.99127	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:53:00	59.99255	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:53:02	59.99387	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:53:04	59.99387	471	0	0	-653	29781.45	0	0	0	0.000	0.000
05/16/11 07:53:06	59.99289	471	0	0	-653	29781.45	0	0	0	-0.001	0.001
05/16/11 07:53:08	59.99097	471	0	0	-653	29781.45	0	0	0	-0.002	0.002
05/16/11 07:53:10	59.98868	471	0	0	-653	29781.45	0	0	0	-0.002	0.002
05/16/11 07:53:12	59.98642	471	0	0	-653	29781.45	0	0	0	-0.002	0.002
05/16/11 07:53:14	59.98386	471	0	0	-653	29802.43	0	0	0	-0.003	0.003
05/16/11 07:53:16	59.9816	471	0	0	-653	29802.43	0	0	0	-0.002	0.002
05/16/11 07:53:18	59.97931	471	0	0	-653	29802.43	0	0	0	-0.002	0.002
05/16/11 07:53:20	59.97675	471	0	0	-653	29802.43	0	0	0	-0.003	0.003
05/16/11 07:53:22	59.97415	471	0	0	-653	29802.43	0	0	0	-0.003	0.003
05/16/11 07:53:24	59.97287	471	0	0	-653	29802.4	0	0	0	-0.001	0.001
05/16/11 07:53:26	59.97223	471	0	0	-653	29802.4	0	0	0	-0.001	0.001
05/16/11 07:53:28	59.97318	471	0	0	-653	29802.4	0	0	0	0.001	0.001
05/16/11 07:53:30	59.97449	471	0	0	-653	29802.4	0	0	0	0.001	0.001
05/16/11 07:53:32	59.97351	471	0	0	-653	29802.4	0	0	0	-0.001	0.001
05/16/11 07:53:34	59.97253	471	0	0	-653	29804.4	0	0	0	-0.001	0.001
05/16/11 07:53:36	59.97253	471	0	0	-653	29804.4	0	0	0	0.000	0.000
05/16/11 07:53:38	59.97223	471	0	0	-653	29804.4	0	0	0	0.000	0.000
05/16/11 07:53:40	59.97156	471	0	0	-653	29804.4	0	0	0	-0.001	0.001
05/16/11 07:53:42	59.97189	471	0	0	-653	29804.4	0	0	0	0.000	0.000
05/16/11 07:53:44	59.97318	471	0	0	-653	29804.4	0	0	0	0.001	0.001
05/16/11 07:53:46	59.97479	471	0	0	-653	29804.4	0	0	0	0.002	0.002
05/16/11 07:53:48	59.9761	471	0	0	-653	29804.4	0	0	0	0.001	0.001
05/16/11 07:53:50	59.97803	471	0	0	-653	29804.4	0	0	0	0.002	0.002
05/16/11 07:53:52	59.98062	471	0	0	-653	29804.4	0	0	0	0.003	0.003
05/16/11 07:53:54	59.98254	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:53:56	59.98416	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:53:58	59.98611	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:54:00	59.98804	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:54:02	59.9903	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:54:04	59.99161	471	0	0	-653	29797.29	0	0	0	0.001	0.001
05/16/11 07:54:06	59.99323	471	0	0	-653	29797.29	0	0	0	0.002	0.002
05/16/11 07:54:08	59.99484	471	0	0	-653	29797.29	0	0	0	0.002	0.002
05/16/11 07:54:10	59.99579	471	0	0	-653	29797.29	0	0	0	0.001	0.001
05/16/11 07:54:12	59.99515	471	0	0	-653	29797.29	0	0	0	-0.001	0.001
05/16/11 07:54:14	59.99612	471	0	0	-653	29823.76	0	0	0	0.001	0.001
05/16/11 07:54:16	59.99805	471	0	0	-653	29823.76	0	0	0	0.002	0.002
05/16/11 07:54:18	59.99936	471	0	0	-653	29823.76	0	0	0	0.001	0.001
05/16/11 07:54:20	60.00064	471	0	0	-653	29823.76	0	0	0	0.001	0.001
05/16/11 07:54:22	60.00098	471	0	0	-653	29823.76	0	0	0	0.000	0.000
05/16/11 07:54:24	60.00064	471	0	0	-653	29818.41	0	0	0	0.000	0.000

05/16/11 07:54:26	60	471	0	0	-653	29818.41	0	0	0	-0.001	0.001
05/16/11 07:54:28	59.99902	471	0	0	-653	29818.41	0	0	0	-0.001	0.001
05/16/11 07:54:30	59.99872	471	0	0	-653	29818.41	0	0	0	0.000	0.000
05/16/11 07:54:32	59.99936	471	0	0	-653	29818.41	0	0	0	0.001	0.001
05/16/11 07:54:34	60.00034	471	0	0	-653	29808.89	0	0	0	0.001	0.001
05/16/11 07:54:36	60.00162	471	0	0	-653	29808.89	0	0	0	0.001	0.001
05/16/11 07:54:38	60.00354	471	0	0	-653	29808.89	0	0	0	0.002	0.002
05/16/11 07:54:40	60.00485	471	0	0	-653	29808.89	0	0	0	0.001	0.001
05/16/11 07:54:42	60.00421	471	0	0	-653	29808.89	0	0	0	-0.001	0.001
05/16/11 07:54:44	60.00195	471	0	0	-653	29814.89	0	0	0	-0.002	0.002
05/16/11 07:54:46	59.99902	471	0	0	-653	29814.89	0	0	0	-0.003	0.003
05/16/11 07:54:48	59.99646	471	0	0	-653	29814.89	0	0	0	-0.003	0.003
05/16/11 07:54:50	59.99417	471	0	0	-653	29814.89	0	0	0	-0.002	0.002
05/16/11 07:54:52	59.99323	471	0	0	-653	29814.89	0	0	0	-0.001	0.001
05/16/11 07:54:54	59.99127	471	0	0	-653	29826.47	0	0	0	-0.002	0.002
05/16/11 07:54:56	59.98935	471	0	0	-653	29826.47	0	0	0	-0.002	0.002
05/16/11 07:54:58	59.98709	471	0	0	-653	29826.47	0	0	0	-0.002	0.002
05/16/11 07:55:00	59.98578	471	0	0	-653	29826.47	0	0	0	-0.001	0.001
05/16/11 07:55:02	59.98547	471	0	0	-653	29826.47	0	0	0	0.000	0.000
05/16/11 07:55:04	59.98547	471	0	0	-653	29826.41	0	0	0	0.000	0.000
05/16/11 07:55:06	59.98514	471	0	0	-653	29826.41	0	0	0	0.000	0.000
05/16/11 07:55:08	59.9845	471	0	0	-653	29826.41	0	0	0	-0.001	0.001
05/16/11 07:55:10	59.9845	471	0	0	-653	29826.41	0	0	0	0.000	0.000
05/16/11 07:55:12	59.9848	471	0	0	-653	29826.41	0	0	0	0.000	0.000
05/16/11 07:55:14	59.9848	471	0	0	-653	29834.18	0	0	0	0.000	0.000
05/16/11 07:55:16	59.98611	471	0	0	-653	29834.18	0	0	0	0.001	0.001
05/16/11 07:55:18	59.9874	471	0	0	-653	29834.18	0	0	0	0.001	0.001
05/16/11 07:55:20	59.98868	471	0	0	-653	29834.18	0	0	0	0.001	0.001
05/16/11 07:55:22	59.98837	471	0	0	-653	29834.18	0	0	0	0.000	0.000
05/16/11 07:55:24	59.98837	471	0	0	-653	29836.13	0	0	0	0.000	0.000
05/16/11 07:55:26	59.98578	471	0	0	-653	29836.13	0	0	0	-0.003	0.003
05/16/11 07:55:28	59.9845	471	0	0	-653	29836.13	0	0	0	-0.001	0.001
05/16/11 07:55:30	59.9848	471	0	0	-653	29836.13	0	0	0	0.000	0.000
05/16/11 07:55:32	59.98547	471	0	0	-653	29836.13	0	0	0	0.001	0.001
05/16/11 07:55:34	59.98642	471	0	0	-653	29821.84	0	0	0	0.001	0.001
05/16/11 07:55:36	59.98773	471	0	0	-653	29821.84	0	0	0	0.001	0.001
05/16/11 07:55:38	59.98965	471	0	0	-653	29821.84	0	0	0	0.002	0.002
05/16/11 07:55:40	59.99063	471	0	0	-653	29821.84	0	0	0	0.001	0.001
05/16/11 07:55:42	59.99063	471	0	0	-653	29821.84	0	0	0	0.000	0.000
05/16/11 07:55:44	59.99063	471	0	0	-653	29821.87	0	0	0	0.000	0.000
05/16/11 07:55:46	59.99063	471	0	0	-653	29821.87	0	0	0	0.000	0.000
05/16/11 07:55:48	59.98642	471	0	0	-653	29821.87	0	0	0	-0.004	0.004
05/16/11 07:55:50	59.9845	471	0	0	-653	29821.87	0	0	0	-0.002	0.002
05/16/11 07:55:52	59.98224	471	0	0	-653	29821.87	0	0	0	-0.002	0.002
05/16/11 07:55:54	59.98062	471	0	0	-653	29831.33	0	0	0	-0.002	0.002
05/16/11 07:55:56	59.97739	471	0	0	-653	29831.33	0	0	0	-0.003	0.003
05/16/11 07:55:58	59.97641	471	0	0	-653	29831.33	0	0	0	-0.001	0.001
05/16/11 07:56:00	59.97641	471	0	0	-653	29831.33	0	0	0	0.000	0.000
05/16/11 07:56:02	59.9761	471	0	0	-653	29831.33	0	0	0	0.000	0.000

05/16/11 07:56:04	59.97543	471	0	0	-653	29831.33	0	0	0	-0.001	0.001
05/16/11 07:56:06	59.97577	471	0	0	-653	29831.33	0	0	0	0.000	0.000
05/16/11 07:56:08	59.97675	471	0	0	-653	29831.33	0	0	0	0.001	0.001
05/16/11 07:56:10	59.97705	471	0	0	-653	29831.33	0	0	0	0.000	0.000
05/16/11 07:56:12	59.97705	471	0	0	-653	29831.33	0	0	0	0.000	0.000
05/16/11 07:56:14	59.97705	471	0	0	-653	29835.51	0	0	0	0.000	0.000
05/16/11 07:56:16	59.97675	471	0	0	-653	29835.51	0	0	0	0.000	0.000
05/16/11 07:56:18	59.97705	471	0	0	-653	29835.51	0	0	0	0.000	0.000
05/16/11 07:56:20	59.97739	471	0	0	-653	29835.51	0	0	0	0.000	0.000
05/16/11 07:56:22	59.97803	471	0	0	-653	29835.51	0	0	0	0.001	0.001
05/16/11 07:56:24	59.97803	471	0	0	-653	29856.55	0	0	0	0.000	0.000
05/16/11 07:56:26	59.97867	471	0	0	-653	29856.55	0	0	0	0.001	0.001
05/16/11 07:56:28	59.97964	471	0	0	-653	29856.55	0	0	0	0.001	0.001
05/16/11 07:56:30	59.9816	471	0	0	-653	29856.55	0	0	0	0.002	0.002
05/16/11 07:56:32	59.98352	471	0	0	-653	29856.55	0	0	0	0.002	0.002
05/16/11 07:56:34	59.98642	471	0	0	-653	29846.76	0	0	0	0.003	0.003
05/16/11 07:56:36	59.9903	471	0	0	-653	29846.76	0	0	0	0.004	0.004
05/16/11 07:56:38	59.99451	471	0	0	-653	29846.76	0	0	0	0.004	0.004
05/16/11 07:56:40	59.99741	471	0	0	-653	29846.76	0	0	0	0.003	0.003
05/16/11 07:56:42	59.99838	471	0	0	-653	29846.76	0	0	0	0.001	0.001
05/16/11 07:56:44	59.99805	471	0	0	-653	29860.05	0	0	0	0.000	0.000
05/16/11 07:56:46	59.99677	471	0	0	-653	29860.05	0	0	0	-0.001	0.001
05/16/11 07:56:48	59.99612	471	0	0	-653	29860.05	0	0	0	-0.001	0.001
05/16/11 07:56:50	59.99548	471	0	0	-653	29860.05	0	0	0	-0.001	0.001
05/16/11 07:56:52	59.99612	471	0	0	-653	29860.05	0	0	0	0.001	0.001
05/16/11 07:56:54	59.99936	471	0	0	-653	29873.15	0	0	0	0.003	0.003
05/16/11 07:56:56	60.00323	471	0	0	-653	29873.15	0	0	0	0.004	0.004
05/16/11 07:56:58	60.00745	471	0	0	-653	29873.15	0	0	0	0.004	0.004
05/16/11 07:57:00	60.01163	471	0	0	-653	29873.15	0	0	0	0.004	0.004
05/16/11 07:57:02	60.01453	471	0	0	-653	29873.15	0	0	0	0.003	0.003
05/16/11 07:57:04	60.01746	471	0	0	-653	29873.15	0	0	0	0.003	0.003
05/16/11 07:57:06	60.01907	471	0	0	-653	29873.15	0	0	0	0.002	0.002
05/16/11 07:57:08	60.01938	471	0	0	-653	29873.15	0	0	0	0.000	0.000
05/16/11 07:57:10	60.01938	471	0	0	-653	29873.15	0	0	0	0.000	0.000
05/16/11 07:57:12	60.01938	471	0	0	-653	29873.15	0	0	0	0.000	0.000
05/16/11 07:57:14	60.02036	471	0	0	-653	29889.67	0	0	0	0.001	0.001
05/16/11 07:57:16	60.02197	471	0	0	-653	29889.67	0	0	0	0.002	0.002
05/16/11 07:57:18	60.02423	471	0	0	-653	29889.67	0	0	0	0.002	0.002
05/16/11 07:57:20	60.02682	471	0	0	-653	29889.67	0	0	0	0.003	0.003
05/16/11 07:57:22	60.02811	471	0	0	-653	29889.67	0	0	0	0.001	0.001
05/16/11 07:57:24	60.02939	471	0	0	-653	29886.6	0	0	0	0.001	0.001
05/16/11 07:57:26	60.03036	471	0	0	-653	29886.6	0	0	0	0.001	0.001
05/16/11 07:57:28	60.02875	471	0	0	-653	29886.6	0	0	0	-0.002	0.002
05/16/11 07:57:30	60.02682	471	0	0	-653	29886.6	0	0	0	-0.002	0.002
05/16/11 07:57:32	60.02457	471	0	0	-653	29886.6	0	0	0	-0.002	0.002
05/16/11 07:57:34	60.02261	471	0	0	-653	29891.67	0	0	0	-0.002	0.002
05/16/11 07:57:36	60.02231	471	0	0	-653	29891.67	0	0	0	0.000	0.000
05/16/11 07:57:38	60.02295	471	0	0	-653	29891.67	0	0	0	0.001	0.001
05/16/11 07:57:40	60.02359	471	0	0	-653	29891.67	0	0	0	0.001	0.001

05/16/11 07:57:42	60.02261	471	0	0	-653	29891.67	0	0	0	-0.001	0.001
05/16/11 07:57:44	60.02164	471	0	0	-653	29891.64	0	0	0	-0.001	0.001
05/16/11 07:57:46	60.01971	471	0	0	-653	29891.64	0	0	0	-0.002	0.002
05/16/11 07:57:48	60.01776	471	0	0	-653	29891.64	0	0	0	-0.002	0.002
05/16/11 07:57:50	60.01746	471	0	0	-653	29891.64	0	0	0	0.000	0.000
05/16/11 07:57:52	60.01682	471	0	0	-653	29891.64	0	0	0	-0.001	0.001
05/16/11 07:57:54	60.01712	471	0	0	-653	29891.51	0	0	0	0.000	0.000
05/16/11 07:57:56	60.0184	471	0	0	-653	29891.51	0	0	0	0.001	0.001
05/16/11 07:57:58	60.01874	471	0	0	-653	29891.51	0	0	0	0.000	0.000
05/16/11 07:58:00	60.0181	471	0	0	-653	29891.51	0	0	0	-0.001	0.001
05/16/11 07:58:02	60.01682	471	0	0	-653	29891.51	0	0	0	-0.001	0.001
05/16/11 07:58:04	60.0152	471	0	0	-653	29891.6	0	0	0	-0.002	0.002
05/16/11 07:58:06	60.0152	471	0	0	-653	29891.6	0	0	0	0.000	0.000
05/16/11 07:58:08	60.0155	471	0	0	-653	29891.6	0	0	0	0.000	0.000
05/16/11 07:58:10	60.0155	471	0	0	-653	29891.6	0	0	0	0.000	0.000
05/16/11 07:58:12	60.01453	471	0	0	-653	29891.6	0	0	0	-0.001	0.001
05/16/11 07:58:14	60.01453	471	0	0	-653	29884.5	0	0	0	0.000	0.000
05/16/11 07:58:16	60.0152	471	0	0	-653	29884.5	0	0	0	0.001	0.001
05/16/11 07:58:18	60.01584	471	0	0	-653	29884.5	0	0	0	0.001	0.001
05/16/11 07:58:20	60.01614	471	0	0	-653	29884.5	0	0	0	0.000	0.000
05/16/11 07:58:22	60.01584	471	0	0	-653	29884.5	0	0	0	0.000	0.000
05/16/11 07:58:24	60.0152	471	0	0	-653	29881.79	0	0	0	-0.001	0.001
05/16/11 07:58:26	60.0155	471	0	0	-653	29881.79	0	0	0	0.000	0.000
05/16/11 07:58:28	60.01614	471	0	0	-653	29881.79	0	0	0	0.001	0.001
05/16/11 07:58:30	60.01776	471	0	0	-653	29881.79	0	0	0	0.002	0.002
05/16/11 07:58:32	60.01907	471	0	0	-653	29881.79	0	0	0	0.001	0.001
05/16/11 07:58:34	60.02069	471	0	0	-653	29887.14	0	0	0	0.002	0.002
05/16/11 07:58:36	60.02133	471	0	0	-653	29887.14	0	0	0	0.001	0.001
05/16/11 07:58:38	60.02069	471	0	0	-653	29887.14	0	0	0	-0.001	0.001
05/16/11 07:58:40	60.01907	471	0	0	-653	29887.14	0	0	0	-0.002	0.002
05/16/11 07:58:42	60.01746	471	0	0	-653	29887.14	0	0	0	-0.002	0.002
05/16/11 07:58:44	60.01614	471	0	0	-653	29873.08	0	0	0	-0.001	0.001
05/16/11 07:58:46	60.0152	471	0	0	-653	29873.08	0	0	0	-0.001	0.001
05/16/11 07:58:48	60.01453	471	0	0	-653	29873.08	0	0	0	-0.001	0.001
05/16/11 07:58:50	60.01389	471	0	0	-653	29873.08	0	0	0	-0.001	0.001
05/16/11 07:58:52	60.01358	471	0	0	-653	29873.08	0	0	0	0.000	0.000
05/16/11 07:58:54	60.01099	471	0	0	-653	29862.1	0	0	0	-0.003	0.003
05/16/11 07:58:56	60.00549	471	0	0	-653	29862.1	0	0	0	-0.005	0.005
05/16/11 07:58:58	59.99966	471	0	0	-653	29862.1	0	0	0	-0.006	0.006
05/16/11 07:59:00	59.99451	471	0	0	-653	29862.1	0	0	0	-0.005	0.005
05/16/11 07:59:02	59.99127	471	0	0	-653	29862.1	0	0	0	-0.003	0.003
05/16/11 07:59:04	59.98965	471	0	0	-653	29861.95	0	0	0	-0.002	0.002
05/16/11 07:59:06	59.98868	471	0	0	-653	29861.95	0	0	0	-0.001	0.001
05/16/11 07:59:08	59.98676	471	0	0	-653	29861.95	0	0	0	-0.002	0.002
05/16/11 07:59:10	59.9848	471	0	0	-653	29861.95	0	0	0	-0.002	0.002
05/16/11 07:59:12	59.98288	471	0	0	-653	29861.95	0	0	0	-0.002	0.002
05/16/11 07:59:14	59.98062	471	0	0	-653	29906.21	0	0	0	-0.002	0.002
05/16/11 07:59:16	59.97803	471	0	0	-653	29906.21	0	0	0	-0.003	0.003
05/16/11 07:59:18	59.9761	471	0	0	-653	29906.21	0	0	0	-0.002	0.002

05/16/11 07:59:20	59.97577	471	0	0	-653	29906.21	0	0	0	0.000	0.000
05/16/11 07:59:22	59.9761	471	0	0	-653	29906.21	0	0	0	0.000	0.000
05/16/11 07:59:24	59.9761	471	0	0	-653	29878.69	0	0	0	0.000	0.000
05/16/11 07:59:26	59.97641	471	0	0	-653	29878.69	0	0	0	0.000	0.000
05/16/11 07:59:28	59.97543	471	0	0	-653	29878.69	0	0	0	-0.001	0.001
05/16/11 07:59:30	59.97479	471	0	0	-653	29878.69	0	0	0	-0.001	0.001
05/16/11 07:59:32	59.97382	471	0	0	-653	29878.69	0	0	0	-0.001	0.001
05/16/11 07:59:34	59.97253	471	0	0	-653	29900.56	0	0	0	-0.001	0.001
05/16/11 07:59:36	59.97223	471	0	0	-653	29900.56	0	0	0	0.000	0.000
05/16/11 07:59:38	59.97253	471	0	0	-653	29900.56	0	0	0	0.000	0.000
05/16/11 07:59:40	59.97351	471	0	0	-653	29900.56	0	0	0	0.001	0.001
05/16/11 07:59:42	59.97351	471	0	0	-653	29900.56	0	0	0	0.000	0.000
05/16/11 07:59:44	59.97318	471	0	0	-653	29896.99	0	0	0	0.000	0.000
05/16/11 07:59:46	59.97189	471	0	0	-653	29896.99	0	0	0	-0.001	0.001
05/16/11 07:59:48	59.97092	471	0	0	-653	29896.99	0	0	0	-0.001	0.001
05/16/11 07:59:50	59.97028	471	0	0	-653	29896.99	0	0	0	-0.001	0.001
05/16/11 07:59:52	59.97028	471	0	0	-653	29896.99	0	0	0	0.000	0.000
05/16/11 07:59:54	59.97028	471	0	0	-653	29905.8	0	0	0	0.000	0.000
05/16/11 07:59:56	59.97028	471	0	0	-653	29905.8	0	0	0	0.000	0.000
05/16/11 07:59:58	59.97061	471	0	0	-653	29905.8	0	0	0	0.000	0.000
05/16/11 08:00:00	59.97287	471	0	0	-653	29905.8	0	0	0	0.002	0.002
05/16/11 08:00:02	59.97287	471	0	0	-653	29905.8	0	0	0	0.000	0.000
05/16/11 08:00:04	59.97479	471	0	0	-653	29905.77	0	0	0	0.002	0.002
05/16/11 08:00:06	59.97479	471	0	0	-653	29905.77	0	0	0	0.000	0.000
05/16/11 08:00:08	59.97382	471	0	0	-653	29905.77	0	0	0	-0.001	0.001
05/16/11 08:00:10	59.96832	471	0	0	-653	29905.77	0	0	0	-0.005	0.005
05/16/11 08:00:12	59.96802	471	0	0	-653	29905.77	0	0	0	0.000	0.000
05/16/11 08:00:14	59.96899	471	0	0	-653	29914.9	0	0	0	0.001	0.001
05/16/11 08:00:16	59.96994	471	0	0	-653	29914.9	0	0	0	0.001	0.001
05/16/11 08:00:18	59.97382	471	0	0	-653	29914.9	0	0	0	0.004	0.004
05/16/11 08:00:20	59.97382	471	0	0	-653	29914.9	0	0	0	0.000	0.000
05/16/11 08:00:22	59.97382	471	0	0	-653	29914.9	0	0	0	0.000	0.000
05/16/11 08:00:24	59.97769	471	0	0	-653	29925.58	0	0	0	0.004	0.004
05/16/11 08:00:26	59.97739	471	0	0	-653	29925.58	0	0	0	0.000	0.000
05/16/11 08:00:28	59.9761	471	0	0	-653	29925.58	0	0	0	-0.001	0.001
05/16/11 08:00:30	59.9761	471	0	0	-653	29925.58	0	0	0	0.000	0.000
05/16/11 08:00:32	59.97705	471	0	0	-653	29925.58	0	0	0	0.001	0.001
05/16/11 08:00:34	59.97769	471	0	0	-653	29938.87	0	0	0	0.001	0.001
05/16/11 08:00:36	59.97803	471	0	0	-653	29938.87	0	0	0	0.000	0.000
05/16/11 08:00:38	59.97803	471	0	0	-653	29938.87	0	0	0	0.000	0.000
05/16/11 08:00:40	59.97739	471	0	0	-653	29938.87	0	0	0	-0.001	0.001
05/16/11 08:00:42	59.97675	471	0	0	-653	29938.87	0	0	0	-0.001	0.001
05/16/11 08:00:44	59.97641	471	0	0	-653	29952.51	0	0	0	0.000	0.000
05/16/11 08:00:46	59.97479	471	0	0	-653	29952.51	0	0	0	-0.002	0.002
05/16/11 08:00:48	59.97449	471	0	0	-653	29952.51	0	0	0	0.000	0.000
05/16/11 08:00:50	59.97543	471	0	0	-653	29952.51	0	0	0	0.001	0.001
05/16/11 08:00:52	59.97705	471	0	0	-653	29952.51	0	0	0	0.002	0.002
05/16/11 08:00:54	59.97931	471	0	0	-653	29952.51	0	0	0	0.002	0.002
05/16/11 08:00:56	59.97964	471	0	0	-653	29948.95	0	0	0	0.000	0.000

05/16/11 08:00:58	59.979	471	0	0	-653	29948.95	0	0	0	-0.001	0.001
05/16/11 08:01:00	59.97803	471	0	0	-653	29948.95	0	0	0	-0.001	0.001
05/16/11 08:01:02	59.97803	471	0	0	-653	29948.95	0	0	0	0.000	0.000
05/16/11 08:01:04	59.979	471	0	0	-653	29948.95	0	0	0	0.001	0.001
05/16/11 08:01:06	59.98029	471	0	0	-653	29948.95	0	0	0	0.001	0.001
05/16/11 08:01:08	59.9819	471	0	0	-653	29948.95	0	0	0	0.002	0.002
05/16/11 08:01:10	59.98318	471	0	0	-653	29948.95	0	0	0	0.001	0.001
05/16/11 08:01:12	59.9845	471	0	0	-653	29948.95	0	0	0	0.001	0.001
05/16/11 08:01:14	59.98578	471	0	0	-653	29951.05	0	0	0	0.001	0.001
05/16/11 08:01:16	59.98642	471	0	0	-653	29951.05	0	0	0	0.001	0.001
05/16/11 08:01:18	59.98642	471	0	0	-653	29951.05	0	0	0	0.000	0.000
05/16/11 08:01:20	59.98709	471	0	0	-653	29951.05	0	0	0	0.001	0.001
05/16/11 08:01:22	59.98773	471	0	0	-653	29951.05	0	0	0	0.001	0.001
05/16/11 08:01:24	59.98965	471	0	0	-653	29955.09	0	0	0	0.002	0.002
05/16/11 08:01:26	59.99161	471	0	0	-653	29955.09	0	0	0	0.002	0.002
05/16/11 08:01:28	59.99255	471	0	0	-653	29955.09	0	0	0	0.001	0.001
05/16/11 08:01:30	59.99323	471	0	0	-653	29955.09	0	0	0	0.001	0.001
05/16/11 08:01:32	59.99289	471	0	0	-653	29955.09	0	0	0	0.000	0.000
05/16/11 08:01:34	59.99097	471	0	0	-653	29967.69	0	0	0	-0.002	0.002
05/16/11 08:01:36	59.98804	471	0	0	-653	29967.69	0	0	0	-0.003	0.003
05/16/11 08:01:38	59.98578	471	0	0	-653	29967.69	0	0	0	-0.002	0.002
05/16/11 08:01:40	59.98386	471	0	0	-653	29967.69	0	0	0	-0.002	0.002
05/16/11 08:01:42	59.98318	471	0	0	-653	29967.69	0	0	0	-0.001	0.001
05/16/11 08:01:44	59.98318	471	0	0	-653	29983.13	0	0	0	0.000	0.000
05/16/11 08:01:46	59.98288	471	0	0	-653	29983.13	0	0	0	0.000	0.000
05/16/11 08:01:48	59.98126	471	0	0	-653	29983.13	0	0	0	-0.002	0.002
05/16/11 08:01:50	59.97998	471	0	0	-653	29983.13	0	0	0	-0.001	0.001
05/16/11 08:01:52	59.97964	471	0	0	-653	29983.13	0	0	0	0.000	0.000
05/16/11 08:01:54	59.98029	471	0	0	-653	29976.75	0	0	0	0.001	0.001
05/16/11 08:01:56	59.98126	471	0	0	-653	29976.75	0	0	0	0.001	0.001
05/16/11 08:01:58	59.98352	471	0	0	-653	29976.75	0	0	0	0.002	0.002
05/16/11 08:02:00	59.98386	471	0	0	-653	29976.75	0	0	0	0.000	0.000
05/16/11 08:02:02	59.98126	471	0	0	-653	29976.75	0	0	0	-0.003	0.003
05/16/11 08:02:04	59.97543	471	0	0	-653	29976.78	0	0	0	-0.006	0.006
05/16/11 08:02:06	59.96832	471	0	0	-653	29976.78	0	0	0	-0.007	0.007
05/16/11 08:02:08	59.9635	471	0	0	-653	29976.78	0	0	0	-0.005	0.005
05/16/11 08:02:10	59.96155	471	0	0	-653	29976.78	0	0	0	-0.002	0.002
05/16/11 08:02:12	59.96091	471	0	0	-653	29976.78	0	0	0	-0.001	0.001
05/16/11 08:02:14	59.96155	471	0	0	-653	30008.51	0	0	0	0.001	0.001
05/16/11 08:02:16	59.96057	471	0	0	-653	30008.51	0	0	0	-0.001	0.001
05/16/11 08:02:18	59.95801	471	0	0	-653	30008.51	0	0	0	-0.003	0.003
05/16/11 08:02:20	59.95575	471	0	0	-653	30008.51	0	0	0	-0.002	0.002
05/16/11 08:02:22	59.95575	471	0	0	-653	30008.51	0	0	0	0.000	0.000
05/16/11 08:02:24	59.95703	471	0	0	-653	30037.25	0	0	0	0.001	0.001
05/16/11 08:02:26	59.95895	471	0	0	-653	30037.25	0	0	0	0.002	0.002
05/16/11 08:02:28	59.96057	471	0	0	-653	30037.25	0	0	0	0.002	0.002
05/16/11 08:02:30	59.96155	471	0	0	-653	30037.25	0	0	0	0.001	0.001
05/16/11 08:02:32	59.96252	471	0	0	-653	30037.25	0	0	0	0.001	0.001
05/16/11 08:02:34	59.96414	471	0	0	-653	30055.73	0	0	0	0.002	0.002

05/16/11 08:02:36	59.96512	471	0	0	-653	30055.73	0	0	0	0.001	0.001
05/16/11 08:02:38	59.96512	471	0	0	-653	30055.73	0	0	0	0.000	0.000
05/16/11 08:02:40	59.96576	471	0	0	-653	30055.73	0	0	0	0.001	0.001
05/16/11 08:02:42	59.96704	471	0	0	-653	30055.73	0	0	0	0.001	0.001
05/16/11 08:02:44	59.96994	471	0	0	-653	30068.76	0	0	0	0.003	0.003
05/16/11 08:02:46	59.97253	471	0	0	-653	30068.76	0	0	0	0.003	0.003
05/16/11 08:02:48	59.97415	471	0	0	-653	30068.76	0	0	0	0.002	0.002
05/16/11 08:02:50	59.9761	471	0	0	-653	30068.76	0	0	0	0.002	0.002
05/16/11 08:02:52	59.97739	471	0	0	-653	30068.76	0	0	0	0.001	0.001
05/16/11 08:02:54	59.97931	471	0	0	-653	30068.21	0	0	0	0.002	0.002
05/16/11 08:02:56	59.98029	471	0	0	-653	30068.21	0	0	0	0.001	0.001
05/16/11 08:02:58	59.98062	471	0	0	-653	30068.21	0	0	0	0.000	0.000
05/16/11 08:03:00	59.98029	471	0	0	-653	30068.21	0	0	0	0.000	0.000
05/16/11 08:03:02	59.98029	471	0	0	-653	30068.21	0	0	0	0.000	0.000
05/16/11 08:03:04	59.97836	471	0	0	-653	30068.24	0	0	0	-0.002	0.002
05/16/11 08:03:06	59.97836	471	0	0	-653	30068.24	0	0	0	0.000	0.000
05/16/11 08:03:08	59.979	471	0	0	-653	30068.24	0	0	0	0.001	0.001
05/16/11 08:03:10	59.97998	471	0	0	-653	30068.24	0	0	0	0.001	0.001
05/16/11 08:03:12	59.98029	471	0	0	-653	30068.24	0	0	0	0.000	0.000
05/16/11 08:03:14	59.98093	471	0	0	-653	30076.2	0	0	0	0.001	0.001
05/16/11 08:03:16	59.98093	471	0	0	-653	30076.2	0	0	0	0.000	0.000
05/16/11 08:03:18	59.97998	471	0	0	-653	30076.2	0	0	0	-0.001	0.001
05/16/11 08:03:20	59.98062	471	0	0	-653	30076.2	0	0	0	0.001	0.001
05/16/11 08:03:22	59.98029	471	0	0	-653	30076.2	0	0	0	0.000	0.000
05/16/11 08:03:24	59.97998	471	0	0	-653	30093.95	0	0	0	0.000	0.000
05/16/11 08:03:26	59.979	471	0	0	-653	30093.95	0	0	0	-0.001	0.001
05/16/11 08:03:28	59.97931	471	0	0	-653	30093.95	0	0	0	0.000	0.000
05/16/11 08:03:30	59.97998	471	0	0	-653	30093.95	0	0	0	0.001	0.001
05/16/11 08:03:32	59.98029	471	0	0	-653	30093.95	0	0	0	0.000	0.000
05/16/11 08:03:34	59.98029	471	0	0	-653	30100.97	0	0	0	0.000	0.000
05/16/11 08:03:36	59.98029	471	0	0	-653	30100.97	0	0	0	0.000	0.000
05/16/11 08:03:38	59.97964	471	0	0	-653	30100.97	0	0	0	-0.001	0.001
05/16/11 08:03:40	59.979	471	0	0	-653	30100.97	0	0	0	-0.001	0.001
05/16/11 08:03:42	59.97803	471	0	0	-653	30100.97	0	0	0	-0.001	0.001
05/16/11 08:03:44	59.97803	471	0	0	-653	30118.87	0	0	0	0.000	0.000
05/16/11 08:03:46	59.97867	471	0	0	-653	30118.87	0	0	0	0.001	0.001
05/16/11 08:03:48	59.97964	471	0	0	-653	30118.87	0	0	0	0.001	0.001
05/16/11 08:03:50	59.98224	471	0	0	-653	30118.87	0	0	0	0.003	0.003
05/16/11 08:03:52	59.9848	471	0	0	-653	30118.87	0	0	0	0.003	0.003
05/16/11 08:03:54	59.98514	471	0	0	-653	30118.77	0	0	0	0.000	0.000
05/16/11 08:03:56	59.98416	471	0	0	-653	30118.77	0	0	0	-0.001	0.001
05/16/11 08:03:58	59.98224	471	0	0	-653	30118.77	0	0	0	-0.002	0.002
05/16/11 08:04:00	59.98029	471	0	0	-653	30118.77	0	0	0	-0.002	0.002
05/16/11 08:04:02	59.979	471	0	0	-653	30118.77	0	0	0	-0.001	0.001
05/16/11 08:04:04	59.97867	471	0	0	-653	30118.74	0	0	0	0.000	0.000
05/16/11 08:04:06	59.97931	471	0	0	-653	30118.74	0	0	0	0.001	0.001
05/16/11 08:04:08	59.97998	471	0	0	-653	30118.74	0	0	0	0.001	0.001
05/16/11 08:04:10	59.97931	471	0	0	-653	30118.74	0	0	0	-0.001	0.001
05/16/11 08:04:12	59.979	471	0	0	-653	30118.74	0	0	0	0.000	0.000

05/16/11 08:04:14	59.97803	471	0	0	-653	30106.93	0	0	0	-0.001	0.001
05/16/11 08:04:16	59.97675	471	0	0	-653	30106.93	0	0	0	-0.001	0.001
05/16/11 08:04:18	59.97739	471	0	0	-653	30106.93	0	0	0	0.001	0.001
05/16/11 08:04:20	59.979	471	0	0	-653	30106.93	0	0	0	0.002	0.002
05/16/11 08:04:22	59.97964	471	0	0	-653	30106.93	0	0	0	0.001	0.001
05/16/11 08:04:24	59.98093	471	0	0	-653	30106.61	0	0	0	0.001	0.001
05/16/11 08:04:26	59.98224	471	0	0	-653	30106.61	0	0	0	0.001	0.001
05/16/11 08:04:28	59.98318	471	0	0	-653	30106.61	0	0	0	0.001	0.001
05/16/11 08:04:30	59.98318	471	0	0	-653	30106.61	0	0	0	0.000	0.000
05/16/11 08:04:32	59.98224	471	0	0	-653	30106.61	0	0	0	-0.001	0.001
05/16/11 08:04:34	59.9819	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:36	59.9819	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:38	59.9819	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:40	59.9816	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:42	59.9819	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:44	59.9816	471	0	0	-653	30141.59	0	0	0	0.000	0.000
05/16/11 08:04:46	59.98126	471	0	0	-653	30141.59	0	0	0	0.000	0.000
05/16/11 08:04:48	59.9816	471	0	0	-653	30141.59	0	0	0	0.000	0.000
05/16/11 08:04:50	59.98254	471	0	0	-653	30141.59	0	0	0	0.001	0.001
05/16/11 08:04:52	59.98352	471	0	0	-653	30141.59	0	0	0	0.001	0.001
05/16/11 08:04:54	59.98416	471	0	0	-653	30144.23	0	0	0	0.001	0.001
05/16/11 08:04:56	59.98416	471	0	0	-653	30144.23	0	0	0	0.000	0.000
05/16/11 08:04:58	59.98416	471	0	0	-653	30144.23	0	0	0	0.000	0.000
05/16/11 08:05:00	59.98514	471	0	0	-653	30144.23	0	0	0	0.001	0.001
05/16/11 08:05:02	59.9874	471	0	0	-653	30144.23	0	0	0	0.002	0.002
05/16/11 08:05:04	59.98901	471	0	0	-653	30144.23	0	0	0	0.002	0.002
05/16/11 08:05:06	59.98804	471	0	0	-653	30144.23	0	0	0	-0.001	0.001
05/16/11 08:05:08	59.98642	471	0	0	-653	30144.23	0	0	0	-0.002	0.002
05/16/11 08:05:10	59.98288	471	0	0	-653	30144.23	0	0	0	-0.004	0.004
05/16/11 08:05:12	59.98254	471	0	0	-653	30144.23	0	0	0	0.000	0.000
05/16/11 08:05:14	59.98318	471	0	0	-653	30148.67	0	0	0	0.001	0.001
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05/16/11 08:05:18	59.98062	471	0	0	-653	30148.67	0	0	0	-0.001	0.001
05/16/11 08:05:20	59.97964	471	0	0	-653	30148.67	0	0	0	-0.001	0.001
05/16/11 08:05:22	59.97964	471	0	0	-653	30148.67	0	0	0	0.000	0.000
05/16/11 08:05:24	59.97964	471	0	0	-653	30155.67	0	0	0	0.000	0.000
05/16/11 08:05:26	59.98029	471	0	0	-653	30155.67	0	0	0	0.001	0.001
05/16/11 08:05:28	59.98224	471	0	0	-653	30155.67	0	0	0	0.002	0.002
05/16/11 08:05:30	59.98352	471	0	0	-653	30155.67	0	0	0	0.001	0.001
05/16/11 08:05:32	59.98578	471	0	0	-653	30155.67	0	0	0	0.002	0.002
05/16/11 08:05:34	59.9874	471	0	0	-653	30142.79	0	0	0	0.002	0.002
05/16/11 08:05:36	59.98804	471	0	0	-653	30142.79	0	0	0	0.001	0.001
05/16/11 08:05:38	59.9874	471	0	0	-653	30142.79	0	0	0	-0.001	0.001
05/16/11 08:05:40	59.98611	471	0	0	-653	30142.79	0	0	0	-0.001	0.001
05/16/11 08:05:42	59.9848	471	0	0	-653	30142.79	0	0	0	-0.001	0.001
05/16/11 08:05:44	59.98352	471	0	0	-653	30154.67	0	0	0	-0.001	0.001
05/16/11 08:05:46	59.98318	471	0	0	-653	30154.67	0	0	0	0.000	0.000
05/16/11 08:05:48	59.98352	471	0	0	-653	30154.67	0	0	0	0.000	0.000
05/16/11 08:05:50	59.98416	471.3000183	0	0	-653	30150.35	0	0	0	0.001	0.001

05/16/11 08:05:52	59.98514	471.3000183	0	0	-653	30150.35	0	0	0	0.001	0.001
05/16/11 08:05:54	59.98547	471.3000183	0	0	-653	30159.63	0	0	0	0.000	0.000
05/16/11 08:05:56	59.98642	471.3000183	0	0	-653	30159.63	0	0	0	0.001	0.001
05/16/11 08:05:58	59.98676	471.8999939	0	0	-653	30159.63	0	0	0	0.000	0.000
05/16/11 08:06:00	59.9874	471.8999939	0	0	-653	30159.63	0	0	0	0.001	0.001
05/16/11 08:06:02	59.98773	471.8999939	0	0	-653	30151.42	0	0	0	0.000	0.000
05/16/11 08:06:04	59.98901	471.8999939	0	0	-653	30151.42	0	0	0	0.001	0.001
05/16/11 08:06:06	59.98901	471.8999939	0	0	-653	30156.16	0	0	0	0.000	0.000
05/16/11 08:06:08	59.98804	471.3999939	0	0	-653	30156.16	0	0	0	-0.001	0.001
05/16/11 08:06:10	59.98642	471.3999939	0	0	-653	30156.16	0	0	0	-0.002	0.002
05/16/11 08:06:12	59.98547	471.3999939	0	0	-653	30156.16	0	0	0	-0.001	0.001
05/16/11 08:06:14	59.98642	471.3999939	0	0	-653	30164.15	0	0	0	0.001	0.001
05/16/11 08:06:16	59.98935	471.3999939	0	0	-653	30164.15	0	0	0	0.003	0.003
05/16/11 08:06:18	59.99225	471.3999939	0	0	-653	30164.15	0	0	0	0.003	0.003
05/16/11 08:06:20	59.99515	471.3999939	0	0	-653	30164.15	0	0	0	0.003	0.003
05/16/11 08:06:22	59.99579	471.3999939	0	0	-653	30203.91	0	0	0	0.001	0.001
05/16/11 08:06:24	59.99515	471.3999939	0	0	-653	30203.91	0	0	0	-0.001	0.001
05/16/11 08:06:26	59.99548	471.3999939	0	0	-653	30203.73	0	0	0	0.000	0.000
05/16/11 08:06:28	59.99741	470.8999939	0	0	-653	30203.73	0	0	0	0.002	0.002
05/16/11 08:06:30	60	470.8999939	0	0	-653	30203.73	0	0	0	0.003	0.003
05/16/11 08:06:32	60.00162	470.8999939	0	0	-653	30203.73	0	0	0	0.002	0.002
05/16/11 08:06:34	60.00162	470.8999939	0	0	-653	30199.61	0	0	0	0.000	0.000
05/16/11 08:06:36	60.00195	470.8999939	0	0	-653	30199.61	0	0	0	0.000	0.000
05/16/11 08:06:38	59.95963	0	0	0	-653	30199.61	0	0	1	-0.042	0.042
05/16/11 08:06:40	59.88144	0	0	0	-653	30199.61	1	0	1	-0.078	0.078
05/16/11 08:06:42	59.87237	0	0	0	-653	30086.11	1	0	1	-0.009	0.009
05/16/11 08:06:44	59.87011	0	0	0	-653	30086.11	1	0	1	-0.002	0.002
05/16/11 08:06:46	59.87432	0	0	0	-653	30086.14	1	0	1	0.004	0.004
05/16/11 08:06:48	59.88076	0	0	0	-653	30086.14	1	0	1	0.006	0.006
05/16/11 08:06:50	59.88531	0	0	0	-653	30086.14	1	0	1	0.005	0.005
05/16/11 08:06:52	59.88787	0	0	0	-653	30086.14	1	0	1	0.003	0.003
05/16/11 08:06:54	59.88949	0	0	0	-653	30094.43	1	0	1	0.002	0.002
05/16/11 08:06:56	59.8908	0	0	0	-653	30094.43	1	0	1	0.001	0.001
05/16/11 08:06:58	59.89175	0	0	0	-653	30094.43	1	0	1	0.001	0.001
05/16/11 08:07:00	59.89242	0	0	0	-653	30094.43	1	0	1	0.001	0.001
05/16/11 08:07:02	59.89306	0	0	0	-653	30139.49	1	0	1	0.001	0.001
05/16/11 08:07:04	59.89306	0	0	0	-653	30139.49	1	0	1	0.000	0.000
05/16/11 08:07:06	59.89306	0	0	0	-653	30133.38	1	0	1	0.000	0.000
05/16/11 08:07:08	59.89532	0	0	0	-653	30133.38	1	0	1	0.002	0.002
05/16/11 08:07:10	59.89788	0	0	0	-653	30133.38	1	0	1	0.003	0.003
05/16/11 08:07:12	59.8995	0	0	0	-653	30133.38	1	0	1	0.002	0.002
05/16/11 08:07:14	59.90081	0	0	0	-653	30137.26	1	0	1	0.001	0.001
05/16/11 08:07:16	59.9021	0	0	0	-653	30137.26	1	0	1	0.001	0.001
05/16/11 08:07:18	59.90179	0	0	0	-653	30137.26	1	0	1	0.000	0.000
05/16/11 08:07:20	59.90081	0	0	0	-653	30137.26	1	0	1	-0.001	0.001
05/16/11 08:07:22	59.90081	0	0	0	-653	30171.38	1	0	1	0.000	0.000
05/16/11 08:07:24	59.90048	0	0	0	-653	30171.38	1	0	1	0.000	0.000
05/16/11 08:07:26	59.8992	0	0	0	-653	30168.76	1	0	1	-0.001	0.001
05/16/11 08:07:28	59.89886	0	0	0	-653	30168.76	1	0	1	0.000	0.000

05/16/11 08:07:30	59.89856	0	0	0	-653	30168.76	1	0	1	0.000	0.000
05/16/11 08:07:32	59.90017	0	0	0	-653	30168.76	1	0	1	0.002	0.002
05/16/11 08:07:34	59.90243	0	0	0	-653	30208.99	1	0	1	0.002	0.002
05/16/11 08:07:36	59.90469	0	0	0	-653	30208.99	1	0	1	0.002	0.002
05/16/11 08:07:38	59.90695	0	0	0	-653	30208.99	1	0	1	0.002	0.002
05/16/11 08:07:40	59.90887	0	0	0	-653	30208.99	1	0	1	0.002	0.002
05/16/11 08:07:42	59.90921	0	0	0	-653	30205.66	1	0	1	0.000	0.000
05/16/11 08:07:44	59.90857	0	0	0	-653	30205.66	1	0	1	-0.001	0.001
05/16/11 08:07:46	59.90887	0	0	0	-653	30205.66	1	0	1	0.000	0.000
05/16/11 08:07:48	59.91018	0	0	0	-653	30205.66	1	0	1	0.001	0.001
05/16/11 08:07:50	59.91244	0	0	0	-653	30205.66	1	0	1	0.002	0.002
05/16/11 08:07:52	59.9147	0	0	0	-653	30205.66	1	0	1	0.002	0.002
05/16/11 08:07:54	59.9176	0	0	0	-653	30211.75	1	0	1	0.003	0.003
05/16/11 08:07:56	59.91922	0	0	0	-653	30211.75	1	0	1	0.002	0.002
05/16/11 08:07:58	59.92083	0	0	0	-653	30211.75	1	0	1	0.002	0.002
05/16/11 08:08:00	59.92215	0	0	0	-653	30211.75	1	0	1	0.001	0.001
05/16/11 08:08:02	59.92309	0	0	0	-653	30217.55	1	0	1	0.001	0.001
05/16/11 08:08:04	59.92505	0	0	0	-653	30217.55	1	0	1	0.002	0.002
05/16/11 08:08:06	59.92505	0	0	0	-653	30217.57	1	0	1	0.000	0.000
05/16/11 08:08:08	59.9273	0	0	0	-653	30217.57	1	0	1	0.002	0.002
05/16/11 08:08:10	59.93246	0	0	0	-653	30217.57	1	0	1	0.005	0.005
05/16/11 08:08:12	59.93505	0	0	0	-653	30217.57	1	0	1	0.003	0.003
05/16/11 08:08:14	59.93701	0	0	0	-653	30217.59	1	0	1	0.002	0.002
05/16/11 08:08:16	59.93765	0	0	0	-653	30217.59	1	0	1	0.001	0.001
05/16/11 08:08:18	59.93927	0	0	0	-653	30217.59	1	0	1	0.002	0.002
05/16/11 08:08:20	59.94183	0	0	0	-653	30217.59	1	0	1	0.003	0.003
05/16/11 08:08:22	59.94409	0	0	0	-653	30210.49	1	0	1	0.002	0.002
05/16/11 08:08:24	59.94571	0	0	0	-653	30210.49	1	0	1	0.002	0.002
05/16/11 08:08:26	59.94797	0	0	0	-653	30210.26	1	0	1	0.002	0.002
05/16/11 08:08:28	59.94766	0	0	0	-653	30210.26	1	0	1	0.000	0.000
05/16/11 08:08:30	59.9454	0	0	0	-653	30210.26	1	0	1	-0.002	0.002
05/16/11 08:08:32	59.94443	0	0	0	-653	30210.26	1	0	1	-0.001	0.001
05/16/11 08:08:34	59.94409	0	0	0	-653	30234.59	1	0	1	0.000	0.000
05/16/11 08:08:36	59.94507	0	0	0	-653	30234.59	1	0	1	0.001	0.001
05/16/11 08:08:38	59.94604	0	0	0	-653	30234.59	1	0	1	0.001	0.001
05/16/11 08:08:40	59.94638	0	0	0	-653	30234.59	1	0	1	0.000	0.000
05/16/11 08:08:42	59.94733	0	0	0	-653	30223.6	1	0	1	0.001	0.001
05/16/11 08:08:44	59.9483	0	0	0	-653	30223.6	1	0	1	0.001	0.001
05/16/11 08:08:46	59.94894	0	0	0	-653	30223.73	1	0	1	0.001	0.001
05/16/11 08:08:48	59.94992	0	0	0	-653	30223.73	1	0	1	0.001	0.001
05/16/11 08:08:50	59.9509	0	0	0	-653	30223.73	1	0	1	0.001	0.001
05/16/11 08:08:52	59.95154	0	0	0	-653	30223.73	1	0	1	0.001	0.001
05/16/11 08:08:54	59.95187	0	0	0	-653	30224.39	1	0	1	0.000	0.000
05/16/11 08:08:56	59.95346	0	0	0	-653	30224.39	1	0	1	0.002	0.002
05/16/11 08:08:58	59.95508	0	0	0	-653	30224.39	1	0	1	0.002	0.002
05/16/11 08:09:00	59.95575	0	0	0	-653	30224.39	1	0	1	0.001	0.001
05/16/11 08:09:02	59.95639	0	0	0	-653	30255.53	1	0	1	0.001	0.001
05/16/11 08:09:04	59.95801	0	0	0	-653	30255.53	1	0	1	0.002	0.002
05/16/11 08:09:06	59.96124	0	0	0	-653	30252.87	1	0	1	0.003	0.003

05/16/11 08:09:08	59.96252	0	0	0	-653	30252.87	1	0	1	0.001	0.001
05/16/11 08:09:10	59.96188	0	0	0	-653	30252.87	1	0	1	-0.001	0.001
05/16/11 08:09:12	59.96124	0	0	0	-653	30252.87	1	0	1	-0.001	0.001
05/16/11 08:09:14	59.96027	0	0	0	-653	30232.45	1	0	1	-0.001	0.001
05/16/11 08:09:16	59.96057	0	0	0	-653	30232.45	1	0	1	0.000	0.000
05/16/11 08:09:18	59.96219	0	0	0	-653	30232.45	1	0	1	0.002	0.002
05/16/11 08:09:20	59.96512	0	0	0	-653	30232.45	1	0	1	0.003	0.003
05/16/11 08:09:22	59.96738	0	0	0	-653	30263.99	1	0	1	0.002	0.002
05/16/11 08:09:24	59.96899	0	0	0	-653	30263.99	1	0	1	0.002	0.002
05/16/11 08:09:26	59.97061	0	0	0	-653	30263.68	1	0	1	0.002	0.002
05/16/11 08:09:28	59.97318	0	0	0	-653	30263.68	1	0	1	0.003	0.003
05/16/11 08:09:30	59.97351	0	0	0	-653	30263.68	1	0	1	0.000	0.000
05/16/11 08:09:32	59.97287	0	0	0	-653	30263.68	1	0	1	-0.001	0.001
05/16/11 08:09:34	59.97253	0	0	0	-653	30264.96	1	0	1	0.000	0.000
05/16/11 08:09:36	59.97318	0	0	0	-653	30264.96	1	0	1	0.001	0.001
05/16/11 08:09:38	59.97415	0	0	0	-653	30264.96	1	0	1	0.001	0.001
05/16/11 08:09:40	59.97543	0	0	0	-653	30264.96	1	0	1	0.001	0.001
05/16/11 08:09:42	59.97577	0	0	0	-653	30263.63	1	0	1	0.000	0.000
05/16/11 08:09:44	59.9761	0	0	0	-653	30263.63	1	0	1	0.000	0.000
05/16/11 08:09:46	59.97675	0	0	0	-653	30279.39	1	0	1	0.001	0.001
05/16/11 08:09:48	59.97803	0	0	0	-653	30279.39	1	0	1	0.001	0.001
05/16/11 08:09:50	59.97931	0	0	0	-653	30279.39	1	0	1	0.001	0.001
05/16/11 08:09:52	59.97998	0	0	0	-653	30279.39	1	0	1	0.001	0.001
05/16/11 08:09:54	59.97964	0	0	0	-653	30255.32	1	0	1	0.000	0.000
05/16/11 08:09:56	59.979	0	0	0	-653	30255.32	1	0	1	-0.001	0.001
05/16/11 08:09:58	59.97964	0	0	0	-653	30255.32	1	0	1	0.001	0.001
05/16/11 08:10:00	59.98093	0	0	0	-653	30255.32	1	0	1	0.001	0.001
05/16/11 08:10:02	59.98224	0	0	0	-653	30260.67	1	0	1	0.001	0.001
05/16/11 08:10:04	59.98386	0	0	0	-653	30260.67	1	0	1	0.002	0.002
05/16/11 08:10:06	59.98514	0	0	0	-653	30259.99	1	0	1	0.001	0.001
05/16/11 08:10:08	59.98773	0	0	0	-653	30259.99	1	0	1	0.003	0.003
05/16/11 08:10:10	59.9903	0	0	0	-653	30259.99	1	0	1	0.003	0.003
05/16/11 08:10:12	59.99289	0	0	0	-653	30259.99	1	0	1	0.003	0.003
05/16/11 08:10:14	59.99579	0	0	0	-653	30274.08	1	0	1	0.003	0.003
05/16/11 08:10:16	59.99646	0	0	0	-653	30274.08	1	0	1	0.001	0.001
05/16/11 08:10:18	59.99579	0	0	0	-653	30274.08	1	0	1	-0.001	0.001
05/16/11 08:10:20	59.99612	0	0	0	-653	30274.08	1	0	1	0.000	0.000
05/16/11 08:10:22	59.99579	0	0	0	-653	30297.68	1	0	1	0.000	0.000
05/16/11 08:10:24	59.99484	0	0	0	-653	30297.68	1	0	1	-0.001	0.001
05/16/11 08:10:26	59.99484	0	0	0	-653	30297.65	1	0	1	0.000	0.000
05/16/11 08:10:28	59.99805	0	0	0	-653	30297.65	1	0	1	0.003	0.003
05/16/11 08:10:30	59.99872	0	0	0	-653	30297.65	1	1	1	0.001	0.001
05/16/11 08:10:32	60.00034	0	0	0	-653	30297.65	1	1	1	0.002	0.002
05/16/11 08:10:34	60.00195	0	0	0	-653	30300.1	1	1	1	0.002	0.002
05/16/11 08:10:36	60.00259	0	0	0	-653	30300.1	1	1	1	0.001	0.001
05/16/11 08:10:38	60.00226	0	0	0	-653	30300.1	1	1	1	0.000	0.000
05/16/11 08:10:40	60.00195	0	0	0	-653	30300.1	1	1	1	0.000	0.000
05/16/11 08:10:42	60.00064	0	0	0	-653	30314.84	1	1	1	-0.001	0.001
05/16/11 08:10:44	59.99646	0	0	0	-653	30314.84	1	0	1	-0.004	0.004

05/16/11 08:10:46	59.99191	0	0	0	-653	30309.71	1	0	1	-0.005	0.005
05/16/11 08:10:48	59.98901	0	0	0	-653	30309.71	1	0	1	-0.003	0.003
05/16/11 08:10:50	59.98773	0	0	0	-653	30309.71	1	0	1	-0.001	0.001
05/16/11 08:10:52	59.98901	0	0	0	-653	30309.71	1	0	1	0.001	0.001
05/16/11 08:10:54	59.99255	0	0	0	-653	30319.5	1	0	1	0.004	0.004
05/16/11 08:10:56	59.99579	0	0	0	-653	30319.5	1	0	1	0.003	0.003
05/16/11 08:10:58	59.99902	0	0	0	-653	30319.5	1	1	1	0.003	0.003
05/16/11 08:11:00	60.00195	0	0	0	-653	30319.5	1	1	1	0.003	0.003
05/16/11 08:11:02	60.00485	0	0	0	-653	30357.21	1	1	1	0.003	0.003
05/16/11 08:11:04	60.00809	0	0	0	-653	30357.21	1	1	1	0.003	0.003
05/16/11 08:11:06	60.01163	0	0	0	-653	30357.18	1	1	1	0.004	0.004
05/16/11 08:11:08	60.01422	0	0	0	-653	30357.18	1	1	1	0.003	0.003
05/16/11 08:11:10	60.0152	0	0	0	-653	30357.18	1	1	1	0.001	0.001
05/16/11 08:11:12	60.0155	0	0	0	-653	30357.18	1	1	1	0.000	0.000
05/16/11 08:11:14	60.0155	0	0	0	-653	30354.26	1	1	1	0.000	0.000
05/16/11 08:11:16	60.01682	0	0	0	-653	30354.26	1	1	1	0.001	0.001
05/16/11 08:11:18	60.01907	0	0	0	-653	30354.26	1	1	1	0.002	0.002
05/16/11 08:11:20	60.02295	0	0	0	-653	30354.26	1	1	1	0.004	0.004
05/16/11 08:11:22	60.02618	0	0	0	-653	30354.48	1	1	1	0.003	0.003
05/16/11 08:11:24	60.02972	0	0	0	-653	30354.48	1	1	1	0.004	0.004
05/16/11 08:11:26	60.03262	0	0	0	-653	30353.83	1	1	1	0.003	0.003
05/16/11 08:11:28	60.03458	0	0	0	-653	30353.83	1	1	1	0.002	0.002
05/16/11 08:11:30	60.03522	0	0	0	-653	30353.83	1	1	1	0.001	0.001
05/16/11 08:11:32	60.03424	0	0	0	-653	30353.83	1	1	1	-0.001	0.001
05/16/11 08:11:34	60.0336	0	0	0	-653	30370.41	1	1	1	-0.001	0.001
05/16/11 08:11:36	60.03522	0	0	0	-653	30370.41	1	1	1	0.002	0.002
05/16/11 08:11:38	60.03812	0	0	0	-653	30370.41	1	1	1	0.003	0.003
05/16/11 08:11:40	60.04037	0	0	0	-653	30370.41	1	1	1	0.002	0.002
05/16/11 08:11:42	60.04105	0	0	0	-653	30374.79	1	1	1	0.001	0.001
05/16/11 08:11:44	60.04199	0	0	0	-653	30374.79	1	1	1	0.001	0.001
05/16/11 08:11:46	60.04233	0	0	0	-653	30366.14	1	1	1	0.000	0.000
05/16/11 08:11:48	60.0433	0	0	0	-653	30366.14	1	1	1	0.001	0.001
05/16/11 08:11:50	60.04425	0	0	0	-653	30366.14	1	1	1	0.001	0.001
05/16/11 08:11:52	60.04492	0	0	0	-653	30366.14	1	1	1	0.001	0.001
05/16/11 08:11:54	60.04556	0	0	0	-653	30373.53	1	1	1	0.001	0.001
05/16/11 08:11:56	60.04587	0	0	0	-653	30373.53	1	1	1	0.000	0.000
05/16/11 08:11:58	60.04654	0	0	0	-653	30373.53	1	1	1	0.001	0.001
05/16/11 08:12:00	60.0488	0	0	0	-653	30373.53	1	1	1	0.002	0.002
05/16/11 08:12:02	60.04974	0	0	0	-653	30343.46	1	1	1	0.001	0.001
05/16/11 08:12:04	60.0491	0	0	0	-653	30343.46	1	1	1	-0.001	0.001
05/16/11 08:12:06	60.0491	0	0	0	-653	30335.12	1	1	1	0.000	0.000
05/16/11 08:12:08	60.05042	0	0	0	-653	30335.12	1	1	1	0.001	0.001
05/16/11 08:12:10	60.04974	0	0	0	-653	30335.12	1	1	1	-0.001	0.001
05/16/11 08:12:12	60.04846	0	0	0	-653	30335.12	1	1	1	-0.001	0.001
05/16/11 08:12:14	60.04718	0	0	0	-653	30337.29	1	1	1	-0.001	0.001
05/16/11 08:12:16	60.04587	0	0	0	-653	30337.29	1	1	1	-0.001	0.001
05/16/11 08:12:18	60.04587	0	0	0	-653	30337.29	1	1	1	0.000	0.000
05/16/11 08:12:20	60.04556	0	0	0	-653	30337.29	1	1	1	0.000	0.000
05/16/11 08:12:22	60.04425	0	0	0	-653	30350.2	1	1	1	-0.001	0.001

05/16/11 08:12:24	60.04297	0	0	0	-653	30350.2	1	1	1	-0.001	0.001
05/16/11 08:12:26	60.04169	0	0	0	-653	30350.07	1	1	1	-0.001	0.001
05/16/11 08:12:28	60.04233	0	0	0	-653	30350.07	1	1	1	0.001	0.001
05/16/11 08:12:30	60.04459	0	0	0	-653	30350.07	1	1	1	0.002	0.002
05/16/11 08:12:32	60.04654	0	0	0	-653	30350.07	1	1	1	0.002	0.002
05/16/11 08:12:34	60.04718	0	0	0	-653	30354.77	1	1	1	0.001	0.001
05/16/11 08:12:36	60.0462	0	0	0	-653	30354.77	1	1	1	-0.001	0.001
05/16/11 08:12:38	60.04425	0	0	0	-653	30354.77	1	1	1	-0.002	0.002
05/16/11 08:12:40	60.04492	0	0	0	-653	30354.77	1	1	1	0.001	0.001
05/16/11 08:12:42	60.04523	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:44	60.04523	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:46	60.04556	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:48	60.0462	0	0	0	-653	30372.38	1	1	1	0.001	0.001
05/16/11 08:12:50	60.04654	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:52	60.04654	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:54	60.04523	0	0	0	-653	30349.1	1	1	1	-0.001	0.001
05/16/11 08:12:56	60.04361	0	0	0	-653	30349.1	1	1	1	-0.002	0.002
05/16/11 08:12:58	60.04199	0	0	0	-653	30349.1	1	1	1	-0.002	0.002
05/16/11 08:13:00	60.04071	0	0	0	-653	30349.1	1	1	1	-0.001	0.001
05/16/11 08:13:02	60.03876	0	0	0	-653	30363.65	1	1	1	-0.002	0.002
05/16/11 08:13:04	60.03586	0	0	0	-653	30363.65	1	1	1	-0.003	0.003
05/16/11 08:13:06	60.03394	0	0	0	-653	30363.88	1	1	1	-0.002	0.002
05/16/11 08:13:08	60.0336	0	0	0	-653	30363.88	1	1	1	0.000	0.000
05/16/11 08:13:10	60.03262	0	0	0	-653	30363.88	1	1	1	-0.001	0.001
05/16/11 08:13:12	60.03006	0	0	0	-653	30363.88	1	1	1	-0.003	0.003
05/16/11 08:13:14	60.02747	0	0	0	-653	30364.77	1	1	1	-0.003	0.003
05/16/11 08:13:16	60.02682	0	0	0	-653	30364.77	1	1	1	-0.001	0.001
05/16/11 08:13:18	60.02585	0	0	0	-653	30364.77	1	1	1	-0.001	0.001
05/16/11 08:13:20	60.02359	0	0	0	-653	30364.77	1	1	1	-0.002	0.002
05/16/11 08:13:22	60.02197	0	0	0	-653	30374.33	1	1	1	-0.002	0.002
05/16/11 08:13:24	60.02164	0	0	0	-653	30374.33	1	1	1	0.000	0.000
05/16/11 08:13:26	60.02231	0	0	0	-653	30364.67	1	1	1	0.001	0.001
05/16/11 08:13:28	60.02133	0	0	0	-653	30364.67	1	1	1	-0.001	0.001
05/16/11 08:13:30	60.02133	0	0	0	-653	30364.67	1	1	1	0.000	0.000
05/16/11 08:13:32	60.02002	0	0	0	-653	30364.67	1	1	1	-0.001	0.001
05/16/11 08:13:34	60.01776	0	0	0	-653	30361.56	1	1	1	-0.002	0.002
05/16/11 08:13:36	60.01584	0	0	0	-653	30361.56	1	1	1	-0.002	0.002
05/16/11 08:13:38	60.01291	0	0	0	-653	30361.56	1	1	1	-0.003	0.003
05/16/11 08:13:40	60.01132	0	0	0	-653	30361.56	1	1	1	-0.002	0.002
05/16/11 08:13:42	60.01001	0	0	0	-653	30350.69	1	1	1	-0.001	0.001
05/16/11 08:13:44	60.00937	0	0	0	-653	30350.69	1	1	1	-0.001	0.001
05/16/11 08:13:46	60.00775	0	0	0	-653	30344.52	1	1	1	-0.002	0.002
05/16/11 08:13:48	60.00516	0	0	0	-653	30344.52	1	1	1	-0.003	0.003
05/16/11 08:13:50	60.00452	0	0	0	-653	30344.52	1	1	1	-0.001	0.001
05/16/11 08:13:52	60.00613	0	0	0	-653	30344.52	1	1	1	0.002	0.002
05/16/11 08:13:54	60.00613	0	0	0	-653	30354.37	1	1	1	0.000	0.000
05/16/11 08:13:56	60.00549	0	0	0	-653	30354.37	1	1	1	-0.001	0.001
05/16/11 08:13:58	60.00516	0	0	0	-653	30354.37	1	1	1	0.000	0.000
05/16/11 08:14:00	60.00388	0	0	0	-653	30354.37	1	1	1	-0.001	0.001

05/16/11 08:14:02	60.00259	0	0	0	-653	30373.31	1	1	1	-0.001	0.001
05/16/11 08:14:04	60.00128	0	0	0	-653	30373.31	1	1	1	-0.001	0.001
05/16/11 08:14:06	60.00128	0	0	0	-653	30373.78	1	1	1	0.000	0.000
05/16/11 08:14:08	60.00064	0	0	0	-653	30373.78	1	1	1	-0.001	0.001
05/16/11 08:14:10	60.00034	0	0	0	-653	30373.78	1	1	1	0.000	0.000
05/16/11 08:14:12	60.00226	0	0	0	-653	30373.78	1	1	1	0.002	0.002
05/16/11 08:14:14	60.00421	0	0	0	-653	30366.33	1	1	1	0.002	0.002
05/16/11 08:14:16	60.00677	0	0	0	-653	30366.33	1	1	1	0.003	0.003
05/16/11 08:14:18	60.00903	0	0	0	-653	30366.33	1	1	1	0.002	0.002
05/16/11 08:14:20	60.01291	0	0	0	-653	30366.33	1	1	1	0.004	0.004
05/16/11 08:14:22	60.01486	0	0	0	-653	30373.85	1	1	1	0.002	0.002
05/16/11 08:14:24	60.01453	0	0	0	-653	30373.85	1	1	1	0.000	0.000
05/16/11 08:14:26	60.01422	0	0	0	-653	30373.05	1	1	1	0.000	0.000
05/16/11 08:14:28	60.0152	0	0	0	-653	30373.05	1	1	1	0.001	0.001
05/16/11 08:14:30	60.01614	0	0	0	-653	30373.05	1	1	1	0.001	0.001
05/16/11 08:14:32	60.01682	0	0	0	-653	30373.05	1	1	1	0.001	0.001
05/16/11 08:14:34	60.01746	0	0	0	-653	30369.77	1	1	1	0.001	0.001
05/16/11 08:14:36	60.01712	0	0	0	-653	30369.77	1	1	1	0.000	0.000
05/16/11 08:14:38	60.01682	0	0	0	-653	30369.77	1	1	1	0.000	0.000
05/16/11 08:14:40	60.01648	0	0	0	-653	30369.77	1	1	1	0.000	0.000
05/16/11 08:14:42	60.01614	0	0	0	-653	30388.99	1	1	1	0.000	0.000
05/16/11 08:14:44	60.01746	0	0	0	-653	30388.99	1	1	1	0.001	0.001
05/16/11 08:14:46	60.01776	0	0	0	-653	30388.16	1	1	1	0.000	0.000
05/16/11 08:14:48	60.01776	0	0	0	-653	30388.16	1	1	1	0.000	0.000
05/16/11 08:14:50	60.01648	0	0	0	-653	30388.16	1	1	1	-0.001	0.001
05/16/11 08:14:52	60.01584	0	0	0	-653	30388.16	1	1	1	-0.001	0.001
05/16/11 08:14:54	60.01648	0	0	0	-653	30376.94	1	1	1	0.001	0.001
05/16/11 08:14:56	60.01584	0	0	0	-653	30376.94	1	1	1	-0.001	0.001
05/16/11 08:14:58	60.01358	0	0	0	-653	30376.94	1	1	1	-0.002	0.002
05/16/11 08:15:00	60.01163	0	0	0	-653	30376.94	1	1	1	-0.002	0.002
05/16/11 08:15:02	60.01132	0	0	0	-653	30371.85	1	1	1	0.000	0.000
05/16/11 08:15:04	60.01132	0	0	0	-653	30371.85	1	1	1	0.000	0.000
05/16/11 08:15:06	60.01099	0	0	0	-653	30362.65	1	1	1	0.000	0.000
05/16/11 08:15:08	60.01099	0	0	0	-653	30362.65	1	1	1	0.000	0.000
05/16/11 08:15:10	60.01291	0	0	0	-653	30362.65	1	1	1	0.002	0.002
05/16/11 08:15:12	60.01486	0	0	0	-653	30362.65	1	1	1	0.002	0.002
05/16/11 08:15:14	60.01776	0	0	0	-653	30395.46	1	1	1	0.003	0.003
05/16/11 08:15:16	60.01776	0	0	0	-653	30395.46	1	1	1	0.000	0.000
05/16/11 08:15:18	60.0184	0	0	0	-653	30395.46	1	1	1	0.001	0.001
05/16/11 08:15:20	60.0181	0	0	0	-653	30395.46	1	1	1	0.000	0.000
05/16/11 08:15:22	60.01746	0	0	0	-653	30397.03	1	1	1	-0.001	0.001
05/16/11 08:15:24	60.0152	0	0	0	-653	30397.03	1	1	1	-0.002	0.002
05/16/11 08:15:26	60.0152	0	0	0	-653	30396.67	1	1	1	0.000	0.000
05/16/11 08:15:28	60.01389	0	0	0	-653	30396.67	1	1	1	-0.001	0.001
05/16/11 08:15:30	60.01746	0	0	0	-653	30396.67	1	1	1	0.004	0.004
05/16/11 08:15:32	60.01907	0	0	0	-653	30396.67	1	1	1	0.002	0.002
05/16/11 08:15:34	60.01907	0	0	0	-653	30388.62	1	1	1	0.000	0.000
05/16/11 08:15:36	60.02036	0	0	0	-653	30388.62	1	1	1	0.001	0.001
05/16/11 08:15:38	60.01874	0	0	0	-653	30388.62	1	1	1	-0.002	0.002

05/16/11 08:15:40	60.01874	0	0	0	-653	30388.62	1	1	1	0.000	0.000
05/16/11 08:15:42	60.01971	0	0	0	-653	30381.78	1	1	1	0.001	0.001
05/16/11 08:15:44	60.01971	0	0	0	-653	30381.78	1	1	1	0.000	0.000
05/16/11 08:15:46	60.01971	0	0	0	-653	30382.96	1	1	1	0.000	0.000
05/16/11 08:15:48	60.0184	0	0	0	-653	30382.96	1	1	1	-0.001	0.001
05/16/11 08:15:50	60.01486	0	0	0	-653	30382.96	1	1	1	-0.004	0.004
05/16/11 08:15:52	60.01358	0	0	0	-653	30382.96	1	1	1	-0.001	0.001
05/16/11 08:15:54	60.01389	0	0	0	-653	30381.48	1	1	1	0.000	0.000
05/16/11 08:15:56	60.01227	0	0	0	-653	30381.48	1	1	1	-0.002	0.002
05/16/11 08:15:58	60.01001	0	0	0	-653	30381.48	1	1	1	-0.002	0.002
05/16/11 08:16:00	60.00583	0	0	0	-653	30381.48	1	1	1	-0.004	0.004
05/16/11 08:16:02	60.00162	0	0	0	-653	30394.03	1	1	1	-0.004	0.004
05/16/11 08:16:04	60.00162	0	0	0	-653	30394.03	1	1	1	0.000	0.000
05/16/11 08:16:06	59.99805	0	0	0	-653	30394.07	1	0	1	-0.004	0.004
05/16/11 08:16:08	59.99353	0	0	0	-653	30394.07	1	0	1	-0.005	0.005
05/16/11 08:16:10	59.99255	0	0	0	-653	30394.07	1	0	1	-0.001	0.001
05/16/11 08:16:12	59.99225	0	0	0	-653	30394.07	1	0	1	0.000	0.000
05/16/11 08:16:14	59.98999	0	0	0	-653	30376.91	1	0	1	-0.002	0.002
05/16/11 08:16:16	59.98837	0	0	0	-653	30376.91	1	0	1	-0.002	0.002
05/16/11 08:16:18	59.98416	0	0	0	-653	30376.91	1	0	1	-0.004	0.004
05/16/11 08:16:20	59.9816	0	0	0	-653	30376.91	1	0	1	-0.003	0.003
05/16/11 08:16:22	59.98093	0	0	0	-653	30367.96	1	0	1	-0.001	0.001
05/16/11 08:16:24	59.98029	0	0	0	-653	30367.96	1	0	1	-0.001	0.001
05/16/11 08:16:26	59.97998	0	0	0	-653	30367.46	1	0	1	0.000	0.000
05/16/11 08:16:28	59.97836	0	0	0	-653	30367.46	1	0	1	-0.002	0.002
05/16/11 08:16:30	59.97513	0	0	0	-653	30367.46	1	0	1	-0.003	0.003
05/16/11 08:16:32	59.97287	0	0	0	-653	30367.46	1	0	1	-0.002	0.002
05/16/11 08:16:34	59.97189	0	0	0	-653	30361.18	1	0	1	-0.001	0.001
05/16/11 08:16:36	59.97156	0	0	0	-653	30361.18	1	0	1	0.000	0.000
05/16/11 08:16:38	59.97382	0	0	0	-653	30361.18	1	0	1	0.002	0.002
05/16/11 08:16:40	59.97641	0	0	0	-653	30361.18	1	0	1	0.003	0.003
05/16/11 08:16:42	59.97836	0	0	0	-653	30365.59	1	0	1	0.002	0.002
05/16/11 08:16:44	59.97705	0	0	0	-653	30365.59	1	0	1	-0.001	0.001
05/16/11 08:16:46	59.97449	0	0	0	-653	30365.19	1	0	1	-0.003	0.003
05/16/11 08:16:48	59.97125	0	0	0	-653	30365.19	1	0	1	-0.003	0.003
05/16/11 08:16:50	59.97092	0	0	0	-653	30365.19	1	0	1	0.000	0.000
05/16/11 08:16:52	59.97287	0	0	0	-653	30365.19	1	0	1	0.002	0.002
05/16/11 08:16:54	59.97449	0	0	0	-653	30375.91	1	0	1	0.002	0.002
05/16/11 08:16:56	59.97382	0	0	0	-653	30375.91	1	0	1	-0.001	0.001
05/16/11 08:16:58	59.97318	0	0	0	-653	30375.91	1	0	1	-0.001	0.001
05/16/11 08:17:00	59.97449	0	0	0	-653	30375.91	1	0	1	0.001	0.001
05/16/11 08:17:02	59.9761	0	0	0	-653	30367.4	1	0	1	0.002	0.002
05/16/11 08:17:04	59.97739	0	0	0	-653	30367.4	1	0	1	0.001	0.001
05/16/11 08:17:06	59.97836	0	0	0	-653	30367.72	1	0	1	0.001	0.001
05/16/11 08:17:08	59.97769	0	0	0	-653	30367.72	1	0	1	-0.001	0.001
05/16/11 08:17:10	59.97705	0	0	0	-653	30367.72	1	0	1	-0.001	0.001
05/16/11 08:17:12	59.97641	0	0	0	-653	30367.72	1	0	1	-0.001	0.001
05/16/11 08:17:14	59.97543	0	0	0	-653	30416.87	1	0	1	-0.001	0.001
05/16/11 08:17:16	59.97382	0	0	0	-653	30416.87	1	0	1	-0.002	0.002

05/16/11 08:17:18	59.97318	0	0	0	-653	30416.87	1	0	1	-0.001	0.001
05/16/11 08:17:20	59.97223	0	0	0	-653	30416.87	1	0	1	-0.001	0.001
05/16/11 08:17:22	59.97189	0	0	0	-653	30413.65	1	0	1	0.000	0.000
05/16/11 08:17:24	59.97092	0	0	0	-653	30413.65	1	0	1	-0.001	0.001
05/16/11 08:17:26	59.96994	0	0	0	-653	30406.3	1	0	1	-0.001	0.001
05/16/11 08:17:28	59.96832	0	0	0	-653	30406.3	1	0	1	-0.002	0.002
05/16/11 08:17:30	59.96606	0	0	0	-653	30406.3	1	0	1	-0.002	0.002
05/16/11 08:17:32	59.96542	0	0	0	-653	30406.3	1	0	1	-0.001	0.001
05/16/11 08:17:34	59.96606	0	0	0	-653	30418.59	1	0	1	0.001	0.001
05/16/11 08:17:36	59.9693	0	0	0	-653	30418.59	1	0	1	0.003	0.003
05/16/11 08:17:38	59.97253	0	0	0	-653	30418.59	1	0	1	0.003	0.003
05/16/11 08:17:40	59.97351	0	0	0	-653	30418.59	1	0	1	0.001	0.001
05/16/11 08:17:42	59.97382	0	0	0	-653	30433.31	1	0	1	0.000	0.000
05/16/11 08:17:44	59.97253	0	0	0	-653	30433.31	1	0	1	-0.001	0.001
05/16/11 08:17:46	59.97253	0	0	0	-653	30433.31	1	0	1	0.000	0.000
05/16/11 08:17:48	59.97253	0	0	0	-653	30433.31	1	0	1	0.000	0.000
05/16/11 08:17:50	59.96768	0	0	0	-653	30433.31	1	0	1	-0.005	0.005
05/16/11 08:17:52	59.97125	0	0	0	-653	30433.31	1	0	1	0.004	0.004
05/16/11 08:17:54	59.97577	0	0	0	-653	30451.3	1	0	1	0.005	0.005
05/16/11 08:17:56	59.97577	0	0	0	-653	30451.3	1	0	1	0.000	0.000
05/16/11 08:17:58	59.97577	0	0	0	-653	30451.3	1	0	1	0.000	0.000
05/16/11 08:18:00	59.98416	0	0	0	-653	30451.3	1	0	1	0.008	0.008
05/16/11 08:18:02	59.9819	0	0	0	-653	30425.74	1	0	1	-0.002	0.002
05/16/11 08:18:04	59.979	0	0	0	-653	30425.74	1	0	1	-0.003	0.003
05/16/11 08:18:06	59.97769	0	0	0	-653	30419.18	1	0	1	-0.001	0.001
05/16/11 08:18:08	59.97769	0	0	0	-653	30419.18	1	0	1	0.000	0.000
05/16/11 08:18:10	59.98126	0	0	0	-653	30419.18	1	0	1	0.004	0.004
05/16/11 08:18:12	59.9848	0	0	0	-653	30419.18	1	0	1	0.004	0.004
05/16/11 08:18:14	59.98868	0	0	0	-653	30424.29	1	0	1	0.004	0.004
05/16/11 08:18:16	59.99161	0	0	0	-653	30424.29	1	0	1	0.003	0.003
05/16/11 08:18:18	59.99353	0	0	0	-653	30424.29	1	0	1	0.002	0.002
05/16/11 08:18:20	59.99579	0	0	0	-653	30424.29	1	0	1	0.002	0.002
05/16/11 08:18:22	59.99677	0	0	0	-653	30440.82	1	0	1	0.001	0.001
05/16/11 08:18:24	59.99774	0	0	0	-653	30440.82	1	0	1	0.001	0.001
05/16/11 08:18:26	59.99838	0	0	0	-653	30431.58	1	0	1	0.001	0.001
05/16/11 08:18:28	59.99774	0	0	0	-653	30431.58	1	0	1	-0.001	0.001
05/16/11 08:18:30	59.9971	0	0	0	-653	30431.58	1	0	1	-0.001	0.001
05/16/11 08:18:32	59.99741	0	0	0	-653	30431.58	1	0	1	0.000	0.000
05/16/11 08:18:34	59.99741	0	0	0	-653	30444.25	1	0	1	0.000	0.000
05/16/11 08:18:36	59.99741	0	0	0	-653	30444.25	1	0	1	0.000	0.000
05/16/11 08:18:38	60.00064	0	0	0	-653	30444.25	1	1	1	0.003	0.003
05/16/11 08:18:40	60.00323	0	0	0	-653	30444.25	1	1	1	0.003	0.003
05/16/11 08:18:42	60.00354	0	0	0	-653	30465.11	1	1	1	0.000	0.000
05/16/11 08:18:44	60.00259	0	0	0	-653	30465.11	1	1	1	-0.001	0.001
05/16/11 08:18:46	60.00098	0	0	0	-653	30465.3	1	1	1	-0.002	0.002
05/16/11 08:18:48	59.99936	0	0	0	-653	30465.3	1	1	1	-0.002	0.002
05/16/11 08:18:50	59.99741	0	0	0	-653	30465.3	1	0	1	-0.002	0.002
05/16/11 08:18:52	59.99677	0	0	0	-653	30465.3	1	0	1	-0.001	0.001
05/16/11 08:18:54	59.99677	0	0	0	-653	30478.25	1	0	1	0.000	0.000

05/16/11 08:18:56	59.9971	0	0	0	-653	30478.25	1	0	1	0.000	0.000
05/16/11 08:18:58	59.99774	0	0	0	-653	30478.25	1	0	1	0.001	0.001
05/16/11 08:19:00	59.99872	0	0	0	-653	30478.25	1	1	1	0.001	0.001
05/16/11 08:19:02	59.99966	0	0	0	-653	30473.86	1	1	1	0.001	0.001
05/16/11 08:19:04	60	0	0	0	-653	30473.86	1	1	1	0.000	0.000
05/16/11 08:19:06	60.00034	0	0	0	-653	30468.84	1	1	1	0.000	0.000
05/16/11 08:19:08	60.00098	0	0	0	-653	30468.84	1	1	1	0.001	0.001
05/16/11 08:19:10	60.00226	0	0	0	-653	30468.84	1	1	1	0.001	0.001
05/16/11 08:19:12	60.0029	0	0	0	-653	30468.84	1	1	1	0.001	0.001
05/16/11 08:19:14	60.00259	0	0	0	-653	30469.63	1	1	1	0.000	0.000
05/16/11 08:19:16	60.00226	0	0	0	-653	30469.63	1	1	1	0.000	0.000
05/16/11 08:19:18	60.00226	0	0	0	-653	30469.63	1	1	1	0.000	0.000
05/16/11 08:19:20	60.00323	0	0	0	-653	30469.63	1	1	1	0.001	0.001
05/16/11 08:19:22	60.00421	0	0	0	-653	30488.41	1	1	1	0.001	0.001
05/16/11 08:19:24	60.00485	0	0	0	-653	30488.41	1	1	1	0.001	0.001
05/16/11 08:19:26	60.00452	0	0	0	-653	30480.29	1	1	1	0.000	0.000
05/16/11 08:19:28	60.00354	0	0	0	-653	30480.29	1	1	1	-0.001	0.001
05/16/11 08:19:30	60.00354	0	0	0	-653	30480.29	1	1	1	0.000	0.000
05/16/11 08:19:32	60.00354	0	0	0	-653	30480.29	1	1	1	0.000	0.000
05/16/11 08:19:34	60.00354	0	0	0	-653	30477.13	1	1	1	0.000	0.000
05/16/11 08:19:36	60.00354	0	0	0	-653	30477.13	1	1	1	0.000	0.000
05/16/11 08:19:38	60.00354	0	0	0	-653	30477.13	1	1	1	0.000	0.000
05/16/11 08:19:40	60.00354	0	0	0	-653	30477.13	1	1	1	0.000	0.000
05/16/11 08:19:42	60.00613	0	0	0	-653	30487.82	1	1	1	0.003	0.003
05/16/11 08:19:44	60.00485	0	0	0	-653	30487.82	1	1	1	-0.001	0.001
05/16/11 08:19:46	60.00452	0	0	0	-653	30489.73	1	1	1	0.000	0.000
05/16/11 08:19:48	60.00452	0	0	0	-653	30489.73	1	1	1	0.000	0.000
05/16/11 08:19:50	60.00354	0	0	0	-653	30489.73	1	1	1	-0.001	0.001
05/16/11 08:19:52	60.0029	0	0	0	-653	30489.73	1	1	1	-0.001	0.001
05/16/11 08:19:54	60.00162	0	0	0	-653	30480.09	1	1	1	-0.001	0.001
05/16/11 08:19:56	60.00162	0	0	0	-653	30480.09	1	1	1	0.000	0.000
05/16/11 08:19:58	60.00421	0	0	0	-653	30480.09	1	1	1	0.003	0.003
05/16/11 08:20:00	60.00421	0	0	0	-653	30480.09	1	1	1	0.000	0.000
05/16/11 08:20:02	60.0029	0	0	0	-653	30480.91	1	1	1	-0.001	0.001
05/16/11 08:20:04	60.00034	0	0	0	-653	30480.91	1	1	1	-0.003	0.003
05/16/11 08:20:06	59.99805	0	0	0	-653	30480.84	1	0	1	-0.002	0.002
05/16/11 08:20:08	59.99646	0	0	0	-653	30480.84	1	0	1	-0.002	0.002
05/16/11 08:20:10	59.99515	0	0	0	-653	30480.84	1	0	1	-0.001	0.001
05/16/11 08:20:12	59.99387	0	0	0	-653	30480.84	1	0	1	-0.001	0.001
05/16/11 08:20:14	59.99289	0	0	0	-653	30476.09	1	0	1	-0.001	0.001
05/16/11 08:20:16	59.99255	0	0	0	-653	30476.09	1	0	1	0.000	0.000
05/16/11 08:20:18	59.99225	0	0	0	-653	30476.09	1	0	1	0.000	0.000
05/16/11 08:20:20	59.98965	0	0	0	-653	30476.09	1	0	1	-0.003	0.003
05/16/11 08:20:22	59.98514	0	0	0	-653	30456.76	1	0	1	-0.005	0.005
05/16/11 08:20:24	59.98254	0	0	0	-653	30456.76	1	0	1	-0.003	0.003
05/16/11 08:20:26	59.97836	0	0	0	-653	30457.12	1	0	1	-0.004	0.004
05/16/11 08:20:28	59.97641	0	0	0	-653	30457.12	1	0	1	-0.002	0.002
05/16/11 08:20:30	59.97705	0	0	0	-653	30457.12	1	0	1	0.001	0.001
05/16/11 08:20:32	59.97705	0	0	0	-653	30457.12	1	0	1	0.000	0.000

05/16/11 08:20:34	59.97705	0	0	0	-653	30446.98	1	0	1	0.000	0.000
05/16/11 08:20:36	59.97803	0	0	0	-653	30446.98	1	0	1	0.001	0.001
05/16/11 08:20:38	59.97964	0	0	0	-653	30446.98	1	0	1	0.002	0.002
05/16/11 08:20:40	59.9816	0	0	0	-653	30446.98	1	0	1	0.002	0.002
05/16/11 08:20:42	59.98126	0	0	0	-653	30461.02	1	0	1	0.000	0.000
05/16/11 08:20:44	59.97931	0	0	0	-653	30461.02	1	0	1	-0.002	0.002
05/16/11 08:20:46	59.9761	0	0	0	-653	30460.94	1	0	1	-0.003	0.003
05/16/11 08:20:48	59.97543	0	0	0	-653	30460.94	1	0	1	-0.001	0.001
05/16/11 08:20:50	59.97577	0	0	0	-653	30460.94	1	0	1	0.000	0.000
05/16/11 08:20:52	59.97675	0	0	0	-653	30460.94	1	0	1	0.001	0.001
05/16/11 08:20:54	59.97803	0	0	0	-653	30469.23	1	0	1	0.001	0.001
05/16/11 08:20:56	59.979	0	0	0	-653	30469.23	1	0	1	0.001	0.001
05/16/11 08:20:58	59.97964	0	0	0	-653	30469.23	1	0	1	0.001	0.001
05/16/11 08:21:00	59.98062	0	0	0	-653	30469.23	1	0	1	0.001	0.001
05/16/11 08:21:02	59.9819	0	0	0	-653	30481.49	1	0	1	0.001	0.001
05/16/11 08:21:04	59.98224	0	0	0	-653	30481.49	1	0	1	0.000	0.000
05/16/11 08:21:06	59.98254	0	0	0	-653	30480.29	1	0	1	0.000	0.000
05/16/11 08:21:08	59.98288	0	0	0	-653	30480.29	1	0	1	0.000	0.000
05/16/11 08:21:10	59.98254	0	0	0	-653	30480.29	1	0	1	0.000	0.000
05/16/11 08:21:12	59.98254	0	0	0	-653	30480.29	1	0	1	0.000	0.000
05/16/11 08:21:14	59.98288	0	0	0	-653	30473.15	1	0	1	0.000	0.000
05/16/11 08:21:16	59.98611	0	0	0	-653	30473.15	1	0	1	0.003	0.003
05/16/11 08:21:18	59.99387	0	0	0	-653	30473.15	1	0	1	0.008	0.008
05/16/11 08:21:20	60.00226	0	0	0	-653	30473.15	1	1	1	0.008	0.008
05/16/11 08:21:22	60.01099	0	0	0	-653	30470.66	1	1	1	0.009	0.009
05/16/11 08:21:24	60.01712	0	0	0	-653	30470.66	1	1	1	0.006	0.006
05/16/11 08:21:26	60.02069	0	0	0	-653	30470.6	1	1	1	0.004	0.004
05/16/11 08:21:28	60.02133	0	0	0	-653	30470.6	1	1	1	0.001	0.001
05/16/11 08:21:30	60.02133	0	0	0	-653	30470.6	1	1	1	0.000	0.000
05/16/11 08:21:32	60.02133	0	0	0	-653	30470.6	1	1	1	0.000	0.000
05/16/11 08:21:34	60.02325	0	0	0	-653	30461.28	1	1	1	0.002	0.002
05/16/11 08:21:36	60.02551	0	0	0	-653	30461.28	1	1	1	0.002	0.002
05/16/11 08:21:38	60.02682	0	0	0	-653	30461.28	1	1	1	0.001	0.001
05/16/11 08:21:40	60.02844	0	0	0	-653	30461.28	1	1	1	0.002	0.002
05/16/11 08:21:42	60.02972	0	0	0	-653	30450.44	1	1	1	0.001	0.001
05/16/11 08:21:44	60.03101	0	0	0	-653	30450.44	1	1	1	0.001	0.001
05/16/11 08:21:46	60.03198	0	0	0	-653	30451.91	1	1	1	0.001	0.001
05/16/11 08:21:48	60.03296	0	0	0	-653	30451.91	1	1	1	0.001	0.001
05/16/11 08:21:50	60.03458	0	0	0	-653	30451.91	1	1	1	0.002	0.002
05/16/11 08:21:52	60.03488	0	0	0	-653	30451.91	1	1	1	0.000	0.000
05/16/11 08:21:54	60.03488	0	0	0	-653	30446.52	1	1	1	0.000	0.000
05/16/11 08:21:56	60.03424	0	0	0	-653	30446.52	1	1	1	-0.001	0.001
05/16/11 08:21:58	60.03458	0	0	0	-653	30446.52	1	1	1	0.000	0.000
05/16/11 08:22:00	60.03458	0	0	0	-653	30446.52	1	1	1	0.000	0.000
05/16/11 08:22:02	60.03555	0	0	0	-653	30452.43	1	1	1	0.001	0.001
05/16/11 08:22:04	60.03586	0	0	0	-653	30452.43	1	1	1	0.000	0.000
05/16/11 08:22:06	60.03683	0	0	0	-653	30452.43	1	1	1	0.001	0.001
05/16/11 08:22:08	60.03748	0	0	0	-653	30452.43	1	1	1	0.001	0.001
05/16/11 08:22:10	60.03748	0	0	0	-653	30452.43	1	1	1	0.000	0.000

05/16/11 08:22:12	60.03717	0	0	0	-653	30452.43	1	1	1	0.000	0.000
05/16/11 08:22:14	60.03781	0	0	0	-653	30473.21	1	1	1	0.001	0.001
05/16/11 08:22:16	60.03781	0	0	0	-653	30473.21	1	1	1	0.000	0.000
05/16/11 08:22:18	60.03748	0	0	0	-653	30473.21	1	1	1	0.000	0.000
05/16/11 08:22:20	60.0365	0	0	0	-653	30473.21	1	1	1	-0.001	0.001
05/16/11 08:22:22	60.03683	0	0	0	-653	30476.61	1	1	1	0.000	0.000
05/16/11 08:22:24	60.03748	0	0	0	-653	30476.61	1	1	1	0.001	0.001
05/16/11 08:22:26	60.03748	0	0	0	-653	30476.55	1	1	1	0.000	0.000
05/16/11 08:22:28	60.03812	0	0	0	-653	30476.55	1	1	1	0.001	0.001
05/16/11 08:22:30	60.03876	0	0	0	-653	30476.55	1	1	1	0.001	0.001
05/16/11 08:22:32	60.04007	0	0	0	-653	30476.55	1	1	1	0.001	0.001
05/16/11 08:22:34	60.04169	0	0	0	-653	30473.8	1	1	1	0.002	0.002
05/16/11 08:22:36	60.04361	0	0	0	-653	30473.8	1	1	1	0.002	0.002
05/16/11 08:22:38	60.04523	0	0	0	-653	30473.8	1	1	1	0.002	0.002
05/16/11 08:22:40	60.04492	0	0	0	-653	30473.8	1	1	1	0.000	0.000
05/16/11 08:22:42	60.04459	0	0	0	-653	30471	1	1	1	0.000	0.000
05/16/11 08:22:44	60.04395	0	0	0	-653	30471	1	1	1	-0.001	0.001
05/16/11 08:22:46	60.04199	0	0	0	-653	30471.97	1	1	1	-0.002	0.002
05/16/11 08:22:48	60.03717	0	0	0	-653	30471.97	1	1	1	-0.005	0.005
05/16/11 08:22:50	60.03296	0	0	0	-653	30471.97	1	1	1	-0.004	0.004
05/16/11 08:22:52	60.03101	0	0	0	-653	30471.97	1	1	1	-0.002	0.002
05/16/11 08:22:54	60.03134	0	0	0	-653	30485.47	1	1	1	0.000	0.000
05/16/11 08:22:56	60.03168	0	0	0	-653	30485.47	1	1	1	0.000	0.000
05/16/11 08:22:58	60.03101	0	0	0	-653	30485.47	1	1	1	-0.001	0.001
05/16/11 08:23:00	60.03101	0	0	0	-653	30485.47	1	1	1	0.000	0.000
05/16/11 08:23:02	60.03232	0	0	0	-653	30505.49	1	1	1	0.001	0.001
05/16/11 08:23:04	60.03326	0	0	0	-653	30505.49	1	1	1	0.001	0.001
05/16/11 08:23:06	60.03326	0	0	0	-653	30505.26	1	1	1	0.000	0.000
05/16/11 08:23:08	60.03394	0	0	0	-653	30505.26	1	1	1	0.001	0.001
05/16/11 08:23:10	60.03296	0	0	0	-653	30505.26	1	1	1	-0.001	0.001
05/16/11 08:23:12	60.03232	0	0	0	-653	30505.26	1	1	1	-0.001	0.001
05/16/11 08:23:14	60.03168	0	0	0	-653	30515.6	1	1	1	-0.001	0.001
05/16/11 08:23:16	60.03168	0	0	0	-653	30515.6	1	1	1	0.000	0.000
05/16/11 08:23:18	60.03232	0	0	0	-653	30515.6	1	1	1	0.001	0.001
05/16/11 08:23:20	60.03232	0	0	0	-653	30515.6	1	1	1	0.000	0.000
05/16/11 08:23:22	60.03168	0	0	0	-653	30505.28	1	1	1	-0.001	0.001
05/16/11 08:23:24	60.03168	0	0	0	-653	30505.28	1	1	1	0.000	0.000
05/16/11 08:23:26	60.03134	0	0	0	-653	30506.12	1	1	1	0.000	0.000
05/16/11 08:23:28	60.03101	0	0	0	-653	30506.12	1	1	1	0.000	0.000
05/16/11 08:23:30	60.03036	0	0	0	-653	30506.12	1	1	1	-0.001	0.001
05/16/11 08:23:32	60.03036	0	0	0	-653	30506.12	1	1	1	0.000	0.000
05/16/11 08:23:34	60.02972	0	0	0	-653	30493.68	1	1	1	-0.001	0.001
05/16/11 08:23:36	60.02875	0	0	0	-653	30493.68	1	1	1	-0.001	0.001
05/16/11 08:23:38	60.03006	0	0	0	-653	30493.68	1	1	1	0.001	0.001
05/16/11 08:23:40	60.03198	0	0	0	-653	30493.68	1	1	1	0.002	0.002
05/16/11 08:23:42	60.03326	0	0	0	-653	30529.28	1	1	1	0.001	0.001
05/16/11 08:23:44	60.03458	0	0	0	-653	30529.28	1	1	1	0.001	0.001
05/16/11 08:23:46	60.03488	0	0	0	-653	30529.08	1	1	1	0.000	0.000
05/16/11 08:23:48	60.0336	0	0	0	-653	30529.08	1	1	1	-0.001	0.001

05/16/11 08:23:50	60.03326	0	0	0	-653	30529.08	1	1	1	0.000	0.000
05/16/11 08:23:52	60.03232	0	0	0	-653	30529.08	1	1	1	-0.001	0.001
05/16/11 08:23:54	60.03134	0	0	0	-653	30529.52	1	1	1	-0.001	0.001
05/16/11 08:23:56	60.03168	0	0	0	-653	30529.52	1	1	1	0.000	0.000
05/16/11 08:23:58	60.03326	0	0	0	-653	30529.52	1	1	1	0.002	0.002
05/16/11 08:24:00	60.03458	0	0	0	-653	30529.52	1	1	1	0.001	0.001
05/16/11 08:24:02	60.03586	0	0	0	-653	30535.57	1	1	1	0.001	0.001
05/16/11 08:24:04	60.0365	0	0	0	-653	30535.57	1	1	1	0.001	0.001
05/16/11 08:24:06	60.03748	0	0	0	-653	30533.89	1	1	1	0.001	0.001
05/16/11 08:24:08	60.03683	0	0	0	-653	30533.89	1	1	1	-0.001	0.001
05/16/11 08:24:10	60.03619	0	0	0	-653	30533.89	1	1	1	-0.001	0.001
05/16/11 08:24:12	60.03522	0	0	0	-653	30533.89	1	1	1	-0.001	0.001
05/16/11 08:24:14	60.03424	0	0	0	-653	30521.82	1	1	1	-0.001	0.001
05/16/11 08:24:16	60.03296	0	0	0	-653	30521.82	1	1	1	-0.001	0.001
05/16/11 08:24:18	60.03198	0	0	0	-653	30521.82	1	1	1	-0.001	0.001
05/16/11 08:24:20	60.03134	0	0	0	-653	30521.82	1	1	1	-0.001	0.001
05/16/11 08:24:22	60.03168	0	0	0	-653	30533.64	1	1	1	0.000	0.000
05/16/11 08:24:24	60.03134	0	0	0	-653	30533.64	1	1	1	0.000	0.000
05/16/11 08:24:26	60.03101	0	0	0	-653	30532.32	1	1	1	0.000	0.000
05/16/11 08:24:28	60.03036	0	0	0	-653	30532.32	1	1	1	-0.001	0.001
05/16/11 08:24:30	60.02972	0	0	0	-653	30532.32	1	1	1	-0.001	0.001
05/16/11 08:24:32	60.03006	0	0	0	-653	30532.32	1	1	1	0.000	0.000
05/16/11 08:24:34	60.0307	0	0	0	-653	30551.2	1	1	1	0.001	0.001
05/16/11 08:24:36	60.03168	0	0	0	-653	30551.2	1	1	1	0.001	0.001
05/16/11 08:24:38	60.0336	0	0	0	-653	30551.2	1	1	1	0.002	0.002
05/16/11 08:24:40	60.03488	0	0	0	-653	30551.2	1	1	1	0.001	0.001
05/16/11 08:24:42	60.03522	0	0	0	-653	30548.06	1	1	1	0.000	0.000
05/16/11 08:24:44	60.03586	0	0	0	-653	30548.06	1	1	1	0.001	0.001
05/16/11 08:24:46	60.03717	0	0	0	-653	30543.69	1	1	1	0.001	0.001
05/16/11 08:24:48	60.03812	0	0	0	-653	30543.69	1	1	1	0.001	0.001
05/16/11 08:24:50	60.03717	0	0	0	-653	30543.69	1	1	1	-0.001	0.001
05/16/11 08:24:52	60.03748	0	0	0	-653	30543.69	1	1	1	0.000	0.000
05/16/11 08:24:54	60.03845	0	0	0	-653	30546.32	1	1	1	0.001	0.001
05/16/11 08:24:56	60.03876	0	0	0	-653	30546.32	1	1	1	0.000	0.000
05/16/11 08:24:58	60.03781	0	0	0	-653	30546.32	1	1	1	-0.001	0.001
05/16/11 08:25:00	60.03619	0	0	0	-653	30546.32	1	1	1	-0.002	0.002
05/16/11 08:25:02	60.03488	0	0	0	-653	30546.28	1	1	1	-0.001	0.001
05/16/11 08:25:04	60.03394	0	0	0	-653	30546.28	1	1	1	-0.001	0.001
05/16/11 08:25:06	60.0336	0	0	0	-653	30546.38	1	1	1	0.000	0.000
05/16/11 08:25:08	60.0336	0	0	0	-653	30546.38	1	1	1	0.000	0.000
05/16/11 08:25:10	60.03458	0	0	0	-653	30546.38	1	1	1	0.001	0.001
05/16/11 08:25:12	60.0365	0	0	0	-653	30546.38	1	1	1	0.002	0.002
05/16/11 08:25:14	60.03748	0	0	0	-653	30556.84	1	1	1	0.001	0.001
05/16/11 08:25:16	60.03781	0	0	0	-653	30556.84	1	1	1	0.000	0.000
05/16/11 08:25:18	60.03748	0	0	0	-653	30556.84	1	1	1	0.000	0.000
05/16/11 08:25:20	60.0365	0	0	0	-653	30556.84	1	1	1	-0.001	0.001
05/16/11 08:25:22	60.03488	0	0	0	-653	30557.42	1	1	1	-0.002	0.002
05/16/11 08:25:24	60.0336	0	0	0	-653	30557.42	1	1	1	-0.001	0.001
05/16/11 08:25:26	60.03232	0	0	0	-653	30557.43	1	1	1	-0.001	0.001

05/16/11 08:25:28	60.03134	0	0	0	-653	30557.43	1	1	1	-0.001	0.001
05/16/11 08:25:30	60.03101	0	0	0	-653	30557.43	1	1	1	0.000	0.000
05/16/11 08:25:32	60.03101	0	0	0	-653	30557.43	1	1	1	0.000	0.000
05/16/11 08:25:34	60.0307	0	0	0	-653	30566.39	1	1	1	0.000	0.000
05/16/11 08:25:36	60.02972	0	0	0	-653	30566.39	1	1	1	-0.001	0.001
05/16/11 08:25:38	60.02908	0	0	0	-653	30566.39	1	1	1	-0.001	0.001
05/16/11 08:25:40	60.02811	0	0	0	-653	30566.39	1	1	1	-0.001	0.001
05/16/11 08:25:42	60.02649	0	0	0	-653	30567.26	1	1	1	-0.002	0.002
05/16/11 08:25:44	60.02521	0	0	0	-653	30567.26	1	1	1	-0.001	0.001
05/16/11 08:25:46	60.02359	0	0	0	-653	30562.43	1	1	1	-0.002	0.002
05/16/11 08:25:48	60.02133	0	0	0	-653	30562.43	1	1	1	-0.002	0.002
05/16/11 08:25:50	60.02002	0	0	0	-653	30562.43	1	1	1	-0.001	0.001
05/16/11 08:25:52	60.02002	0	0	0	-653	30562.43	1	1	1	0.000	0.000
05/16/11 08:25:54	60.02069	0	0	0	-653	30573.32	1	1	1	0.001	0.001
05/16/11 08:25:56	60.02133	0	0	0	-653	30573.32	1	1	1	0.001	0.001
05/16/11 08:25:58	60.021	0	0	0	-653	30573.32	1	1	1	0.000	0.000
05/16/11 08:26:00	60.02036	0	0	0	-653	30573.32	1	1	1	-0.001	0.001
05/16/11 08:26:02	60.01938	0	0	0	-653	30567	1	1	1	-0.001	0.001
05/16/11 08:26:04	60.01938	0	0	0	-653	30567	1	1	1	0.000	0.000
05/16/11 08:26:06	60.01938	0	0	0	-653	30567.04	1	1	1	0.000	0.000
05/16/11 08:26:08	60.01971	0	0	0	-653	30567.04	1	1	1	0.000	0.000
05/16/11 08:26:10	60.01971	0	0	0	-653	30567.04	1	1	1	0.000	0.000
05/16/11 08:26:12	60.01907	0	0	0	-653	30567.04	1	1	1	-0.001	0.001
05/16/11 08:26:14	60.01938	0	0	0	-653	30556.49	1	1	1	0.000	0.000
05/16/11 08:26:16	60.02036	0	0	0	-653	30556.49	1	1	1	0.001	0.001
05/16/11 08:26:18	60.02036	0	0	0	-653	30556.49	1	1	1	0.000	0.000
05/16/11 08:26:20	60.01907	0	0	0	-653	30556.49	1	1	1	-0.001	0.001
05/16/11 08:26:22	60.01712	0	0	0	-653	30530.19	1	1	1	-0.002	0.002
05/16/11 08:26:24	60.01584	0	0	0	-653	30530.19	1	1	1	-0.001	0.001
05/16/11 08:26:26	60.0152	0	0	0	-653	30530.04	1	1	1	-0.001	0.001
05/16/11 08:26:28	60.0155	0	0	0	-653	30530.04	1	1	1	0.000	0.000
05/16/11 08:26:30	60.01614	0	0	0	-653	30530.04	1	1	1	0.001	0.001
05/16/11 08:26:32	60.01746	0	0	0	-653	30530.04	1	1	1	0.001	0.001
05/16/11 08:26:34	60.0181	0	0	0	-653	30542.27	1	1	1	0.001	0.001
05/16/11 08:26:36	60.01746	0	0	0	-653	30542.27	1	1	1	-0.001	0.001
05/16/11 08:26:38	60.01712	0	0	0	-653	30542.27	1	1	1	0.000	0.000
05/16/11 08:26:40	60.01648	0	0	0	-653	30542.27	1	1	1	-0.001	0.001
05/16/11 08:26:42	60.01486	0	0	0	-653	30559.64	1	1	1	-0.002	0.002
05/16/11 08:26:44	60.01227	0	0	0	-653	30559.64	1	1	1	-0.003	0.003
05/16/11 08:26:46	60.01035	0	0	0	-653	30559.67	1	1	1	-0.002	0.002
05/16/11 08:26:48	60.00937	0	0	0	-653	30559.67	1	1	1	-0.001	0.001
05/16/11 08:26:50	60.00903	0	0	0	-653	30559.67	1	1	1	0.000	0.000
05/16/11 08:26:52	60.00937	0	0	0	-653	30559.67	1	1	1	0.000	0.000
05/16/11 08:26:54	60.01065	0	0	0	-653	30552.02	1	1	1	0.001	0.001
05/16/11 08:26:56	60.01163	0	0	0	-653	30552.02	1	1	1	0.001	0.001
05/16/11 08:26:58	60.01227	0	0	0	-653	30552.02	1	1	1	0.001	0.001
05/16/11 08:27:00	60.01163	0	0	0	-653	30552.02	1	1	1	-0.001	0.001
05/16/11 08:27:02	60.00873	0	0	0	-653	30556.78	1	1	1	-0.003	0.003
05/16/11 08:27:04	60.00647	0	0	0	-653	30556.78	1	1	1	-0.002	0.002

05/16/11 08:27:06	60.00583	0	0	0	-653	30550.7	1	1	1	-0.001	0.001
05/16/11 08:27:08	60.00613	0	0	0	-653	30550.7	1	1	1	0.000	0.000
05/16/11 08:27:10	60.00613	0	0	0	-653	30550.7	1	1	1	0.000	0.000
05/16/11 08:27:12	60.00711	0	0	0	-653	30550.7	1	1	1	0.001	0.001
05/16/11 08:27:14	60.00903	0	0	0	-653	30559.76	1	1	1	0.002	0.002
05/16/11 08:27:16	60.01099	0	0	0	-653	30559.76	1	1	1	0.002	0.002
05/16/11 08:27:18	60.01099	0	0	0	-653	30559.76	1	1	1	0.000	0.000
05/16/11 08:27:20	60.01035	0	0	0	-653	30559.76	1	1	1	-0.001	0.001
05/16/11 08:27:22	60.0097	0	0	0	-653	30563.61	1	1	1	-0.001	0.001
05/16/11 08:27:24	60.00873	0	0	0	-653	30563.61	1	1	1	-0.001	0.001
05/16/11 08:27:26	60.00711	0	0	0	-653	30556.57	1	1	1	-0.002	0.002
05/16/11 08:27:28	60.00613	0	0	0	-653	30556.57	1	1	1	-0.001	0.001
05/16/11 08:27:30	60.00583	0	0	0	-653	30556.57	1	1	1	0.000	0.000
05/16/11 08:27:32	60.00711	0	0	0	-653	30556.57	1	1	1	0.001	0.001
05/16/11 08:27:34	60.00809	0	0	0	-653	30556.7	1	1	1	0.001	0.001
05/16/11 08:27:36	60.00839	0	0	0	-653	30556.7	1	1	1	0.000	0.000
05/16/11 08:27:38	60.00809	0	0	0	-653	30556.7	1	1	1	0.000	0.000
05/16/11 08:27:40	60.00711	0	0	0	-653	30556.7	1	1	1	-0.001	0.001
05/16/11 08:27:42	60.00677	0	0	0	-653	30544.52	1	1	1	0.000	0.000
05/16/11 08:27:44	60.00775	0	0	0	-653	30544.52	1	1	1	0.001	0.001
05/16/11 08:27:46	60.00711	0	0	0	-653	30543.34	1	1	1	-0.001	0.001
05/16/11 08:27:48	60.00647	0	0	0	-653	30543.34	1	1	1	-0.001	0.001
05/16/11 08:27:50	60.00388	0	0	0	-653	30543.34	1	1	1	-0.003	0.003
05/16/11 08:27:52	60.00128	0	0	0	-653	30543.34	1	1	1	-0.003	0.003
05/16/11 08:27:54	59.99936	0	0	0	-653	30554.42	1	1	1	-0.002	0.002
05/16/11 08:27:56	59.99805	0	0	0	-653	30554.42	1	0	1	-0.001	0.001
05/16/11 08:27:58	59.99741	0	0	0	-653	30554.42	1	0	1	-0.001	0.001
05/16/11 08:28:00	59.9971	0	0	0	-653	30554.42	1	0	1	0.000	0.000
05/16/11 08:28:02	59.99677	0	0	0	-653	30534.33	1	0	1	0.000	0.000
05/16/11 08:28:04	59.9971	0	0	0	-653	30534.33	1	0	1	0.000	0.000
05/16/11 08:28:06	59.99646	0	0	0	-653	30533.84	1	0	1	-0.001	0.001
05/16/11 08:28:08	59.99579	0	0	0	-653	30533.84	1	0	1	-0.001	0.001
05/16/11 08:28:10	59.99451	0	0	0	-653	30533.84	1	0	1	-0.001	0.001
05/16/11 08:28:12	59.99353	0	0	0	-653	30533.84	1	0	1	-0.001	0.001
05/16/11 08:28:14	59.99289	0	0	0	-653	30557.2	1	0	1	-0.001	0.001
05/16/11 08:28:16	59.99191	0	0	0	-653	30557.2	1	0	1	-0.001	0.001
05/16/11 08:28:18	59.98901	0	0	0	-653	30557.2	1	0	1	-0.003	0.003
05/16/11 08:28:20	59.98611	0	0	0	-653	30557.2	1	0	1	-0.003	0.003
05/16/11 08:28:22	59.9845	0	0	0	-653	30560.91	1	0	1	-0.002	0.002
05/16/11 08:28:24	59.98318	0	0	0	-653	30560.91	1	0	1	-0.001	0.001
05/16/11 08:28:26	59.9819	0	0	0	-653	30560.56	1	0	1	-0.001	0.001
05/16/11 08:28:28	59.98093	0	0	0	-653	30560.56	1	0	1	-0.001	0.001
05/16/11 08:28:30	59.97964	0	0	0	-653	30560.56	1	0	1	-0.001	0.001
05/16/11 08:28:32	59.97867	0	0	0	-653	30560.56	1	0	1	-0.001	0.001
05/16/11 08:28:34	59.97964	0	0	0	-653	30560.08	1	0	1	0.001	0.001
05/16/11 08:28:36	59.97998	0	0	0	-653	30560.08	1	0	1	0.000	0.000
05/16/11 08:28:38	59.98062	0	0	0	-653	30560.08	1	0	1	0.001	0.001
05/16/11 08:28:40	59.98029	0	0	0	-653	30560.08	1	0	1	0.000	0.000
05/16/11 08:28:42	59.979	0	0	0	-653	30558.72	1	0	1	-0.001	0.001

05/16/11 08:28:44	59.97739	0	0	0	-653	30558.72	1	0	1	-0.002	0.002
05/16/11 08:28:46	59.97513	0	0	0	-653	30553.46	1	0	1	-0.002	0.002
05/16/11 08:28:48	59.97351	0	0	0	-653	30553.46	1	0	1	-0.002	0.002
05/16/11 08:28:50	59.97253	0	0	0	-653	30553.46	1	0	1	-0.001	0.001
05/16/11 08:28:52	59.97189	0	0	0	-653	30553.46	1	0	1	-0.001	0.001
05/16/11 08:28:54	59.97318	0	0	0	-653	30562.63	1	0	1	0.001	0.001
05/16/11 08:28:56	59.97415	0	0	0	-653	30562.63	1	0	1	0.001	0.001
05/16/11 08:28:58	59.97449	0	0	0	-653	30562.63	1	0	1	0.000	0.000
05/16/11 08:29:00	59.97513	0	0	0	-653	30562.63	1	0	1	0.001	0.001
05/16/11 08:29:02	59.97577	0	0	0	-653	30578.05	1	0	1	0.001	0.001
05/16/11 08:29:04	59.97641	0	0	0	-653	30578.05	1	0	1	0.001	0.001
05/16/11 08:29:06	59.97705	0	0	0	-653	30570.97	1	0	1	0.001	0.001
05/16/11 08:29:08	59.97675	0	0	0	-653	30570.97	1	0	1	0.000	0.000
05/16/11 08:29:10	59.97675	0	0	0	-653	30570.97	1	0	1	0.000	0.000
05/16/11 08:29:12	59.97675	0	0	0	-653	30570.97	1	0	1	0.000	0.000
05/16/11 08:29:14	59.9761	0	0	0	-653	30593.17	1	0	1	-0.001	0.001
05/16/11 08:29:16	59.9761	0	0	0	-653	30593.17	1	0	1	0.000	0.000
05/16/11 08:29:18	59.97641	0	0	0	-653	30593.17	1	0	1	0.000	0.000
05/16/11 08:29:20	59.97705	0	0	0	-653	30593.17	1	0	1	0.001	0.001
05/16/11 08:29:22	59.97803	0	0	0	-653	30575.07	1	0	1	0.001	0.001
05/16/11 08:29:24	59.98029	0	0	0	-653	30575.07	1	0	1	0.002	0.002
05/16/11 08:29:26	59.98318	0	0	0	-653	30575.07	1	0	1	0.003	0.003
05/16/11 08:29:28	59.98547	0	0	0	-653	30575.07	1	0	1	0.002	0.002
05/16/11 08:29:30	59.98709	0	0	0	-653	30575.07	1	0	1	0.002	0.002
05/16/11 08:29:32	59.98965	0	0	0	-653	30575.07	1	0	1	0.003	0.003
05/16/11 08:29:34	59.99225	0	0	0	-653	30575.72	1	0	1	0.003	0.003
05/16/11 08:29:36	59.99484	0	0	0	-653	30575.72	1	0	1	0.003	0.003
05/16/11 08:29:38	59.99646	0	0	0	-653	30575.72	1	0	1	0.002	0.002
05/16/11 08:29:40	59.99774	0	0	0	-653	30575.72	1	0	1	0.001	0.001
05/16/11 08:29:42	59.99966	0	0	0	-653	30583.84	1	1	1	0.002	0.002
05/16/11 08:29:44	60.00034	0	0	0	-653	30583.84	1	1	1	0.001	0.001
05/16/11 08:29:46	60.00128	0	0	0	-653	30586.4	1	1	1	0.001	0.001
05/16/11 08:29:48	60.00195	0	0	0	-653	30586.4	1	1	1	0.001	0.001
05/16/11 08:29:50	60.00226	0	0	0	-653	30586.4	1	1	1	0.000	0.000
05/16/11 08:29:52	60.0029	0	0	0	-653	30586.4	1	1	1	0.001	0.001
05/16/11 08:29:54	60.00354	0	0	0	-653	30589.72	1	1	1	0.001	0.001
05/16/11 08:29:56	60.00421	0	0	0	-653	30589.72	1	1	1	0.001	0.001
05/16/11 08:29:58	60.00452	0	0	0	-653	30589.72	1	1	1	0.000	0.000
05/16/11 08:30:00	60.00388	0	0	0	-653	30589.72	1	1	1	-0.001	0.001
05/16/11 08:30:02	60.00388	0	0	0	-653	30590.3	1	1	1	0.000	0.000
05/16/11 08:30:04	60.00421	0	0	0	-653	30590.3	1	1	1	0.000	0.000
05/16/11 08:30:06	60.00421	0	0	0	-653	30590.22	1	1	1	0.000	0.000
05/16/11 08:30:08	60.00388	0	0	0	-653	30590.22	1	1	1	0.000	0.000
05/16/11 08:30:10	60.00195	0	0	0	-653	30590.22	1	1	1	-0.002	0.002
05/16/11 08:30:12	59.99966	0	0	0	-653	30590.22	1	1	1	-0.002	0.002
05/16/11 08:30:14	59.99387	0	0	0	-653	30600.12	1	0	1	-0.006	0.006
05/16/11 08:30:16	59.99387	0	0	0	-653	30600.12	1	0	1	0.000	0.000
05/16/11 08:30:18	59.98999	0	0	0	-653	30600.12	1	0	1	-0.004	0.004
05/16/11 08:30:20	59.98868	0	0	0	-653	30600.12	1	0	1	-0.001	0.001

05/16/11 08:30:22	59.98709	0	0	0	-653	30603.38	1	0	1	-0.002	0.002
05/16/11 08:30:24	59.98578	0	0	0	-653	30603.38	1	0	1	-0.001	0.001
05/16/11 08:30:26	59.98578	0	0	0	-653	30597.09	1	0	1	0.000	0.000
05/16/11 08:30:28	59.98288	0	0	0	-653	30597.09	1	0	1	-0.003	0.003
05/16/11 08:30:30	59.97964	0	0	0	-653	30597.09	1	0	1	-0.003	0.003
05/16/11 08:30:32	59.97675	0	0	0	-653	30597.09	1	0	1	-0.003	0.003
05/16/11 08:30:34	59.97479	0	0	0	-653	30603.96	1	0	1	-0.002	0.002
05/16/11 08:30:36	59.97479	0	0	0	-653	30603.96	1	0	1	0.000	0.000
05/16/11 08:30:38	59.97641	0	0	0	-653	30603.96	1	0	1	0.002	0.002
05/16/11 08:30:40	59.97641	0	0	0	-653	30603.96	1	0	1	0.000	0.000
05/16/11 08:30:42	59.97543	0	0	0	-653	30607.96	1	0	1	-0.001	0.001
05/16/11 08:30:44	59.97351	0	0	0	-653	30607.96	1	0	1	-0.002	0.002
05/16/11 08:30:46	59.97318	0	0	0	-653	30601.98	1	0	1	0.000	0.000
05/16/11 08:30:48	59.97513	0	0	0	-653	30601.98	1	0	1	0.002	0.002
05/16/11 08:30:50	59.97641	0	0	0	-653	30597.09	1	0	1	0.001	0.001
05/16/11 08:30:52	59.97705	0	0	0	-653	30597.09	1	0	1	0.001	0.001
05/16/11 08:30:54	59.97867	0	0	0	-653	30607.96	1	0	1	0.002	0.002
05/16/11 08:30:56	59.97836	0	0	0	-653	30607.96	1	0	1	0.000	0.000
05/16/11 08:30:58	59.97803	0	0	0	-653	30607.96	1	0	1	0.000	0.000
05/16/11 08:31:00	59.97543	0	0	0	-653	30607.96	1	0	1	-0.003	0.003
05/16/11 08:31:02	59.97415	0	0	0	-653	30607.96	1	0	1	-0.001	0.001
05/16/11 08:31:04	59.97415	0	0	0	-653	30601.98	1	0	1	0.000	0.000
05/16/11 08:31:06	59.97479	0	0	0	-653	30601.98	1	0	1	0.001	0.001
05/16/11 08:31:08	59.97415	0	0	0	-653	30601.98	1	0	1	-0.001	0.001
05/16/11 08:31:10	59.97351	0	0	0	-653	30601.98	1	0	1	-0.001	0.001
05/16/11 08:31:12	59.97351	0	0	0	-653	30601.98	1	0	1	0.000	0.000
05/16/11 08:31:14	59.97543	0	0	0	-653	30632.79	1	0	1	0.002	0.002
05/16/11 08:31:16	59.97769	0	0	0	-653	30632.79	1	0	1	0.002	0.002
05/16/11 08:31:18	59.98062	0	0	0	-653	30632.79	1	0	1	0.003	0.003
05/16/11 08:31:20	59.98514	0	0	0	-653	30632.79	1	0	1	0.005	0.005
05/16/11 08:31:22	59.98773	0	0	0	-653	30632.79	1	0	1	0.003	0.003
05/16/11 08:31:24	59.98965	0	0	0	-653	30633.18	1	0	1	0.002	0.002
05/16/11 08:31:26	59.99097	0	0	0	-653	30633.18	1	0	1	0.001	0.001
05/16/11 08:31:28	59.99225	0	0	0	-653	30633.18	1	0	1	0.001	0.001
05/16/11 08:31:30	59.99323	0	0	0	-653	30633.18	1	0	1	0.001	0.001
05/16/11 08:31:32	59.99612	0	0	0	-653	30633.18	1	0	1	0.003	0.003
05/16/11 08:31:34	60.00034	0	0	0	-653	30620.6	1	1	1	0.004	0.004
05/16/11 08:31:36	60.00452	0	0	0	-653	30620.6	1	1	1	0.004	0.004
05/16/11 08:31:38	60.00809	0	0	0	-653	30620.6	1	1	1	0.004	0.004
05/16/11 08:31:40	60.01099	0	0	0	-653	30620.6	1	1	1	0.003	0.003
05/16/11 08:31:42	60.01389	0	0	0	-653	30620.6	1	1	1	0.003	0.003
05/16/11 08:31:44	60.01776	0	0	0	-653	30620.91	1	1	1	0.004	0.004
05/16/11 08:31:46	60.02069	0	0	0	-653	30620.91	1	1	1	0.003	0.003
05/16/11 08:31:48	60.02164	0	0	0	-653	30620.91	1	1	1	0.001	0.001
05/16/11 08:31:50	60.021	0	0	0	-653	30620.91	1	1	1	-0.001	0.001
05/16/11 08:31:52	60.01907	0	0	0	-653	30620.91	1	1	1	-0.002	0.002
05/16/11 08:31:54	60.0181	0	0	0	-653	30661.87	1	1	1	-0.001	0.001
05/16/11 08:31:56	60.0184	0	0	0	-653	30661.87	1	1	1	0.000	0.000
05/16/11 08:31:58	60.02069	0	0	0	-653	30661.87	1	1	1	0.002	0.002

05/16/11 08:32:00	60.0239	0	0	0	-653	30661.87	1	1	1	0.003	0.003
05/16/11 08:32:02	60.02618	0	0	0	-653	30661.87	1	1	1	0.002	0.002
05/16/11 08:32:04	60.02682	0	0	0	-653	30663.73	1	1	1	0.001	0.001
05/16/11 08:32:06	60.02649	0	0	0	-653	30663.73	1	1	1	0.000	0.000
05/16/11 08:32:08	60.02585	0	0	0	-653	30663.73	1	1	1	-0.001	0.001
05/16/11 08:32:10	60.02359	0	0	0	-653	30663.73	1	1	1	-0.002	0.002
05/16/11 08:32:12	60.02359	0	0	0	-653	30663.73	1	1	1	0.000	0.000
05/16/11 08:32:14	60.02164	0	0	0	-653	30659.84	1	1	1	-0.002	0.002
05/16/11 08:32:16	60.02231	0	0	0	-653	30659.84	1	1	1	0.001	0.001
05/16/11 08:32:18	60.02325	0	0	0	-653	30659.84	1	1	1	0.001	0.001
05/16/11 08:32:20	60.02359	0	0	0	-653	30659.84	1	1	1	0.000	0.000
05/16/11 08:32:22	60.02295	0	0	0	-653	30659.84	1	1	1	-0.001	0.001
05/16/11 08:32:24	60.02133	0	0	0	-653	30653.46	1	1	1	-0.002	0.002
05/16/11 08:32:26	60.021	0	0	0	-653	30653.46	1	1	1	0.000	0.000
05/16/11 08:32:28	60.021	0	0	0	-653	30653.46	1	1	1	0.000	0.000
05/16/11 08:32:30	60.02133	0	0	0	-653	30653.46	1	1	1	0.000	0.000
05/16/11 08:32:32	60.021	0	0	0	-653	30653.46	1	1	1	0.000	0.000
05/16/11 08:32:34	60.02036	0	0	0	-653	30661.6	1	1	1	-0.001	0.001
05/16/11 08:32:36	60.02002	0	0	0	-653	30661.6	1	1	1	0.000	0.000
05/16/11 08:32:38	60.01938	0	0	0	-653	30661.6	1	1	1	-0.001	0.001
05/16/11 08:32:40	60.0184	0	0	0	-653	30661.6	1	1	1	-0.001	0.001
05/16/11 08:32:42	60.01712	0	0	0	-653	30661.6	1	1	1	-0.001	0.001
05/16/11 08:32:44	60.01584	0	0	0	-653	30655.51	1	1	1	-0.001	0.001
05/16/11 08:32:46	60.01486	0	0	0	-653	30655.51	1	1	1	-0.001	0.001
05/16/11 08:32:48	60.01453	0	0	0	-653	30655.51	1	1	1	0.000	0.000
05/16/11 08:32:50	60.01486	0	0	0	-653	30655.51	1	1	1	0.000	0.000
05/16/11 08:32:52	60.01453	0	0	0	-653	30655.51	1	1	1	0.000	0.000
05/16/11 08:32:54	60.01486	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:32:56	60.0152	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:32:58	60.01486	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:33:00	60.0152	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:33:02	60.0152	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:33:04	60.01648	0	0	0	-653	30648.29	1	1	1	0.001	0.001
05/16/11 08:33:06	60.01614	0	0	0	-653	30648.29	1	1	1	0.000	0.000
05/16/11 08:33:08	60.0152	0	0	0	-653	30648.29	1	1	1	-0.001	0.001
05/16/11 08:33:10	60.01486	0	0	0	-653	30648.29	1	1	1	0.000	0.000
05/16/11 08:33:12	60.01453	0	0	0	-653	30648.29	1	1	1	0.000	0.000
05/16/11 08:33:14	60.01291	0	0	0	-653	30652.04	1	1	1	-0.002	0.002
05/16/11 08:33:16	60.01099	0	0	0	-653	30652.04	1	1	1	-0.002	0.002
05/16/11 08:33:18	60.00775	0	0	0	-653	30652.04	1	1	1	-0.003	0.003
05/16/11 08:33:20	60.00421	0	0	0	-653	30652.04	1	1	1	-0.004	0.004
05/16/11 08:33:22	60.00162	0	0	0	-653	30652.04	1	1	1	-0.003	0.003
05/16/11 08:33:24	60	0	0	0	-653	30651.84	1	1	1	-0.002	0.002
05/16/11 08:33:26	59.99774	0	0	0	-653	30651.84	1	0	1	-0.002	0.002
05/16/11 08:33:28	59.99515	0	0	0	-653	30651.84	1	0	1	-0.003	0.003
05/16/11 08:33:30	59.99255	0	0	0	-653	30651.84	1	0	1	-0.003	0.003
05/16/11 08:33:32	59.9903	0	0	0	-653	30651.84	1	0	1	-0.002	0.002
05/16/11 08:33:34	59.98676	0	0	0	-653	30633.8	1	0	1	-0.004	0.004
05/16/11 08:33:36	59.98352	0	0	0	-653	30633.8	1	0	1	-0.003	0.003

05/16/11 08:33:38	59.98062	0	0	0	-653	30633.8	1	0	1	-0.003	0.003
05/16/11 08:33:40	59.97964	0	0	0	-653	30633.8	1	0	1	-0.001	0.001
05/16/11 08:33:42	59.97867	0	0	0	-653	30633.8	1	0	1	-0.001	0.001
05/16/11 08:33:44	59.97705	0	0	0	-653	30627.71	1	0	1	-0.002	0.002
05/16/11 08:33:46	59.97641	0	0	0	-653	30627.71	1	0	1	-0.001	0.001
05/16/11 08:33:48	59.97675	0	0	0	-653	30627.71	1	0	1	0.000	0.000
05/16/11 08:33:50	59.97641	0	0	0	-653	30627.71	1	0	1	0.000	0.000
05/16/11 08:33:52	59.97577	0	0	0	-653	30627.71	1	0	1	-0.001	0.001
05/16/11 08:33:54	59.97479	0	0	0	-653	30634.13	1	0	1	-0.001	0.001
05/16/11 08:33:56	59.97415	0	0	0	-653	30634.13	1	0	1	-0.001	0.001
05/16/11 08:33:58	59.97287	0	0	0	-653	30634.13	1	0	1	-0.001	0.001
05/16/11 08:34:00	59.97125	0	0	0	-653	30634.13	1	0	1	-0.002	0.002
05/16/11 08:34:02	59.97092	0	0	0	-653	30634.13	1	0	1	0.000	0.000
05/16/11 08:34:04	59.97125	0	0	0	-653	30627.05	1	0	1	0.000	0.000
05/16/11 08:34:06	59.97061	0	0	0	-653	30627.05	1	0	1	-0.001	0.001
05/16/11 08:34:08	59.97092	0	0	0	-653	30627.05	1	0	1	0.000	0.000
05/16/11 08:34:10	59.97125	0	0	0	-653	30627.05	1	0	1	0.000	0.000
05/16/11 08:34:12	59.97156	0	0	0	-653	30627.05	1	0	1	0.000	0.000
05/16/11 08:34:14	59.97253	0	0	0	-653	30662.72	1	0	1	0.001	0.001
05/16/11 08:34:16	59.97449	0	0	0	-653	30662.72	1	0	1	0.002	0.002
05/16/11 08:34:18	59.97577	0	0	0	-653	30662.72	1	0	1	0.001	0.001
05/16/11 08:34:20	59.97641	0	0	0	-653	30662.72	1	0	1	0.001	0.001
05/16/11 08:34:22	59.97641	0	0	0	-653	30662.72	1	0	1	0.000	0.000
05/16/11 08:34:24	59.97513	0	0	0	-653	30656.52	1	0	1	-0.001	0.001
05/16/11 08:34:26	59.9761	0	0	0	-653	30656.52	1	0	1	0.001	0.001
05/16/11 08:34:28	59.979	0	0	0	-653	30656.52	1	0	1	0.003	0.003
05/16/11 08:34:30	59.98126	0	0	0	-653	30656.52	1	0	1	0.002	0.002
05/16/11 08:34:32	59.98224	0	0	0	-653	30656.52	1	0	1	0.001	0.001
05/16/11 08:34:34	59.98254	0	0	0	-653	30642.25	1	0	1	0.000	0.000
05/16/11 08:34:36	59.98254	0	0	0	-653	30642.25	1	0	1	0.000	0.000
05/16/11 08:34:38	59.9816	0	0	0	-653	30642.25	1	0	1	-0.001	0.001
05/16/11 08:34:40	59.98029	0	0	0	-653	30642.25	1	0	1	-0.001	0.001
05/16/11 08:34:42	59.97964	0	0	0	-653	30642.25	1	0	1	-0.001	0.001
05/16/11 08:34:44	59.98062	0	0	0	-653	30642.49	1	0	1	0.001	0.001
05/16/11 08:34:46	59.98093	0	0	0	-653	30642.49	1	0	1	0.000	0.000
05/16/11 08:34:48	59.98029	0	0	0	-653	30642.49	1	0	1	-0.001	0.001
05/16/11 08:34:50	59.97931	0	0	0	-653	30642.49	1	0	1	-0.001	0.001
05/16/11 08:34:52	59.97836	0	0	0	-653	30642.49	1	0	1	-0.001	0.001
05/16/11 08:34:54	59.97803	0	0	0	-653	30645.72	1	0	1	0.000	0.000
05/16/11 08:34:56	59.97803	0	0	0	-653	30645.72	1	0	1	0.000	0.000
05/16/11 08:34:58	59.97867	0	0	0	-653	30645.72	1	0	1	0.001	0.001
05/16/11 08:35:00	59.97964	0	0	0	-653	30645.72	1	0	1	0.001	0.001
05/16/11 08:35:02	59.98062	0	0	0	-653	30645.72	1	0	1	0.001	0.001
05/16/11 08:35:04	59.98126	0	0	0	-653	30648.55	1	0	1	0.001	0.001
05/16/11 08:35:06	59.98224	0	0	0	-653	30648.55	1	0	1	0.001	0.001
05/16/11 08:35:08	59.98416	0	0	0	-653	30648.55	1	0	1	0.002	0.002
05/16/11 08:35:10	59.98547	0	0	0	-653	30648.55	1	0	1	0.001	0.001
05/16/11 08:35:12	59.98578	0	0	0	-653	30648.55	1	0	1	0.000	0.000
05/16/11 08:35:14	59.98578	0	0	0	-653	30661.06	1	0	1	0.000	0.000

05/16/11 08:35:16	59.98676	0	0	0	-653	30661.06	1	0	1	0.001	0.001
05/16/11 08:35:18	59.99063	0	0	0	-653	30661.06	1	0	1	0.004	0.004
05/16/11 08:35:20	59.99417	0	0	0	-653	30661.06	1	0	1	0.004	0.004
05/16/11 08:35:22	59.99805	0	0	0	-653	30661.06	1	0	1	0.004	0.004
05/16/11 08:35:24	59.99966	0	0	0	-653	30661.06	1	1	1	0.002	0.002
05/16/11 08:35:26	60.00226	0	0	0	-653	30661.06	1	1	1	0.003	0.003
05/16/11 08:35:28	60.00195	0	0	0	-653	30661.06	1	1	1	0.000	0.000
05/16/11 08:35:30	60.00098	0	0	0	-653	30661.06	1	1	1	-0.001	0.001
05/16/11 08:35:32	59.99936	0	0	0	-653	30661.06	1	1	1	-0.002	0.002
05/16/11 08:35:34	59.99872	0	0	0	-653	30684.31	1	1	1	-0.001	0.001
05/16/11 08:35:36	59.99774	0	0	0	-653	30684.31	1	0	1	-0.001	0.001
05/16/11 08:35:38	59.99741	0	0	0	-653	30684.31	1	0	1	0.000	0.000
05/16/11 08:35:40	59.99741	0	0	0	-653	30684.31	1	0	1	0.000	0.000
05/16/11 08:35:42	59.99838	0	0	0	-653	30684.31	1	0	1	0.001	0.001
05/16/11 08:35:44	59.99966	0	0	0	-653	30686.83	1	1	1	0.001	0.001
05/16/11 08:35:46	60.00064	0	0	0	-653	30686.83	1	1	1	0.001	0.001
05/16/11 08:35:48	60.00098	0	0	0	-653	30686.83	1	1	1	0.000	0.000
05/16/11 08:35:50	60.00064	0	0	0	-653	30686.83	1	1	1	0.000	0.000
05/16/11 08:35:52	60	0	0	0	-653	30686.83	1	1	1	-0.001	0.001
05/16/11 08:35:54	59.99936	0	0	0	-653	30678.05	1	1	1	-0.001	0.001
05/16/11 08:35:56	59.99741	0	0	0	-653	30678.05	1	0	1	-0.002	0.002
05/16/11 08:35:58	59.99484	0	0	0		30678.05	1	0	1	-0.003	0.003
05/16/11 08:36:00	59.99289	0	0	0		30678.05	1	0	1	-0.002	0.002
05/16/11 08:36:02	59.99097	0	0	0		30678.05	1	0	1	-0.002	0.002
05/16/11 08:36:04	59.98965	0	0	0		30679.19	1	0	1	-0.001	0.001
05/16/11 08:36:06	59.98804	0	0	0		30679.19	1	0	1	-0.002	0.002
05/16/11 08:36:08	59.98773	0	0	0		30679.19	1	0	1	0.000	0.000
05/16/11 08:36:10	59.98804	0	0	0		30679.19	1	0	1	0.000	0.000
05/16/11 08:36:12	59.98901	0	0	0		30679.19	1	0	1	0.001	0.001
05/16/11 08:36:14	59.99063	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:16	59.99255	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:18	59.99484	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:20	59.99677	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:22	59.99838	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:24	59.99872	0	0	0		30684.99	1	1	1	0.000	0.000
05/16/11 08:36:26	59.99872	0	0	0		30684.99	1	1	1	0.000	0.000
05/16/11 08:36:28	59.99936	0	0	0		30684.99	1	1	1	0.001	0.001
05/16/11 08:36:30	60.00195	0	0	0		30684.99	1	1	1	0.003	0.003
05/16/11 08:36:32	60.00485	0	0	0		30684.99	1	1	1	0.003	0.003
05/16/11 08:36:34	60.00809	0	0	0		30687.29	1	1	1	0.003	0.003
05/16/11 08:36:36	60.01099	0	0	0		30687.29	1	1	1	0.003	0.003
05/16/11 08:36:38	60.01324	0	0	0		30687.29	1	1	1	0.002	0.002
05/16/11 08:36:40	60.01422	0	0	0		30687.29	1	1	1	0.001	0.001
05/16/11 08:36:42	60.01486	0	0	0		30687.29	1	1	1	0.001	0.001
05/16/11 08:36:44	60.01453	0	0	0		30687.59	1	1	1	0.000	0.000
05/16/11 08:36:46	60.01227	0	0	0		30687.59	1	1	1	-0.002	0.002
05/16/11 08:36:48	60.01099	0	0	0		30687.59	1	1	1	-0.001	0.001
05/16/11 08:36:50	60.01099	0	0	0		30687.59	1	1	1	0.000	0.000
05/16/11 08:36:52	60.01227	0	0	0		30687.59	1	1	1	0.001	0.001

05/16/11 08:36:54	60.01227	0	0	0	30726.76	1	1	1	0.000	0.000
05/16/11 08:36:56	60.01163	0	0	0	30726.76	1	1	1	-0.001	0.001
05/16/11 08:36:58	60.01132	0	0	0	30726.76	1	1	1	0.000	0.000
05/16/11 08:37:00	60.01132	0	0	0	30726.76	1	1	1	0.000	0.000
05/16/11 08:37:02	60.01065	0	0	0	30726.76	1	1	1	-0.001	0.001
05/16/11 08:37:04	60.00903	0	0	0	30726.82	1	1	1	-0.002	0.002
05/16/11 08:37:06	60.00839	0	0	0	30726.82	1	1	1	-0.001	0.001
05/16/11 08:37:08	60.00809	0	0	0	30726.82	1	1	1	0.000	0.000
05/16/11 08:37:10	60.00809	0	0	0	30726.82	1	1	1	0.000	0.000
05/16/11 08:37:12	60.00937	0	0	0	30726.82	1	1	1	0.001	0.001
05/16/11 08:37:14	60.01099	0	0	0	30720.93	1	1	1	0.002	0.002
05/16/11 08:37:16	60.01227	0	0	0	30720.93	1	1	1	0.001	0.001
05/16/11 08:37:18	60.01291	0	0	0	30720.93	1	1	1	0.001	0.001
05/16/11 08:37:20	60.0126	0	0	0	30720.93	1	1	1	0.000	0.000
05/16/11 08:37:22	60.01132	0	0	0	30720.93	1	1	1	-0.001	0.001
05/16/11 08:37:24	60.0097	0	0	0	30720.53	1	1	1	-0.002	0.002
05/16/11 08:37:26	60.00613	0	0	0	30720.53	1	1	1	-0.004	0.004
05/16/11 08:37:28	60.00259	0	0	0	30720.53	1	1	1	-0.004	0.004
05/16/11 08:37:30	59.99936	0	0	0	30720.53	1	1	1	-0.003	0.003
05/16/11 08:37:32	59.99902	0	0	0	30720.53	1	1	1	0.000	0.000
05/16/11 08:37:34	60.00034	0	0	0	30720.62	1	1	1	0.001	0.001
05/16/11 08:37:36	60.00064	0	0	0	30720.62	1	1	1	0.000	0.000
05/16/11 08:37:38	59.99936	0	0	0	30720.62	1	1	1	-0.001	0.001
05/16/11 08:37:40	59.99741	0	0	0	30720.62	1	0	1	-0.002	0.002
05/16/11 08:37:42	59.99579	0	0	0	30720.62	1	0	1	-0.002	0.002
05/16/11 08:37:44	59.99387	0	0	0	30721.15	1	0	1	-0.002	0.002
05/16/11 08:37:46	59.99255	0	0	0	30721.15	1	0	1	-0.001	0.001
05/16/11 08:37:48	59.99191	0	0	0	30721.15	1	0	1	-0.001	0.001
05/16/11 08:37:50	59.99255	0	0	0	30721.15	1	0	1	0.001	0.001
05/16/11 08:37:52	59.99548	0	0	0	30721.15	1	0	1	0.003	0.003
05/16/11 08:37:54	60	0	0	0	30726.87	1	1	1	0.005	0.005
05/16/11 08:37:56	60.00323	0	0	0	30726.87	1	1	1	0.003	0.003
05/16/11 08:37:58	60.00516	0	0	0	30726.87	1	1	1	0.002	0.002
05/16/11 08:38:00	60.00485	0	0	0	30726.87	1	1	1	0.000	0.000
05/16/11 08:38:02	60.00354	0	0	0	30726.87	1	1	1	-0.001	0.001
05/16/11 08:38:04	60.00226	0	0	0	30734.84	1	1	1	-0.001	0.001
05/16/11 08:38:06	60.00098	0	0	0	30734.84	1	1	1	-0.001	0.001
05/16/11 08:38:08	60	0	0	0	30734.84	1	1	1	-0.001	0.001
05/16/11 08:38:10	59.99966	0	0	0	30734.84	1	1	1	0.000	0.000
05/16/11 08:38:12	59.99966	0	0	0	30734.84	1	1	1	0.000	0.000
05/16/11 08:38:14	59.99774	0	0	0	30757.45	1	0	1	-0.002	0.002
05/16/11 08:38:16	59.9971	0	0	0	30757.45	1	0	1	-0.001	0.001
05/16/11 08:38:18	59.99741	0	0	0	30757.45	1	0	1	0.000	0.000
05/16/11 08:38:20	59.99805	0	0	0	30757.45	1	0	1	0.001	0.001
05/16/11 08:38:22	59.99872	0	0	0	30757.45	1	1	1	0.001	0.001
05/16/11 08:38:24	59.99936	0	0	0	30757.92	1	1	1	0.001	0.001
05/16/11 08:38:26	60	0	0	0	30757.92	1	1	1	0.001	0.001
05/16/11 08:38:28	60.00162	0	0	0	30757.92	1	1	1	0.002	0.002
05/16/11 08:38:30	60.00323	0	0	0	30757.92	1	1	1	0.002	0.002

05/16/11 08:38:32	60.00388	0	0	0	30757.92	1	1	1	0.001	0.001
05/16/11 08:38:34	60.00485	0	0	0	30752.27	1	1	1	0.001	0.001
05/16/11 08:38:36	60.00549	0	0	0	30752.27	1	1	1	0.001	0.001
05/16/11 08:38:38	60.00613	0	0	0	30752.27	1	1	1	0.001	0.001
05/16/11 08:38:40	60.00647	0	0	0	30752.27	1	1	1	0.000	0.000
05/16/11 08:38:42	60.00677	0	0	0	30752.27	1	1	1	0.000	0.000
05/16/11 08:38:44	60.00677	0	0	0	30752.33	1	1	1	0.000	0.000
05/16/11 08:38:46	60.00613	0	0	0	30752.33	1	1	1	-0.001	0.001
05/16/11 08:38:48	60.00549	0	0	0	30752.33	1	1	1	-0.001	0.001
05/16/11 08:38:50	60.00485	0	0	0	30752.33	1	1	1	-0.001	0.001
05/16/11 08:38:52	60.00485	0	0	0	30752.33	1	1	1	0.000	0.000
05/16/11 08:38:54	60.00613	0	0	0	30755.63	1	1	1	0.001	0.001
05/16/11 08:38:56	60.01001	0	0	0	30755.63	1	1	1	0.004	0.004
05/16/11 08:38:58	60.01324	0	0	0	30755.63	1	1	1	0.003	0.003
05/16/11 08:39:00	60.01614	0	0	0	30755.63	1	1	1	0.003	0.003
05/16/11 08:39:02	60.0184	0	0	0	30755.63	1	1	1	0.002	0.002
05/16/11 08:39:04	60.01971	0	0	0	30755.66	1	1	1	0.001	0.001
05/16/11 08:39:06	60.021	0	0	0	30755.66	1	1	1	0.001	0.001
05/16/11 08:39:08	60.02133	0	0	0	30755.66	1	1	1	0.000	0.000
05/16/11 08:39:10	60.02197	0	0	0	30755.66	1	1	1	0.001	0.001
05/16/11 08:39:12	60.02359	0	0	0	30755.66	1	1	1	0.002	0.002
05/16/11 08:39:14	60.02682	0	0	0	30784.89	1	1	1	0.003	0.003
05/16/11 08:39:16	60.0307	0	0	0	30784.89	1	1	1	0.004	0.004
05/16/11 08:39:18	60.0336	0	0	0	30784.89	1	1	1	0.003	0.003
05/16/11 08:39:20	60.03424	0	0	0	30784.89	1	1	1	0.001	0.001
05/16/11 08:39:22	60.03326	0	0	0	30784.89	1	1	1	-0.001	0.001
05/16/11 08:39:24	60.0307	0	0	0	30786.98	1	1	1	-0.003	0.003
05/16/11 08:39:26	60.02875	0	0	0	30786.98	1	1	1	-0.002	0.002
05/16/11 08:39:28	60.02875	0	0	0	30786.98	1	1	1	0.000	0.000
05/16/11 08:39:30	60.02939	0	0	0	30786.98	1	1	1	0.001	0.001
05/16/11 08:39:32	60.02908	0	0	0	30786.98	1	1	1	0.000	0.000
05/16/11 08:39:34	60.02844	0	0	0	30796.28	1	1	1	-0.001	0.001
05/16/11 08:39:36	60.02777	0	0	0	30796.28	1	1	1	-0.001	0.001
05/16/11 08:39:38	60.02811	0	0	0	30796.28	1	1	1	0.000	0.000
05/16/11 08:39:40	60.02777	0	0	0	30796.28	1	1	1	0.000	0.000
05/16/11 08:39:42	60.02777	0	0	0	30796.28	1	1	1	0.000	0.000
05/16/11 08:39:44	60.02777	0	0	0	30792.94	1	1	1	0.000	0.000
05/16/11 08:39:46	60.02747	0	0	0	30792.94	1	1	1	0.000	0.000
05/16/11 08:39:48	60.02713	0	0	0	30792.94	1	1	1	0.000	0.000
05/16/11 08:39:50	60.02618	0	0	0	30792.94	1	1	1	-0.001	0.001
05/16/11 08:39:52	60.02521	0	0	0	30792.94	1	1	1	-0.001	0.001
05/16/11 08:39:54	60.02457	0	0	0	30803.58	1	1	1	-0.001	0.001
05/16/11 08:39:56	60.02487	0	0	0	30803.58	1	1	1	0.000	0.000
05/16/11 08:39:58	60.02551	0	0	0	30803.58	1	1	1	0.001	0.001
05/16/11 08:40:00	60.02618	0	0	0	30803.58	1	1	1	0.001	0.001

Balancing Authority Name: MyBA

MyBA_110516_0806_FRS_Form2.9.xlsm

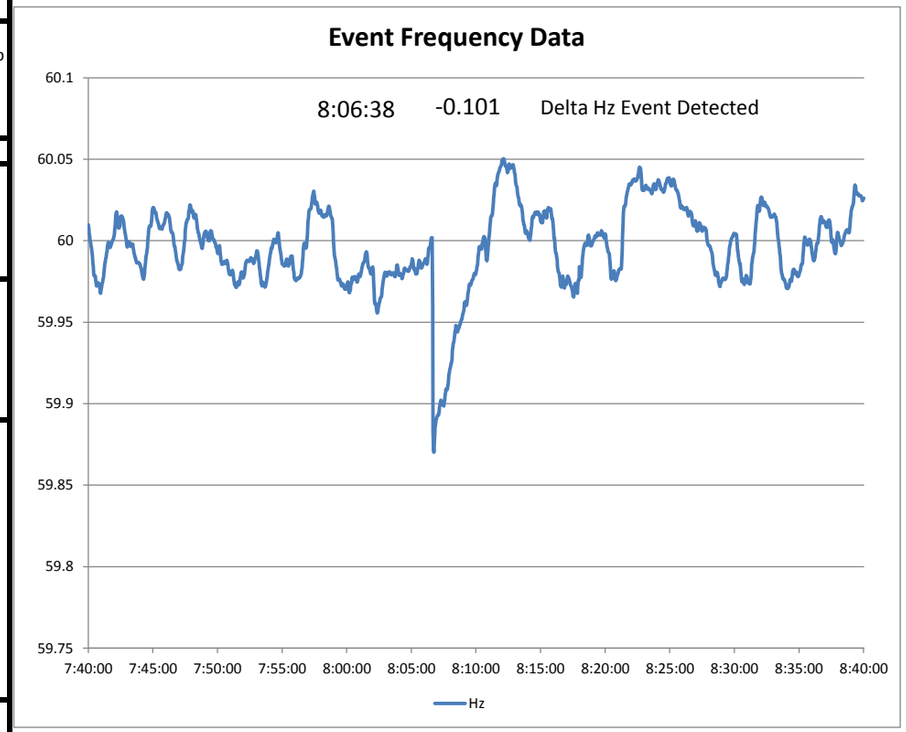
Interconnection Prevailing UFLS First Step Relay trip point 58.500 Hz

Interconnection High Relay trip point 61.500 Hz

Note: See "Instruction" tab for more detailed instructions.

	Auto	**Event Detection**
8:06:38	1245	Manually selected row number of the Event Starting Time.
8:10:30	1442	Manually selected row number of the Event Ending Time.

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



11/05/16 Date yymmdd

8:06 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_110516_0806_FRS_Form2.9.xlsm

Auto
Manual

Date:	Monday, May 16, 2011		Balancing Authority	MyBA		A Point
Time of T(0)	8:06:38		Grid Nominal Frequency	60.000 Hz		FPointA
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30					A Value
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999 Hz		Droop Setting	5.00%	3.00000 Hz	C Value
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897 Hz		Deadband Setting	0.000 Hz		Delta FC
Pre to Post Perturbation Delta Frequency Actual	-0.101 Hz		Hz Span	3.00000 Hz		
Value A Pre-Perturbation Average Contingent MW [T(-2) to T(-16)]	471.09 MW					
Value B Post-Perturbation Average Contingent MW [T(+20 to T(+52)]	0.00 MW					
Pre to Post Perturbation Contingent Delta MW Actual	-471.09 MW					
Initial Performance Ramp Magnitude Adjustment	-0.06 MW					
EPFR Pre-Perturbation Average	8.97 MW					
EPFR Post-Perturbation Average	671.54 MW					
EPFR Delta	662.57 MW		TC (frequency response filter constant)	0.350	Time Constant for delayed delivery of PFR during Sustained Measure	

			Low Hz	Delta Hz Event
			0.00	Actual Interchange MW Average during frequency recovery period
			617.52	Target Interchange MW Average during frequency recovery period
EPFR = Expected Primary Frequency Response	EPFR(Final)	662.51 MW	226.52	Interchange Average Ramp MW during frequency recovery period
MW Response in right direction for frequency delta		Yes	470.90	Actual MW @ T(-4)
			-494.59	Starting and Ending Difference in Interchange MW during frequency recovery per
			0:03:52	Event Duration (h:mm:ss)
			No	Target MW Average minus MW @ T(-4) less than zero
			641.21	Interchange Target Relative Average Change - MW (Low Frequency Event)
			23.69	Interchange Actual Relative Average Change - MW (Low Frequency Event)
			Yes	Interchange Actual Average minus MW @ T(-4) less than zero
			No	Interchange Average MW minus MW @ T(-4) greater than zero
			Yes	Interchange Target MW Average minus MW @ T(-4) greater than zero
			146.62	Interchange Target Relative Average Change - MW (High Frequency Event)
			-470.90	Interchange Actual Relative Average Change - MW (High Frequency Event)
			Down	Ramp Direction during frequency recovery period

Initial Response P.U. Performance			0.711 P.U.							0.738 P.U.	Sustianed Response P.U. Performance					

	T	Frequency Hz	Contingent Resource Lost MW	Value B 20 to 52 sec Average Frequency	Average MW	Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW
T-72 sec	8:05:26	59.98029	471.000			19590	128.735	45.057						
T-70 sec	8:05:28	59.98224	471.000			19590	115.981	69.880						
T-68 sec	8:05:30	59.98352	471.000			19590	107.611	83.086						

T-66 sec	8:05:32	59.98578	471.000			19590	92.864	86.509										
T-64 sec	8:05:34	59.9874	471.000			19590	82.303	85.036										
T-62 sec	8:05:36	59.98804	471.000			19590	78.118	82.615										
T-60 sec	8:05:38	59.9874	471.000			19590	82.303	82.506		2.947	471.000							
T-58 sec	8:05:40	59.98611	471.000			19590	90.672	85.364		2.947	476.805							
T-56 sec	8:05:42	59.9848	471.000			19590	99.241	90.221		2.947	484.609							
T-54 sec	8:05:44	59.98352	471.000			19590	107.611	96.308		2.947	493.643							
T-52 sec	8:05:46	59.98318	471.000			19590	109.803	101.031		2.947	501.313							
T-50 sec	8:05:48	59.98352	471.000			19590	107.611	103.334		2.947	506.563							
T-48 sec	8:05:50	59.98416	471.300			19590	103.426	103.366		2.947	509.542							
T-46 sec	8:05:52	59.98514	471.300			19590	97.049	101.155		2.947	510.278							
T-44 sec	8:05:54	59.98547	471.300			19590	94.857	98.951		2.947	511.020							
T-42 sec	8:05:56	59.98642	471.300			19590	88.680	95.356		2.947	510.372							
T-40 sec	8:05:58	59.98676	471.900			19590	86.487	92.252		2.947	510.215							
T-38 sec	8:06:00	59.9874	471.900			19590	82.303	88.770		2.947	509.680							
T-36 sec	8:06:02	59.98773	471.900			19590	80.110	85.739		2.947	509.596							
T-34 sec	8:06:04	59.98901	471.900			19590	71.741	80.840		2.947	507.643							
T-32 sec	8:06:06	59.98901	471.900			19590	71.741	77.655		2.947	507.406							
T-30 sec	8:06:08	59.98804	471.400			19590	78.118	77.817		2.947	510.515							
T-28 sec	8:06:10	59.98642	471.400			19590	88.680	81.619		2.947	517.263							
T-26 sec	8:06:12	59.98547	471.400			19590	94.857	86.252		2.947	524.844							
T-24 sec	8:06:14	59.98642	471.400			19590	88.680	87.102		2.947	528.640							
T-22 sec	8:06:16	59.98935	471.400			19590	69.549	80.958		2.947	525.443							
T-20 sec	8:06:18	59.99225	471.400			19590	50.617	70.339		2.947	517.771							
T-18 sec	8:06:20	59.99515	471.400			19590	31.685	56.810		2.947	507.189							
T-16 sec	8:06:22	59.99579	471.400	59.999	471.09	19590	27.501	46.552		2.947	499.878							
T-14 sec	8:06:24	59.99515	471.400	59.999	471.09	19590	31.685	41.349		2.947	497.621							
T-12 sec	8:06:26	59.99548	471.400	59.999	471.09	19590	29.493	37.199		2.947	496.419							
T-10 sec	8:06:28	59.99741	470.900	59.999	471.09	19590	16.939	30.108		2.947	492.275							
T-08 sec	8:06:30	60	470.900	59.999	471.09	19590	0.000	19.570		2.947	484.684							
T-06 sec	8:06:32	60.00162	470.900	59.999	471.09	19590	-10.562	9.024		2.947	477.084							
T-04 sec	8:06:34	60.00162	470.900	59.999	471.09	19590	-10.562	2.169		2.947	473.176							
T-02 sec	8:06:36	60.00195	470.900	59.999	471.09	19590	-12.754	-3.054		2.947	470.900							
T+0 sec	8:06:38	59.95963	0.000			19590	263.647	90.291		0.000	564.245							
T+02 sec	8:06:40	59.88144	0.000			19590	774.227	329.669		-4.264	799.359	0.000	681.802	471.678	471.678			
T+04 sec	8:06:42	59.87237	0.000			19590	833.413	505.979		-4.264	971.406	0.000	778.337	467.414	469.546			
T+06 sec	8:06:44	59.87011	0.000			19590	848.160	625.742		-4.264	1086.905	0.000	855.479	463.151	467.414			
T+08 sec	8:06:46	59.87011	0.000			19590	848.160	703.588		-4.264	1160.488	0.000	916.481	458.887	465.282			
T+10 sec	8:06:48	59.87432	0.000			19590	820.659	744.563		-4.264	1197.199	0.000	963.267	454.623	463.151			
T+12 sec	8:06:50	59.88076	0.000			19590	778.611	756.480		-4.264	1204.852	0.000	997.779	450.360	461.019			
T+14 sec	8:06:52	59.88531	0.000			19590	748.918	753.833		-4.264	1197.942	0.000	1022.800	446.096	458.887			
T+16 sec	8:06:54	59.88787	0.000			19590	732.179	746.254		-4.264	1186.099	0.000	1040.944	441.832	456.755			
T+18 sec	8:06:56	59.88949	0.000			19590	721.617	737.631		-4.264	1173.212	0.000	1054.171	437.568	454.623			
T+20 sec	8:06:58	59.8908	0.000	59.897	0.00	19590	713.048	729.027	653.00	-4.264	1160.344	0.000	1063.823	433.305	452.491			
T+22 sec	8:07:00	59.89175	0.000	59.897	0.00	19590	706.870	721.272	653.00	-4.264	1148.326	0.000	1070.865	429.041	450.360			
T+24 sec	8:07:02	59.89242	0.000	59.897	0.00	19590	702.486	714.697	653.00	-4.264	1137.487	0.000	1075.990	424.777	448.228			

T+26 sec	8:07:04	59.89306	0.000	59.897	0.00	19590	698.301	708.959	653.00	-4.264	1127.485	0.000	1079.668	420.514	446.096
T+28 sec	8:07:06	59.89306	0.000	59.897	0.00	19590	698.301	705.229	653.00	-4.264	1119.491	0.000	1082.323	416.250	443.964
T+30 sec	8:07:08	59.89306	0.000	59.897	0.00	19590	698.301	702.804	653.00	-4.264	1112.803	0.000	1084.228	411.986	441.832
T+32 sec	8:07:10	59.89532	0.000	59.897	0.00	19590	683.555	696.067	653.00	-4.264	1101.802	0.000	1085.261	407.723	439.700
T+34 sec	8:07:12	59.89788	0.000	59.897	0.00	19590	666.815	685.829	653.00	-4.264	1087.300	0.000	1085.375	403.459	437.568
T+36 sec	8:07:14	59.8995	0.000	59.897	0.00	19590	656.253	675.477	653.00	-4.264	1072.685	0.000	1084.707	399.195	435.437
T+38 sec	8:07:16	59.90081	0.000	59.897	0.00	19590	647.684	665.750	653.00	-4.264	1058.694	0.000	1083.406	394.932	433.305
T+40 sec	8:07:18	59.9021	0.000	59.897	0.00	19590	639.314	656.497	653.00	-4.264	1045.178	0.000	1081.586	390.668	431.173
T+42 sec	8:07:20	59.90179	0.000	59.897	0.00	19590	641.307	651.181	653.00	-4.264	1035.598	0.000	1079.495	386.404	429.041
T+44 sec	8:07:22	59.90081	0.000	59.897	0.00	19590	647.684	649.957	653.00	-4.264	1030.110	0.000	1077.348	382.141	426.909
T+46 sec	8:07:24	59.90081	0.000	59.897	0.00	19590	647.684	649.162	653.00	-4.264	1025.051	0.000	1075.169	377.877	424.777
T+48 sec	8:07:26	59.90048	0.000	59.897	0.00	19590	649.876	649.412	653.00	-4.264	1021.037	0.000	1073.004	373.613	422.646
T+50 sec	8:07:28	59.8992	0.000	59.897	0.00	19590	658.246	652.504	653.00	-4.264	1019.866	0.000	1070.960	369.350	420.514
T+52 sec	8:07:30	59.89886	0.000	59.897	0.00	19590	660.438	655.281	653.00	-4.264	1018.379	0.000	1069.013	365.086	418.382
T+54 sec	8:07:32	59.89856	0.000			19590	662.431	657.783		-4.264	1016.618	0.000	1067.141	360.822	416.250
T+56 sec	8:07:34	59.90017	0.000			19590	651.869	655.713		-4.264	1010.284	0.000	1065.181	356.559	414.118
T+58 sec	8:07:36	59.90243	0.000			19590	637.122	649.207		-4.264	999.514	0.000	1062.992	352.295	411.986
T+60 sec	8:07:38	59.90469	0.000			19590	622.376	639.816		-4.264	985.859	0.000	1060.504	348.031	409.855
T+62 sec	8:07:40	59.90695	0.000			19590	607.629	628.550		-4.264	970.330	0.000	1057.686	343.768	407.723
T+64 sec	8:07:42	59.90887	0.000			19590	595.074	616.834		-4.264	954.350	0.000	1054.555	339.504	405.591
T+66 sec	8:07:44	59.90921	0.000			19590	592.882	608.451		-4.264	941.703	0.000	1051.235	335.240	403.459
T+68 sec	8:07:46	59.90857	0.000			19590	597.067	604.466		-4.264	933.456	0.000	1047.870	330.977	401.327
T+70 sec	8:07:48	59.90887	0.000			19590	595.074	601.179		-4.264	925.905	0.000	1044.482	326.713	399.195
T+72 sec	8:07:50	59.91018	0.000			19590	586.505	596.043		-4.264	916.505	0.000	1041.023	322.449	397.064
T+74 sec	8:07:52	59.91244	0.000			19590	571.759	587.544		-4.264	903.742	0.000	1037.411	318.186	394.932
T+76 sec	8:07:54	59.9147	0.000			19590	557.012	576.858		-4.264	888.792	0.000	1033.600	313.922	392.800
T+78 sec	8:07:56	59.9176	0.000			19590	538.080	563.286		-4.264	870.956	0.000	1029.534	309.658	390.668
T+80 sec	8:07:58	59.91922	0.000			19590	527.519	550.767		-4.264	854.174	0.000	1025.257	305.395	388.536
T+82 sec	8:08:00	59.92083	0.000			19590	516.957	538.933		-4.264	838.077	0.000	1020.800	301.131	386.404
T+84 sec	8:08:02	59.92215	0.000			19590	508.388	528.242		-4.264	823.122	0.000	1016.203	296.867	384.273
T+86 sec	8:08:04	59.92309	0.000			19590	502.210	519.131		-4.264	809.747	0.000	1011.511	292.603	382.141
T+88 sec	8:08:06	59.92505	0.000			19590	489.456	508.745		-4.264	795.097	0.000	1006.702	288.340	380.009
T+90 sec	8:08:08	59.92505	0.000			19590	489.456	501.994		-4.264	784.082	0.000	1001.862	284.076	377.877
T+92 sec	8:08:10	59.9273	0.000			19590	474.709	492.444		-4.264	770.269	0.000	996.935	279.812	375.745
T+94 sec	8:08:12	59.93246	0.000			19590	441.031	474.450		-4.264	748.011	0.000	991.749	275.549	373.613
T+96 sec	8:08:14	59.93505	0.000			19590	424.092	456.825		-4.264	726.122	0.000	986.328	271.285	371.481
T+98 sec	8:08:16	59.93701	0.000			19590	411.338	440.904		-4.264	705.938	0.000	980.720	267.021	369.350
T+100 sec	8:08:18	59.93765	0.000			19590	407.129	429.083		-4.264	689.853	0.000	975.017	262.758	367.218
T+102 sec	8:08:20	59.93927	0.000			19590	396.567	417.702		-4.264	674.209	0.000	969.232	258.494	365.086
T+104 sec	8:08:22	59.94183	0.000			19590	379.827	404.446		-4.264	656.689	0.000	963.335	254.230	362.954
T+106 sec	8:08:24	59.94409	0.000			19590	365.081	390.668		-4.264	638.647	0.000	957.322	249.967	360.822
T+108 sec	8:08:26	59.94571	0.000			19590	354.519	378.016		-4.264	621.731	0.000	951.220	245.703	358.690
T+110 sec	8:08:28	59.94797	0.000			19590	339.772	364.630		-4.264	604.082	0.000	945.022	241.439	356.559
T+112 sec	8:08:30	59.94766	0.000			19590	341.765	356.628		-4.264	591.816	0.000	938.825	237.176	354.427
T+114 sec	8:08:32	59.9454	0.000			19590	356.512	356.587		-4.264	587.511	0.000	932.768	232.912	352.295

T+116 sec	8:08:34	59.94443	0.000	19590	362.888	358.792	-4.264	585.453	0.000	926.881	228.648	350.163
T+118 sec	8:08:36	59.94409	0.000	19590	365.081	360.993	-4.264	583.390	0.000	921.156	224.385	348.031
T+120 sec	8:08:38	59.94507	0.000	19590	358.704	360.192	-4.264	578.325	0.000	915.536	220.121	345.899
T+122 sec	8:08:40	59.94604	0.000	19590	352.327	357.439	-4.264	571.309	0.000	909.984	215.857	343.768
T+124 sec	8:08:42	59.94638	0.000	19590	350.135	354.883	-4.264	564.489	0.000	904.500	211.594	341.636
T+126 sec	8:08:44	59.94733	0.000	19590	343.957	351.059	-4.264	556.401	0.000	899.061	207.330	339.504
T+128 sec	8:08:46	59.9483	0.000	19590	337.580	346.341	-4.264	547.420	0.000	893.651	203.066	337.372
T+130 sec	8:08:48	59.94894	0.000	19590	333.395	341.810	-4.264	538.625	0.000	888.272	198.803	335.240
T+132 sec	8:08:50	59.94992	0.000	19590	327.018	336.633	-4.264	529.184	0.000	882.912	194.539	333.108
T+134 sec	8:08:52	59.9509	0.000	19590	320.641	331.036	-4.264	519.323	0.000	877.566	190.275	330.977
T+136 sec	8:08:54	59.95154	0.000	19590	316.456	325.933	-4.264	509.957	0.000	872.238	186.012	328.845
T+138 sec	8:08:56	59.95187	0.000	19590	314.264	321.849	-4.264	501.609	0.000	866.943	181.748	326.713
T+140 sec	8:08:58	59.95346	0.000	19590	303.902	315.567	-4.264	491.064	0.000	861.649	177.484	324.581
T+142 sec	8:09:00	59.95508	0.000	19590	293.340	307.788	-4.264	479.021	0.000	856.335	173.221	322.449
T+144 sec	8:09:02	59.95575	0.000	19590	288.956	301.197	-4.264	468.166	0.000	851.017	168.957	320.317
T+146 sec	8:09:04	59.95639	0.000	19590	284.771	295.448	-4.264	458.153	0.000	845.708	164.693	318.186
T+148 sec	8:09:06	59.95801	0.000	19590	274.209	288.014	-4.264	446.456	0.000	840.385	160.430	316.054
T+150 sec	8:09:08	59.96124	0.000	19590	253.085	275.789	-4.264	429.967	0.000	834.985	156.166	313.922
T+152 sec	8:09:10	59.96252	0.000	19590	244.716	264.913	-4.264	414.828	0.000	829.528	151.902	311.790
T+154 sec	8:09:12	59.96188	0.000	19590	248.900	259.309	-4.264	404.960	0.000	824.085	147.638	309.658
T+156 sec	8:09:14	59.96124	0.000	19590	253.085	257.131	-4.264	398.518	0.000	818.698	143.375	307.526
T+158 sec	8:09:16	59.96027	0.000	19590	259.462	257.947	-4.264	395.070	0.000	813.403	139.111	305.395
T+160 sec	8:09:18	59.96057	0.000	19590	257.469	257.780	-4.264	390.640	0.000	808.184	134.847	303.263
T+162 sec	8:09:20	59.96219	0.000	19590	246.908	253.974	-4.264	382.571	0.000	802.993	130.584	301.131
T+164 sec	8:09:22	59.96512	0.000	19590	227.777	244.805	-4.264	369.138	0.000	797.766	126.320	298.999
T+166 sec	8:09:24	59.96738	0.000	19590	213.030	233.684	-4.264	353.753	0.000	792.480	122.056	296.867
T+168 sec	8:09:26	59.96899	0.000	19590	202.468	222.758	-4.264	338.564	0.000	787.140	117.793	294.735
T+170 sec	8:09:28	59.97061	0.000	19590	191.906	211.960	-4.264	323.502	0.000	781.749	113.529	292.603
T+172 sec	8:09:30	59.97318	0.000	19590	175.167	199.083	-4.264	306.360	0.000	776.284	109.265	290.472
T+174 sec	8:09:32	59.97351	0.000	19590	172.975	189.945	-4.264	292.959	0.000	770.792	105.002	288.340
T+176 sec	8:09:34	59.97287	0.000	19590	177.160	185.470	-4.264	284.221	0.000	765.325	100.738	286.208
T+178 sec	8:09:36	59.97253	0.000	19590	179.352	183.329	-4.264	277.815	0.000	759.908	96.474	284.076
T+180 sec	8:09:38	59.97318	0.000	19590	175.167	180.472	-4.264	270.695	0.000	754.532	92.211	281.944
	8:09:40	59.97415	0.000	19590	168.790	176.383	-4.264	262.343	0.000	749.182	87.947	279.812
	8:09:42	59.97543	0.000	19590	160.420	170.796	-4.264	252.492	0.000	743.842	83.683	277.681
	8:09:44	59.97577	0.000	19590	158.228	166.397	-4.264	243.830	0.000	738.522	79.420	275.549
	8:09:46	59.9761	0.000	19590	156.036	162.771	-4.264	235.939	0.000	733.232	75.156	273.417
	8:09:48	59.97675	0.000	19590	151.851	158.949	-4.264	227.854	0.000	727.968	70.892	271.285
	8:09:50	59.97803	0.000	19590	143.481	153.535	-4.264	218.176	0.000	722.712	66.629	269.153
	8:09:52	59.97931	0.000	19590	135.112	147.087	-4.264	207.464	0.000	717.454	62.365	267.021
	8:09:54	59.97998	0.000	19590	130.728	141.361	-4.264	197.475	0.000	712.202	58.101	264.890
	8:09:56	59.97964	0.000	19590	132.920	138.407	-4.264	190.257	0.000	706.983	53.838	262.758
	8:09:58	59.979	0.000	19590	137.104	137.951	-4.264	185.537	0.000	701.820	49.574	260.626
	8:10:00	59.97964	0.000	19590	132.920	136.190	-4.264	179.513	0.000	696.699	45.310	258.494
	8:10:02	59.98093	0.000	19590	124.550	132.116	-4.264	171.175	0.000	691.597	41.047	256.362
	8:10:04	59.98224	0.000	19590	115.981	126.469	-4.264	161.264	0.000	686.498	36.783	254.230

8:10:06	59.98386	0.000	19590	105.419	119.101	-4.264	149.633	0.000	681.385	32.519	252.099
8:10:08	59.98514	0.000	19590	97.049	111.383	-4.264	137.651	0.000	676.255	28.256	249.967
8:10:10	59.98773	0.000	19590	80.110	100.438	-4.264	122.442	0.000	671.079	23.992	247.835
8:10:12	59.9903	0.000	19590	63.371	87.464	-4.264	105.205	0.000	665.840	19.728	245.703
8:10:14	59.99289	0.000	19590	46.432	73.103	-4.264	86.580	0.000	660.525	15.465	243.571
8:10:16	59.99579	0.000	19590	27.501	57.142	-4.264	66.355	0.000	655.124	11.201	241.439
8:10:18	59.99646	0.000	19590	23.116	45.233	-4.264	50.183	0.000	649.674	6.937	239.308
8:10:20	59.99579	0.000	19590	27.501	39.027	-4.264	39.713	0.000	644.228	2.673	237.176
8:10:22	59.99612	0.000	19590	25.309	34.225	-4.264	30.648	0.000	638.798	-1.590	235.044
8:10:24	59.99579	0.000	19590	27.501	31.872	-4.264	24.030	0.000	633.405	-5.854	232.912
8:10:26	59.99484	0.000	19590	33.678	32.504	-4.264	20.399	0.000	628.075	-10.118	230.780
8:10:28	59.99484	0.000	19590	33.678	32.915	-4.264	16.546	0.000	622.803	-14.381	228.648
8:10:30	59.99805	0.000	19590	12.754	25.859	-4.264	5.226	0.000	617.525	-18.645	226.516
8:10:32	59.99872	0.000	19590	8.370	19.738	0.000	-0.895	0.000	612.284	-18.645	224.421
8:10:34	60.00034	0.000	19590	-2.192	12.062	0.000	-8.570	0.000	607.066	-18.645	222.361
8:10:36	60.00195	0.000	19590	-12.754	3.377	0.000	-17.256	0.000	601.864	-18.645	220.336
8:10:38	60.00259	0.000	19590	-16.939	-3.734	0.000	-24.366	0.000	596.688	-18.645	218.344
8:10:40	60.00226	0.000	19590	-14.747	-7.588	0.000	-28.221	0.000	591.566	-18.645	216.386
8:10:42	60.00195	0.000	19590	-12.754	-9.396	0.000	-30.029	0.000	586.512	-18.645	214.459
8:10:44	60.00064	0.000	19590	-4.185	-7.572	0.000	-28.205	0.000	581.555	-18.645	212.564
8:10:46	59.99646	0.000	19590	23.116	3.169	0.000	-17.464	0.000	576.763	-18.645	210.700
8:10:48	59.99191	0.000	19590	52.809	20.543	0.000	-0.090	0.000	572.185	-18.645	208.865
8:10:50	59.98901	0.000	19590	71.741	38.462	0.000	17.830	0.000	567.820	-18.645	207.059
8:10:52	59.98773	0.000	19590	80.110	53.039	0.000	32.407	0.000	563.637	-18.645	205.282
8:10:54	59.98901	0.000	19590	71.741	59.585	0.000	38.952	0.000	559.570	-18.645	203.533
8:10:56	59.99255	0.000	19590	48.624	55.749	0.000	35.116	0.000	555.535	-18.645	201.810
8:10:58	59.99579	0.000	19590	27.501	45.862	0.000	25.229	0.000	551.487	-18.645	200.114
8:11:00	59.99902	0.000	19590	6.377	32.042	0.000	11.410	0.000	547.396	-18.645	198.445
8:11:02	60.00195	0.000	19590	-12.754	16.363	0.000	-4.269	0.000	543.248	-18.645	196.800
8:11:04	60.00485	0.000	19590	-31.685	-0.454	0.000	-21.086	0.000	539.036	-18.645	195.180
8:11:06	60.00809	0.000	19590	-52.809	-18.778	0.000	-39.411	0.000	534.752	-18.645	193.584
8:11:08	60.01163	0.000	19590	-75.926	-38.780	0.000	-59.412	0.000	530.383	-18.645	192.012
8:11:10	60.01422	0.000	19590	-92.864	-57.709	0.000	-78.342	0.000	525.939	-18.645	190.463
8:11:12	60.0152	0.000	19590	-99.241	-72.246	0.000	-92.878	0.000	521.455	-18.645	188.937
8:11:14	60.0155	0.000	19590	-101.234	-82.392	0.000	-103.024	0.000	516.963	-18.645	187.433
8:11:16	60.0155	0.000	19590	-101.234	-88.986	0.000	-109.619	0.000	512.487	-18.645	185.950
8:11:18	60.01682	0.000	19590	-109.803	-96.272	0.000	-116.905	0.000	508.023	-18.645	184.489
8:11:20	60.01907	0.000	19590	-124.550	-106.169	0.000	-126.802	0.000	503.553	-18.645	183.048
8:11:22	60.02295	0.000	19590	-149.858	-121.461	0.000	-142.093	0.000	499.038	-18.645	181.628
8:11:24	60.02618	0.000	19590	-170.982	-138.793	0.000	-159.426	0.000	494.465	-18.645	180.227
8:11:26	60.02972	0.000	19590	-194.099	-158.150	0.000	-178.782	0.000	489.822	-18.645	178.846
8:11:28	60.03262	0.000	19590	-213.030	-177.358	0.000	-197.990	0.000	485.111	-18.645	177.484
8:11:30	60.03458	0.000	19590	-225.784	-194.307	0.000	-214.940	0.000	480.349	-18.645	176.141
8:11:32	60.03522	0.000	19590	-229.969	-206.789	0.000	-227.421	0.000	475.566	-18.645	174.816
8:11:34	60.03424	0.000	19590	-223.592	-212.670	0.000	-233.302	0.000	470.809	-18.645	173.509
8:11:36	60.0336	0.000	19590	-219.407	-215.028	0.000	-235.660	0.000	466.099	-18.645	172.219

8:11:38	60.03522	0.000	19590	-229.969	-220.257	0.000	-240.890	0.000	461.417	-18.645	170.947
8:11:40	60.03812	0.000	19590	-248.900	-230.282	0.000	-250.915	0.000	456.731	-18.645	169.691
8:11:42	60.04037	0.000	19590	-263.647	-241.960	0.000	-262.592	0.000	452.029	-18.645	168.452
8:11:44	60.04105	0.000	19590	-268.031	-251.085	0.000	-271.717	0.000	447.330	-18.645	167.229
8:11:46	60.04199	0.000	19590	-274.209	-259.178	0.000	-279.811	0.000	442.638	-18.645	166.022
8:11:48	60.04233	0.000	19590	-276.401	-265.206	0.000	-285.839	0.000	437.969	-18.645	164.831
8:11:50	60.0433	0.000	19590	-282.778	-271.356	0.000	-291.989	0.000	433.319	-18.645	163.655
8:11:52	60.04425	0.000	19590	-288.956	-277.516	0.000	-298.149	0.000	428.690	-18.645	162.493
8:11:54	60.04492	0.000	19590	-293.340	-283.054	0.000	-303.687	0.000	424.083	-18.645	161.347
8:11:56	60.04556	0.000	19590	-297.525	-288.119	0.000	-308.751	0.000	419.503	-18.645	160.215
8:11:58	60.04587	0.000	19590	-299.518	-292.109	0.000	-312.741	0.000	414.955	-18.645	159.097
8:12:00	60.04654	0.000	19590	-303.902	-296.236	0.000	-316.869	0.000	410.438	-18.645	157.993
8:12:02	60.0488	0.000	19590	-318.648	-304.080	0.000	-324.713	0.000	405.928	-18.645	156.903
8:12:04	60.04974	0.000	19590	-324.826	-311.341	0.000	-331.974	0.000	401.428	-18.645	155.826
8:12:06	60.0491	0.000	19590	-320.641	-314.596	0.000	-335.229	0.000	396.964	-18.645	154.762
8:12:08	60.0491	0.000	19590	-320.641	-316.712	0.000	-337.344	0.000	392.540	-18.645	153.711
8:12:10	60.05042	0.000	19590	-329.210	-321.086	0.000	-341.719	0.000	388.143	-18.645	152.673
8:12:12	60.04974	0.000	19590	-324.826	-322.395	0.000	-343.028	0.000	383.791	-18.645	151.647
8:12:14	60.04846	0.000	19590	-316.456	-320.317	0.000	-340.949	0.000	379.503	-18.645	150.633
8:12:16	60.04718	0.000	19590	-308.087	-316.036	0.000	-336.669	0.000	375.290	-18.645	149.632
8:12:18	60.04587	0.000	19590	-299.518	-310.255	0.000	-330.887	0.000	371.160	-18.645	148.642
8:12:20	60.04587	0.000	19590	-299.518	-306.497	0.000	-327.129	0.000	367.100	-18.645	147.663
8:12:22	60.04556	0.000	19590	-297.525	-303.356	0.000	-323.989	0.000	363.106	-18.645	146.697
8:12:24	60.04425	0.000	19590	-288.956	-298.316	0.000	-318.949	0.000	359.186	-18.645	145.741
8:12:26	60.04297	0.000	19590	-280.586	-292.111	0.000	-312.743	0.000	355.346	-18.645	144.796
8:12:28	60.04169	0.000	19590	-272.216	-285.148	0.000	-305.780	0.000	351.590	-18.645	143.862
8:12:30	60.04233	0.000	19590	-276.401	-282.086	0.000	-302.719	0.000	347.893	-18.645	142.939
8:12:32	60.04459	0.000	19590	-291.148	-285.258	0.000	-305.890	0.000	344.220	-18.645	142.026
8:12:34	60.04654	0.000	19590	-303.902	-291.783	0.000	-312.416	0.000	340.552	-18.645	141.123
8:12:36	60.04718	0.000	19590	-308.087	-297.489	0.000	-318.122	0.000	336.893	-18.645	140.231
8:12:38	60.0462	0.000	19590	-301.710	-298.966	0.000	-319.599	0.000	333.266	-18.645	139.348
8:12:40	60.04425	0.000	19590	-288.956	-295.463	0.000	-316.095	0.000	329.698	-18.645	138.475
8:12:42	60.04492	0.000	19590	-293.340	-294.720	0.000	-315.352	0.000	326.173	-18.645	137.612
8:12:44	60.04523	0.000	19590	-295.333	-294.934	0.000	-315.567	0.000	322.685	-18.645	136.758
8:12:46	60.04523	0.000	19590	-295.333	-295.074	0.000	-315.706	0.000	319.234	-18.645	135.913
8:12:48	60.04556	0.000	19590	-297.525	-295.932	0.000	-316.564	0.000	315.816	-18.645	135.078
8:12:50	60.0462	0.000	19590	-301.710	-297.954	0.000	-318.586	0.000	312.423	-18.645	134.251
8:12:52	60.04654	0.000	19590	-303.902	-300.036	0.000	-320.668	0.000	309.056	-18.645	133.434
8:12:54	60.04654	0.000	19590	-303.902	-301.389	0.000	-322.021	0.000	305.717	-18.645	132.625
8:12:56	60.04523	0.000	19590	-295.333	-299.269	0.000	-319.902	0.000	302.424	-18.645	131.825
8:12:58	60.04361	0.000	19590	-284.771	-294.195	0.000	-314.827	0.000	299.193	-18.645	131.033
8:13:00	60.04199	0.000	19590	-274.209	-287.200	0.000	-307.832	0.000	296.031	-18.645	130.249
8:13:02	60.04071	0.000	19590	-265.839	-279.724	0.000	-300.356	0.000	292.941	-18.645	129.473
8:13:04	60.03876	0.000	19590	-253.085	-270.400	0.000	-291.033	0.000	289.931	-18.645	128.706
8:13:06	60.03586	0.000	19590	-234.154	-257.714	0.000	-278.346	0.000	287.016	-18.645	127.946
8:13:08	60.03394	0.000	19590	-221.599	-245.074	0.000	-265.706	0.000	284.196	-18.645	127.195

8:13:10	60.0336	0.000	19590	-219.407	-236.090	0.000	-256.723	0.000	281.451	-18.645	126.451
8:13:12	60.03262	0.000	19590	-213.030	-228.019	0.000	-248.652	0.000	278.773	-18.645	125.714
8:13:14	60.03006	0.000	19590	-196.291	-216.914	0.000	-237.547	0.000	276.179	-18.645	124.985
8:13:16	60.02747	0.000	19590	-179.352	-203.767	0.000	-224.400	0.000	273.676	-18.645	124.263
8:13:18	60.02682	0.000	19590	-175.167	-193.757	0.000	-214.390	0.000	271.248	-18.645	123.549
8:13:20	60.02585	0.000	19590	-168.790	-185.019	0.000	-205.651	0.000	268.887	-18.645	122.841
8:13:22	60.02359	0.000	19590	-154.043	-174.177	0.000	-194.810	0.000	266.603	-18.645	122.141
8:13:24	60.02197	0.000	19590	-143.481	-163.434	0.000	-184.066	0.000	264.393	-18.645	121.447
8:13:26	60.02164	0.000	19590	-141.289	-155.683	0.000	-176.316	0.000	262.244	-18.645	120.761
8:13:28	60.02231	0.000	19590	-145.674	-152.180	0.000	-172.812	0.000	260.132	-18.645	120.081
8:13:30	60.02133	0.000	19590	-139.297	-147.671	0.000	-168.303	0.000	258.062	-18.645	119.407
8:13:32	60.02133	0.000	19590	-139.297	-144.740	0.000	-165.372	0.000	256.026	-18.645	118.740
8:13:34	60.02002	0.000	19590	-130.728	-139.835	0.000	-160.468	0.000	254.033	-18.645	118.080
8:13:36	60.01776	0.000	19590	-115.981	-131.486	0.000	-152.119	0.000	252.099	-18.645	117.426
8:13:38	60.01584	0.000	19590	-103.426	-121.665	0.000	-142.298	0.000	250.230	-18.645	116.778
8:13:40	60.01291	0.000	19590	-84.295	-108.586	0.000	-129.218	0.000	248.440	-18.645	116.136
8:13:42	60.01132	0.000	19590	-73.933	-96.457	0.000	-117.090	0.000	246.724	-18.645	115.500
8:13:44	60.01001	0.000	19590	-65.364	-85.575	0.000	-106.207	0.000	245.075	-18.645	114.870
8:13:46	60.00937	0.000	19590	-61.179	-77.036	0.000	-97.669	0.000	243.481	-18.645	114.246
8:13:48	60.00775	0.000	19590	-50.617	-67.789	0.000	-88.422	0.000	241.944	-18.645	113.628
8:13:50	60.00516	0.000	19590	-33.678	-55.851	0.000	-76.483	0.000	240.477	-18.645	113.016
8:13:52	60.00452	0.000	19590	-29.493	-46.626	0.000	-67.258	0.000	239.065	-18.645	112.409
8:13:54	60.00613	0.000	19590	-40.055	-44.326	0.000	-64.958	0.000	237.677	-18.645	111.808
8:13:56	60.00613	0.000	19590	-40.055	-42.831	0.000	-63.464	0.000	236.308	-18.645	111.212
8:13:58	60.00549	0.000	19590	-35.870	-40.395	0.000	-61.027	0.000	234.963	-18.645	110.622
8:14:00	60.00516	0.000	19590	-33.678	-38.044	0.000	-58.677	0.000	233.640	-18.645	110.037
8:14:02	60.00388	0.000	19590	-25.309	-33.587	0.000	-54.219	0.000	232.349	-18.645	109.457
8:14:04	60.00259	0.000	19590	-16.939	-27.760	0.000	-48.392	0.000	231.096	-18.645	108.883
8:14:06	60.00128	0.000	19590	-8.370	-20.973	0.000	-41.606	0.000	229.884	-18.645	108.314
8:14:08	60.00128	0.000	19590	-8.370	-16.562	0.000	-37.195	0.000	228.702	-18.645	107.749
8:14:10	60.00064	0.000	19590	-4.185	-12.230	0.000	-32.863	0.000	227.550	-18.645	107.190
8:14:12	60.00034	0.000	19590	-2.192	-8.717	0.000	-29.349	0.000	226.423	-18.645	106.636
8:14:14	60.00226	0.000	19590	-14.747	-10.827	0.000	-31.460	0.000	225.297	-18.645	106.086
8:14:16	60.00421	0.000	19590	-27.501	-16.663	0.000	-37.295	0.000	224.155	-18.645	105.542
8:14:18	60.00677	0.000	19590	-44.240	-26.315	0.000	-46.947	0.000	222.982	-18.645	105.002
8:14:20	60.00903	0.000	19590	-58.987	-37.750	0.000	-58.383	0.000	221.769	-18.645	104.466
8:14:22	60.01291	0.000	19590	-84.295	-54.041	0.000	-74.673	0.000	220.497	-18.645	103.936
8:14:24	60.01486	0.000	19590	-97.049	-69.094	0.000	-89.726	0.000	219.171	-18.645	103.410
8:14:26	60.01453	0.000	19590	-94.857	-78.111	0.000	-98.743	0.000	217.818	-18.645	102.888
8:14:28	60.01422	0.000	19590	-92.864	-83.275	0.000	-103.907	0.000	216.455	-18.645	102.371
8:14:30	60.0152	0.000	19590	-99.241	-88.863	0.000	-109.495	0.000	215.080	-18.645	101.858
8:14:32	60.01614	0.000	19590	-105.419	-94.658	0.000	-115.290	0.000	213.691	-18.645	101.350
8:14:34	60.01682	0.000	19590	-109.803	-99.959	0.000	-120.591	0.000	212.293	-18.645	100.846
8:14:36	60.01746	0.000	19590	-113.988	-104.869	0.000	-125.501	0.000	210.885	-18.645	100.346
8:14:38	60.01712	0.000	19590	-111.796	-107.293	0.000	-127.926	0.000	209.479	-18.645	99.850
8:14:40	60.01682	0.000	19590	-109.803	-108.172	0.000	-128.804	0.000	208.082	-18.645	99.358

8:14:42	60.01648	0.000	19590	-107.611	-107.976	0.000	-128.608	0.000	206.696	-18.645	98.870
8:14:44	60.01614	0.000	19590	-105.419	-107.081	0.000	-127.713	0.000	205.325	-18.645	98.387
8:14:46	60.01746	0.000	19590	-113.988	-109.498	0.000	-130.131	0.000	203.956	-18.645	97.907
8:14:48	60.01776	0.000	19590	-115.981	-111.767	0.000	-132.400	0.000	202.589	-18.645	97.432
8:14:50	60.01776	0.000	19590	-115.981	-113.242	0.000	-133.874	0.000	201.227	-18.645	96.960
8:14:52	60.01648	0.000	19590	-107.611	-111.271	0.000	-131.904	0.000	199.883	-18.645	96.492
8:14:54	60.01584	0.000	19590	-103.426	-108.525	0.000	-129.158	0.000	198.562	-18.645	96.027
8:14:56	60.01648	0.000	19590	-107.611	-108.205	0.000	-128.838	0.000	197.252	-18.645	95.567
8:14:58	60.01584	0.000	19590	-103.426	-106.533	0.000	-127.165	0.000	195.960	-18.645	95.110
8:15:00	60.01358	0.000	19590	-88.680	-100.284	0.000	-120.917	0.000	194.703	-18.645	94.657
8:15:02	60.01163	0.000	19590	-75.926	-91.759	0.000	-112.391	0.000	193.489	-18.645	94.207
8:15:04	60.01132	0.000	19590	-73.933	-85.520	0.000	-106.152	0.000	192.309	-18.645	93.761
8:15:06	60.01132	0.000	19590	-73.933	-81.464	0.000	-102.097	0.000	191.154	-18.645	93.319
8:15:08	60.01099	0.000	19590	-71.741	-78.061	0.000	-98.693	0.000	190.022	-18.645	92.879
8:15:10	60.01099	0.000	19590	-71.741	-75.849	0.000	-96.481	0.000	188.907	-18.645	92.444
8:15:12	60.01291	0.000	19590	-84.295	-78.805	0.000	-99.438	0.000	187.790	-18.645	92.012
8:15:14	60.01486	0.000	19590	-97.049	-85.191	0.000	-105.823	0.000	186.656	-18.645	91.583
8:15:16	60.01776	0.000	19590	-115.981	-95.967	0.000	-116.600	0.000	185.490	-18.645	91.157
8:15:18	60.01776	0.000	19590	-115.981	-102.972	0.000	-123.604	0.000	184.306	-18.645	90.735
8:15:20	60.0184	0.000	19590	-120.166	-108.990	0.000	-129.622	0.000	183.107	-18.645	90.316
8:15:22	60.0181	0.000	19590	-118.173	-112.204	0.000	-132.836	0.000	181.906	-18.645	89.900
8:15:24	60.01746	0.000	19590	-113.988	-112.828	0.000	-133.461	0.000	180.711	-18.645	89.487
8:15:26	60.0152	0.000	19590	-99.241	-108.073	0.000	-128.705	0.000	179.544	-18.645	89.078
8:15:28	60.0152	0.000	19590	-99.241	-104.982	0.000	-125.614	0.000	178.397	-18.645	88.671
8:15:30	60.01389	0.000	19590	-90.672	-99.974	0.000	-120.606	0.000	177.277	-18.645	88.268
8:15:32	60.01746	0.000	19590	-113.988	-104.879	0.000	-125.511	0.000	176.147	-18.645	87.867
8:15:34	60.01907	0.000	19590	-124.550	-111.764	0.000	-132.396	0.000	175.000	-18.645	87.470
8:15:36	60.01907	0.000	19590	-124.550	-116.239	0.000	-136.871	0.000	173.845	-18.645	87.075
8:15:38	60.02036	0.000	19590	-132.920	-122.077	0.000	-142.710	0.000	172.677	-18.645	86.684
8:15:40	60.01874	0.000	19590	-122.358	-122.175	0.000	-142.808	0.000	171.517	-18.645	86.295
8:15:42	60.01874	0.000	19590	-122.358	-122.239	0.000	-142.872	0.000	170.365	-18.645	85.909
8:15:44	60.01971	0.000	19590	-128.735	-124.513	0.000	-145.145	0.000	169.214	-18.645	85.526
8:15:46	60.01971	0.000	19590	-128.735	-125.990	0.000	-146.623	0.000	168.065	-18.645	85.146
8:15:48	60.01971	0.000	19590	-128.735	-126.951	0.000	-147.583	0.000	166.922	-18.645	84.769
8:15:50	60.0184	0.000	19590	-120.166	-124.576	0.000	-145.209	0.000	165.795	-18.645	84.394
8:15:52	60.01486	0.000	19590	-97.049	-114.942	0.000	-135.574	0.000	164.711	-18.645	84.022
8:15:54	60.01358	0.000	19590	-88.680	-105.750	0.000	-126.382	0.000	163.667	-18.645	83.653
8:15:56	60.01389	0.000	19590	-90.672	-100.473	0.000	-121.105	0.000	162.650	-18.645	83.286
8:15:58	60.01227	0.000	19590	-80.110	-93.346	0.000	-113.978	0.000	161.666	-18.645	82.922
8:16:00	60.01001	0.000	19590	-65.364	-83.552	0.000	-104.185	0.000	160.723	-18.645	82.561
8:16:02	60.00583	0.000	19590	-38.062	-67.631	0.000	-88.263	0.000	159.843	-18.645	82.202
8:16:04	60.00162	0.000	19590	-10.562	-47.657	0.000	-68.289	0.000	159.040	-18.645	81.845
8:16:06	60.00162	0.000	19590	-10.562	-34.673	0.000	-55.306	0.000	158.288	-18.645	81.491
8:16:08	59.99805	0.000	19590	12.754	-18.074	0.000	-38.706	0.000	157.599	-18.645	81.140
8:16:10	59.99353	0.000	19590	42.247	3.039	0.000	-17.594	0.000	156.989	-18.645	80.791
8:16:12	59.99255	0.000	19590	48.624	18.994	0.000	-1.639	0.000	156.438	-18.645	80.445

8:16:14	59.99225	0.000	19590	50.617	30.062	0.000	9.429	0.000	155.929	-18.645	80.101
8:16:16	59.98999	0.000	19590	65.364	42.417	0.000	21.785	0.000	155.467	-18.645	79.759
8:16:18	59.98837	0.000	19590	75.926	54.145	0.000	33.513	0.000	155.048	-18.645	79.420
8:16:20	59.98416	0.000	19590	103.426	71.394	0.000	50.761	0.000	154.691	-18.645	79.083
8:16:22	59.9816	0.000	19590	120.166	88.464	0.000	67.831	0.000	154.394	-18.645	78.748
8:16:24	59.98093	0.000	19590	124.550	101.094	0.000	80.462	0.000	154.143	-18.645	78.416
8:16:26	59.98029	0.000	19590	128.735	110.768	0.000	90.136	0.000	153.926	-18.645	78.085
8:16:28	59.97998	0.000	19590	130.728	117.754	0.000	97.122	0.000	153.734	-18.645	77.758
8:16:30	59.97836	0.000	19590	141.289	125.991	0.000	105.359	0.000	153.571	-18.645	77.432
8:16:32	59.97513	0.000	19590	162.413	138.739	0.000	118.107	0.000	153.452	-18.645	77.108
8:16:34	59.97287	0.000	19590	177.160	152.186	0.000	131.554	0.000	153.379	-18.645	76.787
8:16:36	59.97189	0.000	19590	183.537	163.159	0.000	142.526	0.000	153.342	-18.645	76.468
8:16:38	59.97156	0.000	19590	185.729	171.058	0.000	150.426	0.000	153.333	-18.645	76.151
8:16:40	59.97382	0.000	19590	170.982	171.032	0.000	150.399	0.000	153.323	-18.645	75.836
8:16:42	59.97641	0.000	19590	154.043	165.086	0.000	144.453	0.000	153.294	-18.645	75.523
8:16:44	59.97836	0.000	19590	141.289	156.757	0.000	136.125	0.000	153.237	-18.645	75.212
8:16:46	59.97705	0.000	19590	149.858	154.342	0.000	133.710	0.000	153.173	-18.645	74.904
8:16:48	59.97449	0.000	19590	166.598	158.632	0.000	137.999	0.000	153.124	-18.645	74.597
8:16:50	59.97125	0.000	19590	187.722	168.813	0.000	148.181	0.000	153.108	-18.645	74.292
8:16:52	59.97092	0.000	19590	189.914	176.198	0.000	155.566	0.000	153.116	-18.645	73.989
8:16:54	59.97287	0.000	19590	177.160	176.535	0.000	155.902	0.000	153.125	-18.645	73.689
8:16:56	59.97449	0.000	19590	166.598	173.057	0.000	152.424	0.000	153.122	-18.645	73.390
8:16:58	59.97382	0.000	19590	170.982	172.331	0.000	151.698	0.000	153.118	-18.645	73.093
8:17:00	59.97318	0.000	19590	175.167	173.323	0.000	152.691	0.000	153.116	-18.645	72.798
8:17:02	59.97449	0.000	19590	166.598	170.969	0.000	150.337	0.000	153.108	-18.645	72.505
8:17:04	59.9761	0.000	19590	156.036	165.743	0.000	145.110	0.000	153.082	-18.645	72.214
8:17:06	59.97739	0.000	19590	147.666	159.416	0.000	138.784	0.000	153.037	-18.645	71.924
8:17:08	59.97836	0.000	19590	141.289	153.072	0.000	132.439	0.000	152.971	-18.645	71.637
8:17:10	59.97769	0.000	19590	145.674	150.482	0.000	129.850	0.000	152.899	-18.645	71.351
8:17:12	59.97705	0.000	19590	149.858	150.264	0.000	129.632	0.000	152.825	-18.645	71.067
8:17:14	59.97641	0.000	19590	154.043	151.587	0.000	130.954	0.000	152.757	-18.645	70.785
8:17:16	59.97543	0.000	19590	160.420	154.678	0.000	134.046	0.000	152.698	-18.645	70.505
8:17:18	59.97382	0.000	19590	170.982	160.385	0.000	139.752	0.000	152.658	-18.645	70.226
8:17:20	59.97318	0.000	19590	175.167	165.558	0.000	144.926	0.000	152.634	-18.645	69.949
8:17:22	59.97223	0.000	19590	181.345	171.084	0.000	150.451	0.000	152.627	-18.645	69.674
8:17:24	59.97189	0.000	19590	183.537	175.442	0.000	154.810	0.000	152.634	-18.645	69.401
8:17:26	59.97092	0.000	19590	189.914	180.507	0.000	159.875	0.000	152.656	-18.645	69.129
8:17:28	59.96994	0.000	19590	196.291	186.031	0.000	165.399	0.000	152.695	-18.645	68.859
8:17:30	59.96832	0.000	19590	206.852	193.319	0.000	172.686	0.000	152.756	-18.645	68.590
8:17:32	59.96606	0.000	19590	221.599	203.217	0.000	182.584	0.000	152.847	-18.645	68.324
8:17:34	59.96542	0.000	19590	225.784	211.115	0.000	190.483	0.000	152.962	-18.645	68.059
8:17:36	59.96606	0.000	19590	221.599	214.785	0.000	194.152	0.000	153.087	-18.645	67.795
8:17:38	59.9693	0.000	19590	200.475	209.776	0.000	189.144	0.000	153.196	-18.645	67.533
8:17:40	59.97253	0.000	19590	179.352	199.128	0.000	178.495	0.000	153.272	-18.645	67.273
8:17:42	59.97351	0.000	19590	172.975	189.974	0.000	169.342	0.000	153.320	-18.645	67.014
8:17:44	59.97382	0.000	19590	170.982	183.327	0.000	162.695	0.000	153.348	-18.645	66.757

8:17:46	59.97253	0.000	19590	179.352	181.936	0.000	161.303	0.000	153.372	-18.645	66.501
8:17:48	59.97253	0.000	19590	179.352	181.031	0.000	160.399	0.000	153.393	-18.645	66.247
8:17:50	59.97253	0.000	19590	179.352	180.443	0.000	159.811	0.000	153.412	-18.645	65.994
8:17:52	59.96768	0.000	19590	211.037	191.151	0.000	170.519	0.000	153.462	-18.645	65.743
8:17:54	59.97125	0.000	19590	187.722	189.951	0.000	169.318	0.000	153.509	-18.645	65.493
8:17:56	59.97577	0.000	19590	158.228	178.848	0.000	158.215	0.000	153.523	-18.645	65.245
8:17:58	59.97577	0.000	19590	158.228	171.631	0.000	150.999	0.000	153.516	-18.645	64.998
8:18:00	59.97577	0.000	19590	158.228	166.940	0.000	146.308	0.000	153.495	-18.645	64.753
8:18:02	59.98416	0.000	19590	103.426	144.710	0.000	124.078	0.000	153.409	-18.645	64.509
8:18:04	59.9819	0.000	19590	118.173	135.422	0.000	114.790	0.000	153.297	-18.645	64.267
8:18:06	59.979	0.000	19590	137.104	136.011	0.000	115.379	0.000	153.187	-18.645	64.026
8:18:08	59.97769	0.000	19590	145.674	139.393	0.000	118.760	0.000	153.087	-18.645	63.786
8:18:10	59.97769	0.000	19590	145.674	141.591	0.000	120.959	0.000	152.995	-18.645	63.548
8:18:12	59.98126	0.000	19590	122.358	134.859	0.000	114.227	0.000	152.883	-18.645	63.311
8:18:14	59.9848	0.000	19590	99.241	122.393	0.000	101.761	0.000	152.737	-18.645	63.076
8:18:16	59.98868	0.000	19590	73.933	105.432	0.000	84.800	0.000	152.543	-18.645	62.841
8:18:18	59.99161	0.000	19590	54.802	87.711	0.000	67.079	0.000	152.299	-18.645	62.609
8:18:20	59.99353	0.000	19590	42.247	71.799	0.000	51.167	0.000	152.012	-18.645	62.377
8:18:22	59.99579	0.000	19590	27.501	56.295	0.000	35.662	0.000	151.682	-18.645	62.147
8:18:24	59.99677	0.000	19590	21.124	43.985	0.000	23.352	0.000	151.320	-18.645	61.918
8:18:26	59.99774	0.000	19590	14.747	33.751	0.000	13.119	0.000	150.930	-18.645	61.690
8:18:28	59.99838	0.000	19590	10.562	25.635	0.000	5.003	0.000	150.520	-18.645	61.464
8:18:30	59.99774	0.000	19590	14.747	21.824	0.000	1.192	0.000	150.102	-18.645	61.239
8:18:32	59.9971	0.000	19590	18.932	20.812	0.000	0.179	0.000	149.683	-18.645	61.015
8:18:34	59.99741	0.000	19590	16.939	19.456	0.000	-1.176	0.000	149.263	-18.645	60.793
8:18:36	59.99741	0.000	19590	16.939	18.575	0.000	-2.057	0.000	148.843	-18.645	60.572
8:18:38	59.99741	0.000	19590	16.939	18.002	0.000	-2.630	0.000	148.423	-18.645	60.352
8:18:40	60.00064	0.000	19590	-4.185	10.237	0.000	-10.396	0.000	147.984	-18.645	60.133
8:18:42	60.00323	0.000	19590	-21.124	-0.739	0.000	-21.372	0.000	147.518	-18.645	59.915
8:18:44	60.00354	0.000	19590	-23.116	-8.571	0.000	-29.204	0.000	147.032	-18.645	59.699
8:18:46	60.00259	0.000	19590	-16.939	-11.500	0.000	-32.132	0.000	146.542	-18.645	59.483
8:18:48	60.00098	0.000	19590	-6.377	-9.707	0.000	-30.339	0.000	146.058	-18.645	59.269
8:18:50	59.99936	0.000	19590	4.185	-4.845	0.000	-25.477	0.000	145.591	-18.645	59.057
8:18:52	59.99741	0.000	19590	16.939	2.779	0.000	-17.853	0.000	145.147	-18.645	58.845
8:18:54	59.99677	0.000	19590	21.124	9.200	0.000	-11.433	0.000	144.722	-18.645	58.634
8:18:56	59.99677	0.000	19590	21.124	13.373	0.000	-7.259	0.000	144.312	-18.645	58.425
8:18:58	59.9971	0.000	19590	18.932	15.319	0.000	-5.314	0.000	143.908	-18.645	58.217
8:19:00	59.99774	0.000	19590	14.747	15.118	0.000	-5.514	0.000	143.507	-18.645	58.009
8:19:02	59.99872	0.000	19590	8.370	12.756	0.000	-7.876	0.000	143.101	-18.645	57.803
8:19:04	59.99966	0.000	19590	2.192	9.059	0.000	-11.574	0.000	142.687	-18.645	57.598
8:19:06	60	0.000	19590	0.000	5.888	0.000	-14.744	0.000	142.267	-18.645	57.394
8:19:08	60.00034	0.000	19590	-2.192	3.060	0.000	-17.572	0.000	141.842	-18.645	57.192
8:19:10	60.00098	0.000	19590	-6.377	-0.243	0.000	-20.875	0.000	141.411	-18.645	56.990
8:19:12	60.00226	0.000	19590	-14.747	-5.319	0.000	-25.952	0.000	140.968	-18.645	56.789
8:19:14	60.0029	0.000	19590	-18.932	-10.084	0.000	-30.716	0.000	140.515	-18.645	56.590
8:19:16	60.00259	0.000	19590	-16.939	-12.483	0.000	-33.115	0.000	140.058	-18.645	56.391

8:19:18	60.00226	0.000	19590	-14.747	-13.275	0.000	-33.908	0.000	139.601	-18.645	56.194
8:19:20	60.00226	0.000	19590	-14.747	-13.790	0.000	-34.423	0.000	139.146	-18.645	55.997
8:19:22	60.00323	0.000	19590	-21.124	-16.357	0.000	-36.989	0.000	138.686	-18.645	55.802
8:19:24	60.00421	0.000	19590	-27.501	-20.257	0.000	-40.890	0.000	138.218	-18.645	55.608
8:19:26	60.00485	0.000	19590	-31.685	-24.257	0.000	-44.890	0.000	137.743	-18.645	55.414
8:19:28	60.00452	0.000	19590	-29.493	-26.090	0.000	-46.722	0.000	137.265	-18.645	55.222
8:19:30	60.00354	0.000	19590	-23.116	-25.049	0.000	-45.682	0.000	136.792	-18.645	55.031
8:19:32	60.00354	0.000	19590	-23.116	-24.373	0.000	-45.005	0.000	136.324	-18.645	54.840
8:19:34	60.00354	0.000	19590	-23.116	-23.933	0.000	-44.565	0.000	135.859	-18.645	54.651
8:19:36	60.00354	0.000	19590	-23.116	-23.647	0.000	-44.280	0.000	135.397	-18.645	54.462
8:19:38	60.00354	0.000	19590	-23.116	-23.461	0.000	-44.094	0.000	134.938	-18.645	54.275
8:19:40	60.00354	0.000	19590	-23.116	-23.341	0.000	-43.973	0.000	134.481	-18.645	54.088
8:19:42	60.00354	0.000	19590	-23.116	-23.262	0.000	-43.895	0.000	134.027	-18.645	53.903
8:19:44	60.00613	0.000	19590	-40.055	-29.140	0.000	-49.772	0.000	133.561	-18.645	53.718
8:19:46	60.00485	0.000	19590	-31.685	-30.031	0.000	-50.663	0.000	133.094	-18.645	53.535
8:19:48	60.00452	0.000	19590	-29.493	-29.843	0.000	-50.475	0.000	132.631	-18.645	53.352
8:19:50	60.00452	0.000	19590	-29.493	-29.720	0.000	-50.353	0.000	132.170	-18.645	53.170
8:19:52	60.00354	0.000	19590	-23.116	-27.409	0.000	-48.041	0.000	131.717	-18.645	52.989
8:19:54	60.0029	0.000	19590	-18.932	-24.442	0.000	-45.074	0.000	131.274	-18.645	52.809
8:19:56	60.00162	0.000	19590	-10.562	-19.584	0.000	-40.216	0.000	130.845	-18.645	52.630
8:19:58	60.00162	0.000	19590	-10.562	-16.426	0.000	-37.059	0.000	130.427	-18.645	52.452
8:20:00	60.00421	0.000	19590	-27.501	-20.302	0.000	-40.935	0.000	130.000	-18.645	52.275
8:20:02	60.00421	0.000	19590	-27.501	-22.822	0.000	-43.454	0.000	129.570	-18.645	52.098
8:20:04	60.0029	0.000	19590	-18.932	-21.460	0.000	-42.093	0.000	129.145	-18.645	51.923
8:20:06	60.00034	0.000	19590	-2.192	-14.716	0.000	-35.349	0.000	128.739	-18.645	51.748
8:20:08	59.99805	0.000	19590	12.754	-5.102	0.000	-25.734	0.000	128.358	-18.645	51.574
8:20:10	59.99646	0.000	19590	23.116	4.775	0.000	-15.858	0.000	128.004	-18.645	51.401
8:20:12	59.99515	0.000	19590	31.685	14.193	0.000	-6.439	0.000	127.675	-18.645	51.229
8:20:14	59.99387	0.000	19590	40.055	23.245	0.000	2.613	0.000	127.369	-18.645	51.058
8:20:16	59.99289	0.000	19590	46.432	31.361	0.000	10.728	0.000	127.084	-18.645	50.887
8:20:18	59.99255	0.000	19590	48.624	37.403	0.000	16.770	0.000	126.816	-18.645	50.718
8:20:20	59.99225	0.000	19590	50.617	42.028	0.000	21.395	0.000	126.560	-18.645	50.549
8:20:22	59.98965	0.000	19590	67.556	50.963	0.000	30.330	0.000	126.327	-18.645	50.381
8:20:24	59.98514	0.000	19590	97.049	67.093	0.000	46.461	0.000	126.134	-18.645	50.214
8:20:26	59.98254	0.000	19590	113.988	83.506	0.000	62.874	0.000	125.982	-18.645	50.048
8:20:28	59.97836	0.000	19590	141.289	103.730	0.000	83.098	0.000	125.879	-18.645	49.882
8:20:30	59.97641	0.000	19590	154.043	121.340	0.000	100.707	0.000	125.818	-18.645	49.717
8:20:32	59.97705	0.000	19590	149.858	131.321	0.000	110.689	0.000	125.782	-18.645	49.553
8:20:34	59.97705	0.000	19590	149.858	137.809	0.000	117.177	0.000	125.762	-18.645	49.390
8:20:36	59.97705	0.000	19590	149.858	142.026	0.000	121.394	0.000	125.751	-18.645	49.228
8:20:38	59.97803	0.000	19590	143.481	142.536	0.000	121.903	0.000	125.742	-18.645	49.066
8:20:40	59.97964	0.000	19590	132.920	139.170	0.000	118.538	0.000	125.725	-18.645	48.906
8:20:42	59.9816	0.000	19590	120.166	132.519	0.000	111.886	0.000	125.692	-18.645	48.745
8:20:44	59.98126	0.000	19590	122.358	128.962	0.000	108.330	0.000	125.651	-18.645	48.586
8:20:46	59.97931	0.000	19590	135.112	131.115	0.000	110.482	0.000	125.616	-18.645	48.428
8:20:48	59.9761	0.000	19590	156.036	139.837	0.000	119.205	0.000	125.600	-18.645	48.270

8:20:50	59.97543	0.000	19590	160.420	147.041	0.000	126.409	0.000	125.602	-18.645	48.113
8:20:52	59.97577	0.000	19590	158.228	150.957	0.000	130.324	0.000	125.613	-18.645	47.956
8:20:54	59.97675	0.000	19590	151.851	151.270	0.000	130.637	0.000	125.625	-18.645	47.801
8:20:56	59.97803	0.000	19590	143.481	148.544	0.000	127.911	0.000	125.630	-18.645	47.646
8:20:58	59.979	0.000	19590	137.104	144.540	0.000	123.908	0.000	125.626	-18.645	47.492
8:21:00	59.97964	0.000	19590	132.920	140.473	0.000	119.840	0.000	125.613	-18.645	47.338
8:21:02	59.98062	0.000	19590	126.543	135.597	0.000	114.965	0.000	125.588	-18.645	47.185
8:21:04	59.9819	0.000	19590	118.173	129.499	0.000	108.866	0.000	125.550	-18.645	47.033
8:21:06	59.98224	0.000	19590	115.981	124.767	0.000	104.135	0.000	125.501	-18.645	46.882
8:21:08	59.98254	0.000	19590	113.988	120.995	0.000	100.362	0.000	125.443	-18.645	46.731
8:21:10	59.98288	0.000	19590	111.796	117.775	0.000	97.143	0.000	125.378	-18.645	46.582
8:21:12	59.98254	0.000	19590	113.988	116.450	0.000	95.817	0.000	125.311	-18.645	46.432
8:21:14	59.98254	0.000	19590	113.988	115.588	0.000	94.956	0.000	125.242	-18.645	46.284
8:21:16	59.98288	0.000	19590	111.796	114.261	0.000	93.628	0.000	125.170	-18.645	46.136
8:21:18	59.98611	0.000	19590	90.672	106.005	0.000	85.372	0.000	125.080	-18.645	45.989
8:21:20	59.99387	0.000	19590	40.055	82.922	0.000	62.290	0.000	124.937	-18.645	45.842
8:21:22	60.00226	0.000	19590	-14.747	48.738	0.000	28.106	0.000	124.719	-18.645	45.696
8:21:24	60.01099	0.000	19590	-71.741	6.571	0.000	-14.062	0.000	124.406	-18.645	45.551
8:21:26	60.01712	0.000	19590	-111.796	-34.858	0.000	-55.490	0.000	124.002	-18.645	45.406
8:21:28	60.02069	0.000	19590	-135.112	-69.947	0.000	-90.579	0.000	123.521	-18.645	45.262
8:21:30	60.02133	0.000	19590	-139.297	-94.219	0.000	-114.852	0.000	122.988	-18.645	45.119
8:21:32	60.02133	0.000	19590	-139.297	-109.996	0.000	-130.629	0.000	122.422	-18.645	44.976
8:21:34	60.02133	0.000	19590	-139.297	-120.251	0.000	-140.884	0.000	121.835	-18.645	44.834
8:21:36	60.02325	0.000	19590	-151.851	-131.311	0.000	-151.944	0.000	121.227	-18.645	44.693
8:21:38	60.02551	0.000	19590	-166.598	-143.662	0.000	-164.294	0.000	120.594	-18.645	44.552

8:06:36
60.00195313 8:06:36
59.99862671
59.87011337

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-"

Tir
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Value B Post

iod (indicates ramp direction during recovery period)

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

20 to 52

	T	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW		T
T-72 sec	8:05:26	59.980	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	128.735	T-72 sec	8:05:26
T-70 sec	8:05:28	59.982	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	115.981	T-70 sec	8:05:28
T-68 sec	8:05:30	59.984	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	107.611	T-68 sec	8:05:30

T-66 sec	8:05:32	59.986	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30155.67	92.864	T-66 sec	8:05:32
T-64 sec	8:05:34	59.987	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	82.303	T-64 sec	8:05:34
T-62 sec	8:05:36	59.988	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	78.118	T-62 sec	8:05:36
T-60 sec	8:05:38	59.987	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	82.303	T-60 sec	8:05:38
T-58 sec	8:05:40	59.986	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	90.672	T-58 sec	8:05:40
T-56 sec	8:05:42	59.985	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	99.241	T-56 sec	8:05:42
T-54 sec	8:05:44	59.984	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30154.67	107.611	T-54 sec	8:05:44
T-52 sec	8:05:46	59.983	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30154.67	109.803	T-52 sec	8:05:46
T-50 sec	8:05:48	59.984	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30154.67	107.611	T-50 sec	8:05:48
T-48 sec	8:05:50	59.984	471.30	0.00	0.00	0.00	0.00	0.00	-653.00	30150.35	103.426	T-48 sec	8:05:50
T-46 sec	8:05:52	59.985	471.30	0.00	0.00	0.00	0.00	0.00	-653.00	30150.35	97.049	T-46 sec	8:05:52
T-44 sec	8:05:54	59.985	471.30	0.00	0.00	0.00	0.00	0.00	-653.00	30159.63	94.857	T-44 sec	8:05:54
T-42 sec	8:05:56	59.986	471.30	0.00	0.00	0.00	0.00	0.00	-653.00	30159.63	88.680	T-42 sec	8:05:56
T-40 sec	8:05:58	59.987	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30159.63	86.487	T-40 sec	8:05:58
T-38 sec	8:06:00	59.987	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30159.63	82.303	T-38 sec	8:06:00
T-36 sec	8:06:02	59.988	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30151.42	80.110	T-36 sec	8:06:02
T-34 sec	8:06:04	59.989	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30151.42	71.741	T-34 sec	8:06:04
T-32 sec	8:06:06	59.989	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30156.16	71.741	T-32 sec	8:06:06
T-30 sec	8:06:08	59.988	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30156.16	78.118	T-30 sec	8:06:08
T-28 sec	8:06:10	59.986	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30156.16	88.680	T-28 sec	8:06:10
T-26 sec	8:06:12	59.985	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30156.16	94.857	T-26 sec	8:06:12
T-24 sec	8:06:14	59.986	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30164.15	88.680	T-24 sec	8:06:14
T-22 sec	8:06:16	59.989	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30164.15	69.549	T-22 sec	8:06:16
T-20 sec	8:06:18	59.992	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30164.15	50.617	T-20 sec	8:06:18
T-18 sec	8:06:20	59.995	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30164.15	31.685	T-18 sec	8:06:20
T-16 sec	8:06:22	59.996	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30203.91	27.501	T-16 sec	8:06:22
T-14 sec	8:06:24	59.995	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30203.91	31.685	T-14 sec	8:06:24
T-12 sec	8:06:26	59.995	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30203.73	29.493	T-12 sec	8:06:26
T-10 sec	8:06:28	59.997	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30203.73	16.939	T-10 sec	8:06:28
T-08 sec	8:06:30	60.000	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30203.73	0.000	T-08 sec	8:06:30
T-06 sec	8:06:32	60.002	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30203.73	-10.562	T-06 sec	8:06:32
T-04 sec	8:06:34	60.002	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30199.61	-10.562	T-04 sec	8:06:34
T-02 sec	8:06:36	60.002	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30199.61	-12.754	T-02 sec	8:06:36
T+0 sec	8:06:38	59.960	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30199.61	263.647	T+0 sec	8:06:38
T+02 sec	8:06:40	59.881	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30199.61	774.227	T+02 sec	8:06:40
T+04 sec	8:06:42	59.872	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.11	833.413	T+04 sec	8:06:42
T+06 sec	8:06:44	59.870	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.11	848.160	T+06 sec	8:06:44
T+08 sec	8:06:46	59.870	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.11	848.160	T+08 sec	8:06:46
T+10 sec	8:06:48	59.874	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.14	820.659	T+10 sec	8:06:48
T+12 sec	8:06:50	59.881	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.14	778.611	T+12 sec	8:06:50
T+14 sec	8:06:52	59.885	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.14	748.918	T+14 sec	8:06:52
T+16 sec	8:06:54	59.888	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.14	732.179	T+16 sec	8:06:54
T+18 sec	8:06:56	59.889	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30094.43	721.617	T+18 sec	8:06:56
T+20 sec	8:06:58	59.891	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30094.43	713.048	T+20 sec	8:06:58
T+22 sec	8:07:00	59.892	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30094.43	706.870	T+22 sec	8:07:00
T+24 sec	8:07:02	59.892	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30094.43	702.486	T+24 sec	8:07:02

T+26 sec	8:07:04	59.893	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30139.49	698.301	T+26 sec	8:07:04
T+28 sec	8:07:06	59.893	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30139.49	698.301	T+28 sec	8:07:06
T+30 sec	8:07:08	59.893	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30133.38	698.301	T+30 sec	8:07:08
T+32 sec	8:07:10	59.895	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30133.38	683.555	T+32 sec	8:07:10
T+34 sec	8:07:12	59.898	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30133.38	666.815	T+34 sec	8:07:12
T+36 sec	8:07:14	59.900	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30133.38	656.253	T+36 sec	8:07:14
T+38 sec	8:07:16	59.901	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30137.26	647.684	T+38 sec	8:07:16
T+40 sec	8:07:18	59.902	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30137.26	639.314	T+40 sec	8:07:18
T+42 sec	8:07:20	59.902	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30137.26	641.307	T+42 sec	8:07:20
T+44 sec	8:07:22	59.901	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30137.26	647.684	T+44 sec	8:07:22
T+46 sec	8:07:24	59.901	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30171.38	647.684	T+46 sec	8:07:24
T+48 sec	8:07:26	59.900	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30171.38	649.876	T+48 sec	8:07:26
T+50 sec	8:07:28	59.899	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30168.76	658.246	T+50 sec	8:07:28
T+52 sec	8:07:30	59.899	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30168.76	660.438	T+52 sec	8:07:30
T+54 sec	8:07:32	59.899	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30168.76	662.431	T+54 sec	8:07:32
T+56 sec	8:07:34	59.900	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30168.76	651.869	T+56 sec	8:07:34
T+58 sec	8:07:36	59.902	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30208.99	637.122	T+58 sec	8:07:36
T+60 sec	8:07:38	59.905	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30208.99	622.376	T+60 sec	8:07:38
T+62 sec	8:07:40	59.907	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30208.99	607.629	T+62 sec	8:07:40
T+64 sec	8:07:42	59.909	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30208.99	595.074	T+64 sec	8:07:42
T+66 sec	8:07:44	59.909	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	592.882	T+66 sec	8:07:44
T+68 sec	8:07:46	59.909	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	597.067	T+68 sec	8:07:46
T+70 sec	8:07:48	59.909	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	595.074	T+70 sec	8:07:48
T+72 sec	8:07:50	59.910	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	586.505	T+72 sec	8:07:50
T+74 sec	8:07:52	59.912	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	571.759	T+74 sec	8:07:52
T+76 sec	8:07:54	59.915	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	557.012	T+76 sec	8:07:54
T+78 sec	8:07:56	59.918	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30211.75	538.080	T+78 sec	8:07:56
T+80 sec	8:07:58	59.919	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30211.75	527.519	T+80 sec	8:07:58
T+82 sec	8:08:00	59.921	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30211.75	516.957	T+82 sec	8:08:00
T+84 sec	8:08:02	59.922	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30211.75	508.388	T+84 sec	8:08:02
T+86 sec	8:08:04	59.923	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.55	502.210	T+86 sec	8:08:04
T+88 sec	8:08:06	59.925	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.55	489.456	T+88 sec	8:08:06
T+90 sec	8:08:08	59.925	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.57	489.456	T+90 sec	8:08:08
T+92 sec	8:08:10	59.927	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.57	474.709	T+92 sec	8:08:10
T+94 sec	8:08:12	59.932	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.57	441.031	T+94 sec	8:08:12
T+96 sec	8:08:14	59.935	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.57	424.092	T+96 sec	8:08:14
T+98 sec	8:08:16	59.937	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.59	411.338	T+98 sec	8:08:16
T+100 sec	8:08:18	59.938	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.59	407.129	T+100 sec	8:08:18
T+102 sec	8:08:20	59.939	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.59	396.567	T+102 sec	8:08:20
T+104 sec	8:08:22	59.942	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.59	379.827	T+104 sec	8:08:22
T+106 sec	8:08:24	59.944	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.49	365.081	T+106 sec	8:08:24
T+108 sec	8:08:26	59.946	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.49	354.519	T+108 sec	8:08:26
T+110 sec	8:08:28	59.948	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.26	339.772	T+110 sec	8:08:28
T+112 sec	8:08:30	59.948	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.26	341.765	T+112 sec	8:08:30
T+114 sec	8:08:32	59.945	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.26	356.512	T+114 sec	8:08:32

T+116 sec	8:08:34	59.944	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.26	362.888	T+116 sec	8:08:34
T+118 sec	8:08:36	59.944	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30234.59	365.081	T+118 sec	8:08:36
T+120 sec	8:08:38	59.945	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30234.59	358.704	T+120 sec	8:08:38
T+122 sec	8:08:40	59.946	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30234.59	352.327	T+122 sec	8:08:40
T+124 sec	8:08:42	59.946	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30234.59	350.135	T+124 sec	8:08:42
T+126 sec	8:08:44	59.947	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.60	343.957	T+126 sec	8:08:44
T+128 sec	8:08:46	59.948	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.60	337.580	T+128 sec	8:08:46
T+130 sec	8:08:48	59.949	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.73	333.395	T+130 sec	8:08:48
T+132 sec	8:08:50	59.950	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.73	327.018	T+132 sec	8:08:50
T+134 sec	8:08:52	59.951	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.73	320.641	T+134 sec	8:08:52
T+136 sec	8:08:54	59.952	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.73	316.456	T+136 sec	8:08:54
T+138 sec	8:08:56	59.952	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	314.264	T+138 sec	8:08:56
T+140 sec	8:08:58	59.953	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	303.902	T+140 sec	8:08:58
T+142 sec	8:09:00	59.955	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	293.340	T+142 sec	8:09:00
T+144 sec	8:09:02	59.956	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	288.956	T+144 sec	8:09:02
T+146 sec	8:09:04	59.956	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.53	284.771	T+146 sec	8:09:04
T+148 sec	8:09:06	59.958	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.53	274.209	T+148 sec	8:09:06
T+150 sec	8:09:08	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	253.085	T+150 sec	8:09:08
T+152 sec	8:09:10	59.963	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	244.716	T+152 sec	8:09:10
T+154 sec	8:09:12	59.962	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	248.900	T+154 sec	8:09:12
T+156 sec	8:09:14	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	253.085	T+156 sec	8:09:14
T+158 sec	8:09:16	59.960	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	259.462	T+158 sec	8:09:16
T+160 sec	8:09:18	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	257.469	T+160 sec	8:09:18
T+162 sec	8:09:20	59.962	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	246.908	T+162 sec	8:09:20
T+164 sec	8:09:22	59.965	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	227.777	T+164 sec	8:09:22
T+166 sec	8:09:24	59.967	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.99	213.030	T+166 sec	8:09:24
T+168 sec	8:09:26	59.969	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.99	202.468	T+168 sec	8:09:26
T+170 sec	8:09:28	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	191.906	T+170 sec	8:09:28
T+172 sec	8:09:30	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	175.167	T+172 sec	8:09:30
T+174 sec	8:09:32	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	172.975	T+174 sec	8:09:32
T+176 sec	8:09:34	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	177.160	T+176 sec	8:09:34
T+178 sec	8:09:36	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	179.352	T+178 sec	8:09:36
T+180 sec	8:09:38	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	175.167	T+180 sec	8:09:38
	8:09:40	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	168.790		
	8:09:42	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	160.420		
	8:09:44	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.63	158.228		
	8:09:46	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.63	156.036		
	8:09:48	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	151.851		
	8:09:50	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	143.481		
	8:09:52	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	135.112		
	8:09:54	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	130.728		
	8:09:56	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	132.920		
	8:09:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	137.104		
	8:10:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	132.920		
	8:10:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	124.550		
	8:10:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30260.67	115.981		

8:10:06	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30260.67	105.419
8:10:08	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	97.049
8:10:10	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	80.110
8:10:12	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	63.371
8:10:14	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	46.432
8:10:16	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	27.501
8:10:18	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	23.116
8:10:20	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	27.501
8:10:22	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	25.309
8:10:24	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.68	27.501
8:10:26	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.68	33.678
8:10:28	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	33.678
8:10:30	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	12.754
8:10:32	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	8.370
8:10:34	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	-2.192
8:10:36	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-12.754
8:10:38	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-16.939
8:10:40	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-14.747
8:10:42	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-12.754
8:10:44	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30314.84	-4.185
8:10:46	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30314.84	23.116
8:10:48	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	52.809
8:10:50	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	71.741
8:10:52	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	80.110
8:10:54	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	71.741
8:10:56	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	48.624
8:10:58	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	27.501
8:11:00	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	6.377
8:11:02	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	-12.754
8:11:04	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.21	-31.685
8:11:06	60.008	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.21	-52.809
8:11:08	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-75.926
8:11:10	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-92.864
8:11:12	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-99.241
8:11:14	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-101.234
8:11:16	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-101.234
8:11:18	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-109.803
8:11:20	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-124.550
8:11:22	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-149.858
8:11:24	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.48	-170.982
8:11:26	60.030	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.48	-194.099
8:11:28	60.033	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-213.030
8:11:30	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-225.784
8:11:32	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-229.969
8:11:34	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-223.592
8:11:36	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-219.407

8:11:38	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-229.969
8:11:40	60.038	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-248.900
8:11:42	60.040	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-263.647
8:11:44	60.041	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.79	-268.031
8:11:46	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.79	-274.209
8:11:48	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-276.401
8:11:50	60.043	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-282.778
8:11:52	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-288.956
8:11:54	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-293.340
8:11:56	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-297.525
8:11:58	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-299.518
8:12:00	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-303.902
8:12:02	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-318.648
8:12:04	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30343.46	-324.826
8:12:06	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30343.46	-320.641
8:12:08	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-320.641
8:12:10	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-329.210
8:12:12	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-324.826
8:12:14	60.048	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-316.456
8:12:16	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-308.087
8:12:18	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-299.518
8:12:20	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-299.518
8:12:22	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-297.525
8:12:24	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.20	-288.956
8:12:26	60.043	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.20	-280.586
8:12:28	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-272.216
8:12:30	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-276.401
8:12:32	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-291.148
8:12:34	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-303.902
8:12:36	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-308.087
8:12:38	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-301.710
8:12:40	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-288.956
8:12:42	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-293.340
8:12:44	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-295.333
8:12:46	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-295.333
8:12:48	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-297.525
8:12:50	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-301.710
8:12:52	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-303.902
8:12:54	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-303.902
8:12:56	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-295.333
8:12:58	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-284.771
8:13:00	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-274.209
8:13:02	60.041	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-265.839
8:13:04	60.039	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.65	-253.085
8:13:06	60.036	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.65	-234.154
8:13:08	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-221.599

8:13:10	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-219.407
8:13:12	60.033	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-213.030
8:13:14	60.030	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-196.291
8:13:16	60.027	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-179.352
8:13:18	60.027	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-175.167
8:13:20	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-168.790
8:13:22	60.024	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-154.043
8:13:24	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.33	-143.481
8:13:26	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.33	-141.289
8:13:28	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-145.674
8:13:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-139.297
8:13:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-139.297
8:13:34	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-130.728
8:13:36	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-115.981
8:13:38	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-103.426
8:13:40	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-84.295
8:13:42	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-73.933
8:13:44	60.010	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.69	-65.364
8:13:46	60.009	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.69	-61.179
8:13:48	60.008	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-50.617
8:13:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-33.678
8:13:52	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-29.493
8:13:54	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-40.055
8:13:56	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-40.055
8:13:58	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-35.870
8:14:00	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-33.678
8:14:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-25.309
8:14:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.31	-16.939
8:14:06	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.31	-8.370
8:14:08	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-8.370
8:14:10	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-4.185
8:14:12	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-2.192
8:14:14	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-14.747
8:14:16	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-27.501
8:14:18	60.007	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-44.240
8:14:20	60.009	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-58.987
8:14:22	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-84.295
8:14:24	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.85	-97.049
8:14:26	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.85	-94.857
8:14:28	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-92.864
8:14:30	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-99.241
8:14:32	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-105.419
8:14:34	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-109.803
8:14:36	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-113.988
8:14:38	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-111.796
8:14:40	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-109.803

8:14:42	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-107.611
8:14:44	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.99	-105.419
8:14:46	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.99	-113.988
8:14:48	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-115.981
8:14:50	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-115.981
8:14:52	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-107.611
8:14:54	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-103.426
8:14:56	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-107.611
8:14:58	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-103.426
8:15:00	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-88.680
8:15:02	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-75.926
8:15:04	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30371.85	-73.933
8:15:06	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30371.85	-73.933
8:15:08	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-71.741
8:15:10	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-71.741
8:15:12	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-84.295
8:15:14	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-97.049
8:15:16	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-115.981
8:15:18	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-115.981
8:15:20	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-120.166
8:15:22	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-118.173
8:15:24	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30397.03	-113.988
8:15:26	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30397.03	-99.241
8:15:28	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-99.241
8:15:30	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-90.672
8:15:32	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-113.988
8:15:34	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-124.550
8:15:36	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-124.550
8:15:38	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-132.920
8:15:40	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-122.358
8:15:42	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-122.358
8:15:44	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.78	-128.735
8:15:46	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.78	-128.735
8:15:48	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-128.735
8:15:50	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-120.166
8:15:52	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-97.049
8:15:54	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-88.680
8:15:56	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-90.672
8:15:58	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-80.110
8:16:00	60.010	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-65.364
8:16:02	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-38.062
8:16:04	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.03	-10.562
8:16:06	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.03	-10.562
8:16:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	12.754
8:16:10	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	42.247
8:16:12	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	48.624

8:16:14	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	50.617
8:16:16	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	65.364
8:16:18	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	75.926
8:16:20	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	103.426
8:16:22	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	120.166
8:16:24	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.96	124.550
8:16:26	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.96	128.735
8:16:28	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	130.728
8:16:30	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	141.289
8:16:32	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	162.413
8:16:34	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	177.160
8:16:36	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	183.537
8:16:38	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	185.729
8:16:40	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	170.982
8:16:42	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	154.043
8:16:44	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.59	141.289
8:16:46	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.59	149.858
8:16:48	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	166.598
8:16:50	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	187.722
8:16:52	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	189.914
8:16:54	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	177.160
8:16:56	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	166.598
8:16:58	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	170.982
8:17:00	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	175.167
8:17:02	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	166.598
8:17:04	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.40	156.036
8:17:06	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.40	147.666
8:17:08	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	141.289
8:17:10	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	145.674
8:17:12	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	149.858
8:17:14	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	154.043
8:17:16	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	160.420
8:17:18	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	170.982
8:17:20	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	175.167
8:17:22	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	181.345
8:17:24	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30413.65	183.537
8:17:26	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30413.65	189.914
8:17:28	59.970	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	196.291
8:17:30	59.968	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	206.852
8:17:32	59.966	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	221.599
8:17:34	59.965	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	225.784
8:17:36	59.966	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	221.599
8:17:38	59.969	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	200.475
8:17:40	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	179.352
8:17:42	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	172.975
8:17:44	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	170.982

8:17:46	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352
8:17:48	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352
8:17:50	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352
8:17:52	59.968	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	211.037
8:17:54	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	187.722
8:17:56	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228
8:17:58	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228
8:18:00	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228
8:18:02	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	103.426
8:18:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30425.74	118.173
8:18:06	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30425.74	137.104
8:18:08	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	145.674
8:18:10	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	145.674
8:18:12	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	122.358
8:18:14	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	99.241
8:18:16	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	73.933
8:18:18	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	54.802
8:18:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	42.247
8:18:22	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	27.501
8:18:24	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30440.82	21.124
8:18:26	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30440.82	14.747
8:18:28	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	10.562
8:18:30	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	14.747
8:18:32	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	18.932
8:18:34	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	16.939
8:18:36	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	16.939
8:18:38	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	16.939
8:18:40	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	-4.185
8:18:42	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	-21.124
8:18:44	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.11	-23.116
8:18:46	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.11	-16.939
8:18:48	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	-6.377
8:18:50	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	4.185
8:18:52	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	16.939
8:18:54	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	21.124
8:18:56	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	21.124
8:18:58	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	18.932
8:19:00	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	14.747
8:19:02	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	8.370
8:19:04	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.86	2.192
8:19:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.86	0.000
8:19:08	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-2.192
8:19:10	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-6.377
8:19:12	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-14.747
8:19:14	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-18.932
8:19:16	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-16.939

8:19:18	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-14.747
8:19:20	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-14.747
8:19:22	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-21.124
8:19:24	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-27.501
8:19:26	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-31.685
8:19:28	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-29.493
8:19:30	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116
8:19:32	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116
8:19:34	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116
8:19:36	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116
8:19:38	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116
8:19:40	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116
8:19:42	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116
8:19:44	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-40.055
8:19:46	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-31.685
8:19:48	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493
8:19:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493
8:19:52	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-23.116
8:19:54	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-18.932
8:19:56	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562
8:19:58	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562
8:20:00	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501
8:20:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501
8:20:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-18.932
8:20:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-2.192
8:20:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	12.754
8:20:10	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	23.116
8:20:12	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	31.685
8:20:14	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	40.055
8:20:16	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	46.432
8:20:18	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	48.624
8:20:20	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	50.617
8:20:22	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	67.556
8:20:24	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	97.049
8:20:26	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	113.988
8:20:28	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	141.289
8:20:30	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	154.043
8:20:32	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858
8:20:34	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858
8:20:36	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	149.858
8:20:38	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	143.481
8:20:40	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	132.920
8:20:42	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	120.166
8:20:44	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	122.358
8:20:46	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	135.112
8:20:48	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	156.036

8:20:50	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	160.420
8:20:52	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	158.228
8:20:54	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	151.851
8:20:56	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	143.481
8:20:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	137.104
8:21:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	132.920
8:21:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	126.543
8:21:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	118.173
8:21:06	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	115.981
8:21:08	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988
8:21:10	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	111.796
8:21:12	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988
8:21:14	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988
8:21:16	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	111.796
8:21:18	59.986	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	90.672
8:21:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	40.055
8:21:22	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	-14.747
8:21:24	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-71.741
8:21:26	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-111.796
8:21:28	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-135.112
8:21:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297
8:21:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297
8:21:34	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297
8:21:36	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-151.851
8:21:38	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-166.598

Date:	Monday, May 16, 2011	
Time of T(0)	8:06:38	
ne of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30	
ue A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999	Hz
: B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101	Hz
alue A Pre-Perturbation Contingency MW [T(-2) to T(-16)]	471.09	MW
t-Perturbation Average Contingency MW [T(+20 to T(+52)]	0.00	MW
Pre to Post Perturbation Contingency Delta MW Actual	471.09	MW
EPFR Pre-Perturbation Average	8.97	MW
EPFR Post-Perturbation Average	671.54	MW
EPFR Unadjusted	662.57	MW
EPFR Adjusted	662.57	MW
Pre Load Resources MW	0.00	MW
Pre Non-Conforming Load MW	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Sum of Pre Perturbation Adjustments	0.00	MW
Post Load Resources MW	0.00	MW
Post Non-Conforming Load MW	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Sum of Post Perturbation Adjustments	0.00	MW
Net Total Adjustments MW	0.00	MW

Frequency Response Initiative - Additional Primary Frequency Respons

Frequency @ T(+46)	59.901	Hz				
Frequency @ T(+76)	59.915	Hz	Actual		Load	Non-
Frequency @ T(+106)	59.944	Hz	Primary	Un-adjusted	Resources	Conforming
Frequency @ T(+136)	59.952	Hz	Freq Response	P.U.	Tripped	Load
Frequency @ T(+166)	59.967	Hz	MW/0.1 Hz	Performance	Adjustment	Adjustment
EPFR @ T(+46)	-653.00	MW/0.1 Hz	-481.62	0.738	0.00	0.00
EPFR @ T(+76)	-653.00	MW/0.1 Hz	-561.31	0.860	0.00	0.00
EPFR @ T(+106)	-653.00	MW/0.1 Hz	-863.83	1.323	0.00	0.00
EPFR @ T(+136)	-653.00	MW/0.1 Hz	-1000.43	1.532	0.00	0.00
EPFR @ T(+166)	-653.00	MW/0.1 Hz	-1507.48	2.309	0.00	0.00

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-653.00	MW/0.1 Hz
Post-Perturbation Bias Setting	-653.00	MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	8.97	MW
EPFR for Bias Setting Post-Perturbation Average	671.54	MW
EPFR for Bias Setting Delta	662.57	MW
Primary Frequency Response Delivery % of Bias	71.10%	
Pre-Perturbation BA Load	30202.7	MW
Post-Perturbation BA Load	30136.8	MW
Pre to Post Perturbation BA Load Change	-65.973	MW
Load Dampening Frequency Response	-65.020	MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	14.00%	
Average Bias Setting when Hz is greater than +/-0.036 Hz	-653.00	MW/0.1 Hz

2 second Average Period Evaluation

Initial P.U. Performance for FRO	0.711	P.U.
Initial P.U. Performance Adjusted for FRO	0.711	P.U.

Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected MW/0.1 Hz Response MW/0.1 Hz	Actual Average Primary Freq Response MW/0.1 Hz	Actual Primary Freq Response Beta MW/0.1 Hz
													0.0197
													0.0178
													0.0165

													0.0142
													0.0126
													0.0120
													0.0126
													0.0139
													0.0152
													0.0165
													0.0168
													0.0165
													0.0158
													0.0149
													0.0145
													0.0136
													0.0132
													0.0126
													0.0123
													0.0110
													0.0110
													0.0120
													0.0136
													0.0145
													0.0136
													0.0107
													0.0078
													0.0049
59.999	471.09	0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0042
59.999	471.09	0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0049
59.999	471.09	0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0045
59.999	471.09	0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0026
59.999	471.09	0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0000
59.999	471.09	0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0016
59.999	471.09	0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0016
59.999	471.09	0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0020
													0.0404
												401.98	0.1186
												373.12	0.1276
												366.57	0.1299
												366.57	0.1299
												378.99	0.1257
												399.69	0.1192
												415.73	0.1147
												425.35	0.1121
												431.66	0.1105
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	436.91	0.1092
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	440.78	0.1082
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	443.56	0.1076

59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	456.01	0.1047
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	467.62	0.1021
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	475.25	0.1005
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	488.02	0.0979
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	486.48	0.0982
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	479.97	0.0995
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	473.79	0.1008
59.897	0.00	0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	472.19	0.1011
												470.75	0.1014
												478.49	0.0998
												489.72	0.0976
												501.49	0.0953
												513.85	0.0931
												524.85	0.0911
												526.82	0.0908
												523.07	0.0914
												524.85	0.0911
												532.64	0.0898
												546.60	0.0876
												561.31	0.0853
												581.39	0.0824
												593.23	0.0808
												605.56	0.0792
												615.95	0.0779
												623.67	0.0769
												640.22	0.0750
												640.22	0.0750
												660.50	0.0727
												711.98	0.0675
												741.03	0.0649
												764.52	0.0630
												772.60	0.0623
												793.66	0.0607
												829.48	0.0582
												863.83	0.0559
												890.23	0.0543
												929.92	0.0520
												924.35	0.0523
												885.13	0.0546

869.18	0.0556
863.83	0.0559
879.58	0.0549
895.91	0.0540
901.67	0.0536
918.30	0.0527
936.12	0.0517
948.19	0.0511
967.21	0.0501
986.99	0.0491
1000.43	0.0485
1007.61	0.0481
1043.01	0.0465
1081.75	0.0449
1098.69	0.0443
1115.36	0.0436
1159.77	0.0420
1260.13	0.0388
1304.87	0.0375
1282.11	0.0381
1260.13	0.0388
1228.05	0.0397
1237.90	0.0394
1292.85	0.0378
1405.88	0.0349
1507.48	0.0326
1589.76	0.0310
1681.55	0.0294
1850.91	0.0268
1875.65	0.0265
1828.98	0.0271
1805.45	0.0275
1850.91	0.0268
1924.76	0.0258
2031.13	0.0246
2060.96	0.0242
2091.68	0.0239
2152.94	0.0233
2286.90	0.0220
2438.64	0.0207
2526.45	0.0200
2481.77	0.0204
2400.71	0.0210
2481.77	0.0204
2661.48	0.0191
2874.60	0.0178

3189.38	0.0161
3492.44	0.0149
4323.98	0.0123
5654.43	0.0097
8210.95	0.0071
16598.49	0.0042
21741.68	0.0035
16598.49	0.0042
18825.12	0.0039
16598.49	0.0042
12448.87	0.0052
12448.87	0.0052
81245.24	0.0020
	0.0013
	0.0003
	0.0020
	0.0026
	0.0023
	0.0020
	0.0006
21741.68	0.0035
7016.63	0.0081
4900.51	0.0110
4323.98	0.0123
4900.51	0.0110
7757.08	0.0074
16598.49	0.0042
	0.0010
	0.0020
	0.0049
	0.0081
	0.0116
	0.0142
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	0.0155
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	0.0229
	0.0262
	0.0297
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0.0006
0.0003
0.0023
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	0.0123
	0.0100
	0.0058
	0.0016
	0.0016
81245.24	0.0020
9243.47	0.0065
7757.08	0.0074

7385.93	0.0078
5454.63	0.0100
4594.22	0.0116
3256.67	0.0158
2766.41	0.0184
2661.48	0.0191
2568.49	0.0197
2526.45	0.0200
2324.79	0.0216
2004.75	0.0249
1828.98	0.0271
1762.17	0.0281
1740.32	0.0284
1898.72	0.0262
2120.41	0.0236
2324.79	0.0216
2183.39	0.0229
1951.53	0.0255
1720.91	0.0287
1700.07	0.0291
1828.98	0.0271
1951.53	0.0255
1898.72	0.0262
1850.91	0.0268
1951.53	0.0255
2091.68	0.0239
2217.90	0.0226
2324.79	0.0216
2250.23	0.0223
2183.39	0.0229
2120.41	0.0236
2031.13	0.0246
1898.72	0.0262
1850.91	0.0268
1784.58	0.0278
1762.17	0.0281
1700.07	0.0291
1642.19	0.0301
1554.54	0.0317
1446.73	0.0339
1418.80	0.0346
1446.73	0.0339
1606.31	0.0307
1805.45	0.0275
1875.65	0.0265
1898.72	0.0262

1805.45	0.0275
1805.45	0.0275
1805.45	0.0275
1522.35	0.0323
1720.91	0.0287
2060.96	0.0242
2060.96	0.0242
2060.96	0.0242
3256.67	0.0158
2816.90	0.0181
2400.71	0.0210
2250.23	0.0223
2250.23	0.0223
2712.93	0.0187
3407.64	0.0152
4735.15	0.0113
6711.56	0.0084
9243.47	0.0065
16598.49	0.0042
25305.89	0.0032
53229.64	0.0023
192957.44	0.0016
53229.64	0.0023
30873.19	0.0029
38591.49	0.0026
38591.49	0.0026
38591.49	0.0026
	0.0006
	0.0032
	0.0035
	0.0026
	0.0010
	0.0006
38591.49	0.0026
25305.89	0.0032
25305.89	0.0032
30873.19	0.0029
53229.64	0.0023
	0.0013
	0.0003
	0.0000
	0.0003
	0.0010
	0.0023
	0.0029
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	0.0016
	0.0042
	0.0042
	0.0029
	0.0003
81245.24	0.0020
21741.68	0.0035
13540.87	0.0049
9895.25	0.0061
8210.95	0.0071
7757.08	0.0074
7385.93	0.0078
5250.54	0.0103
3492.44	0.0149
2929.15	0.0175
2324.79	0.0216
2120.41	0.0236
2183.39	0.0229
2183.39	0.0229
2183.39	0.0229
2286.90	0.0220
2481.77	0.0204
2766.41	0.0184
2712.93	0.0187
2438.64	0.0207
2091.68	0.0239

2031.13	0.0246
2060.96	0.0242
2152.94	0.0233
2286.90	0.0220
2400.71	0.0210
2481.77	0.0204
2616.37	0.0194
2816.90	0.0181
2874.60	0.0178
2929.15	0.0175
2991.59	0.0171
2929.15	0.0175
2929.15	0.0175
2991.59	0.0171
3765.02	0.0139
9895.25	0.0061
	0.0023
	0.0110
	0.0171
	0.0207
	0.0213
	0.0213
	0.0213
	0.0233
	0.0255

se Evaluation Points

Spare Adjustment	Spare Adjustment	Spare Adjustment	Adjusted P.U. Performance
0.00	0.00	0.00	0.738
0.00	0.00	0.00	0.860
0.00	0.00	0.00	1.323
0.00	0.00	0.00	1.532
0.00	0.00	0.00	2.309

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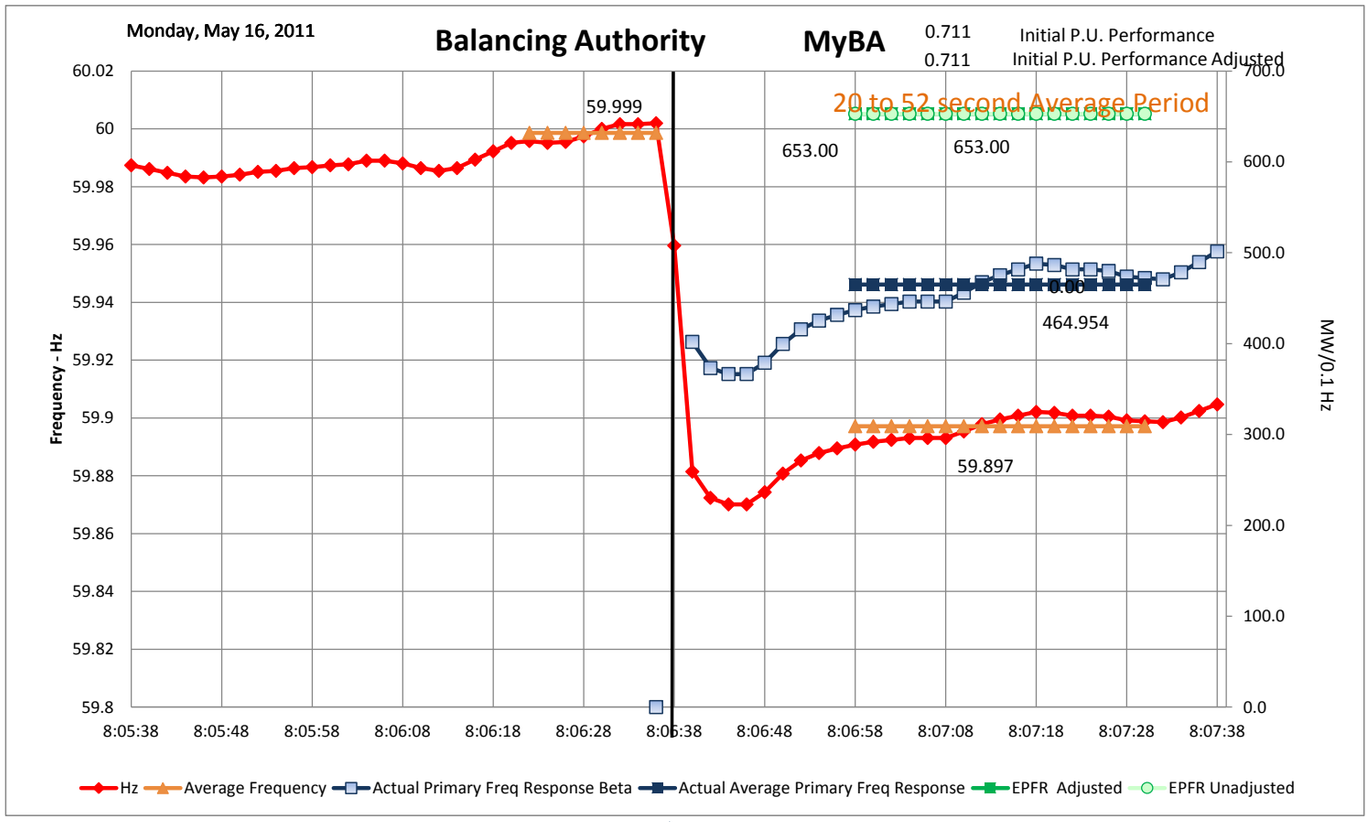


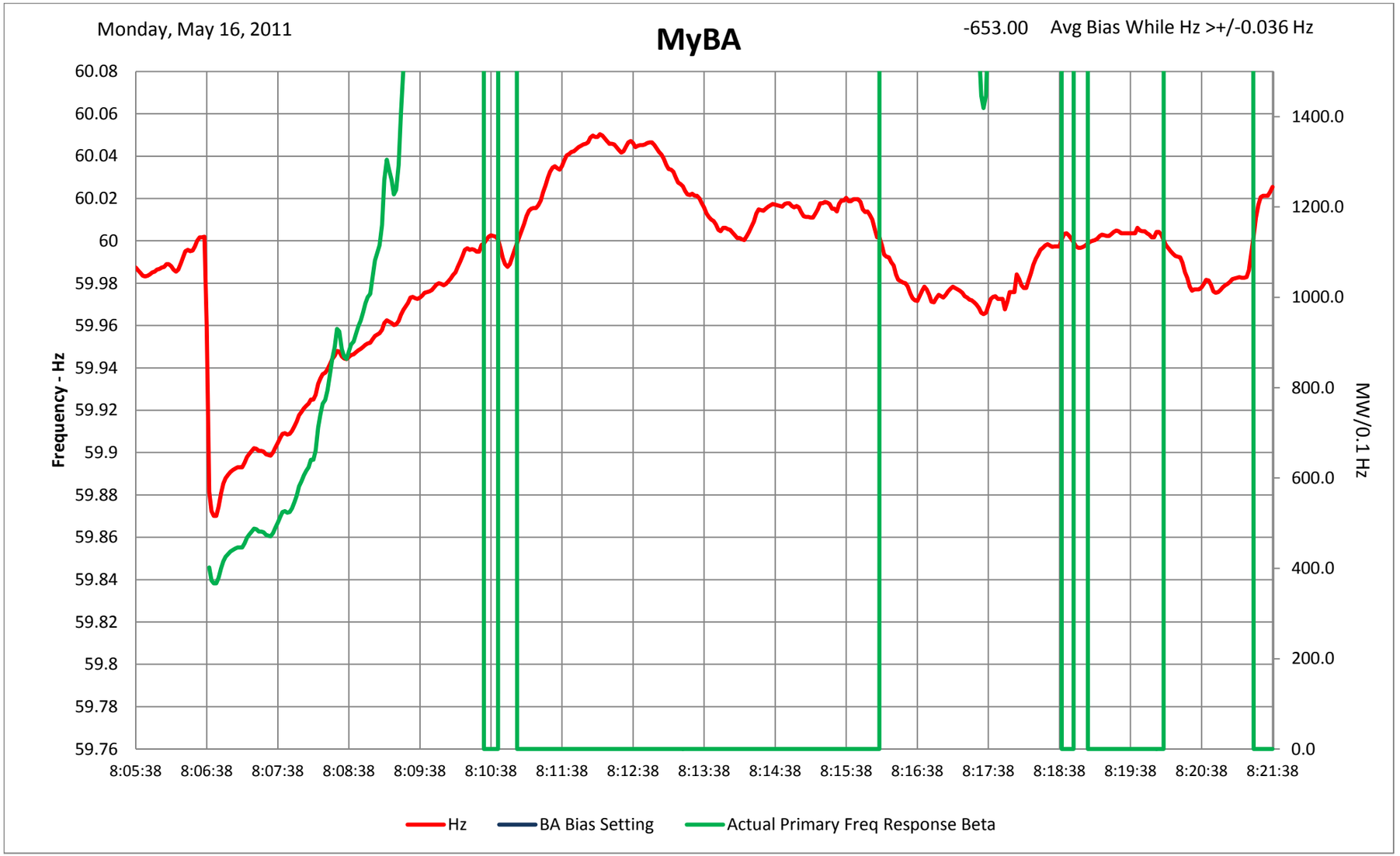
T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

"Auto" Event Detection adjustment of T(0).
# of rows to shift T(0)
1
A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.


Monday, May 16, 2011
MyBA
-653.00 Avg Bias While Hz >+/-0.036 Hz
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Bias Setting
Actual Primary Freq Response Beta

Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Value A Data BA Performance							
						Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW
Monday, May 16, 2011	8:06:38	60.002	59.999	8:06:38	59.870	59.999	471.09	0.00	0.00	0.00	0.00	0.00	0.00

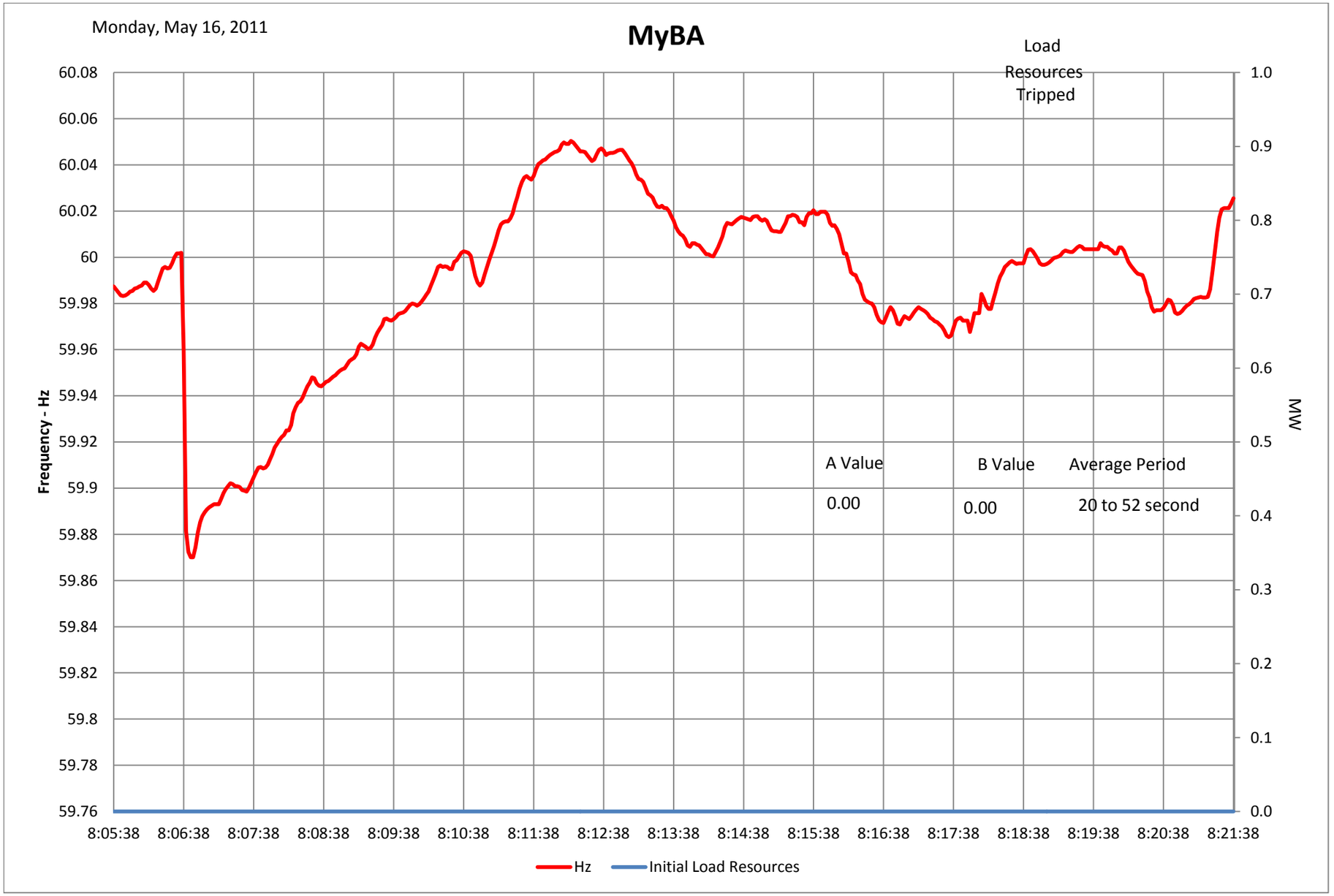
			Value B	20 to 52 second Average Period Evaluation										
BA Bias Setting	BA Load	Bias Setting EPFR	Frequency	Contingent Resource Lost	Load Resources Tripped	Non-Conforming Load Load (-)	Spare	Spare	Spare	Spare	Initial Performance Adjusted	Initial Performance Unadjusted	Sustained Performance
MW/0.1 Hz	MW	MW	Hz	MW	MW	MW	MW	MW	MW	MW	P.U.	P.U.	P.U.
-653.00	30202.74	8.97	59.897	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.711	0.711	0.738

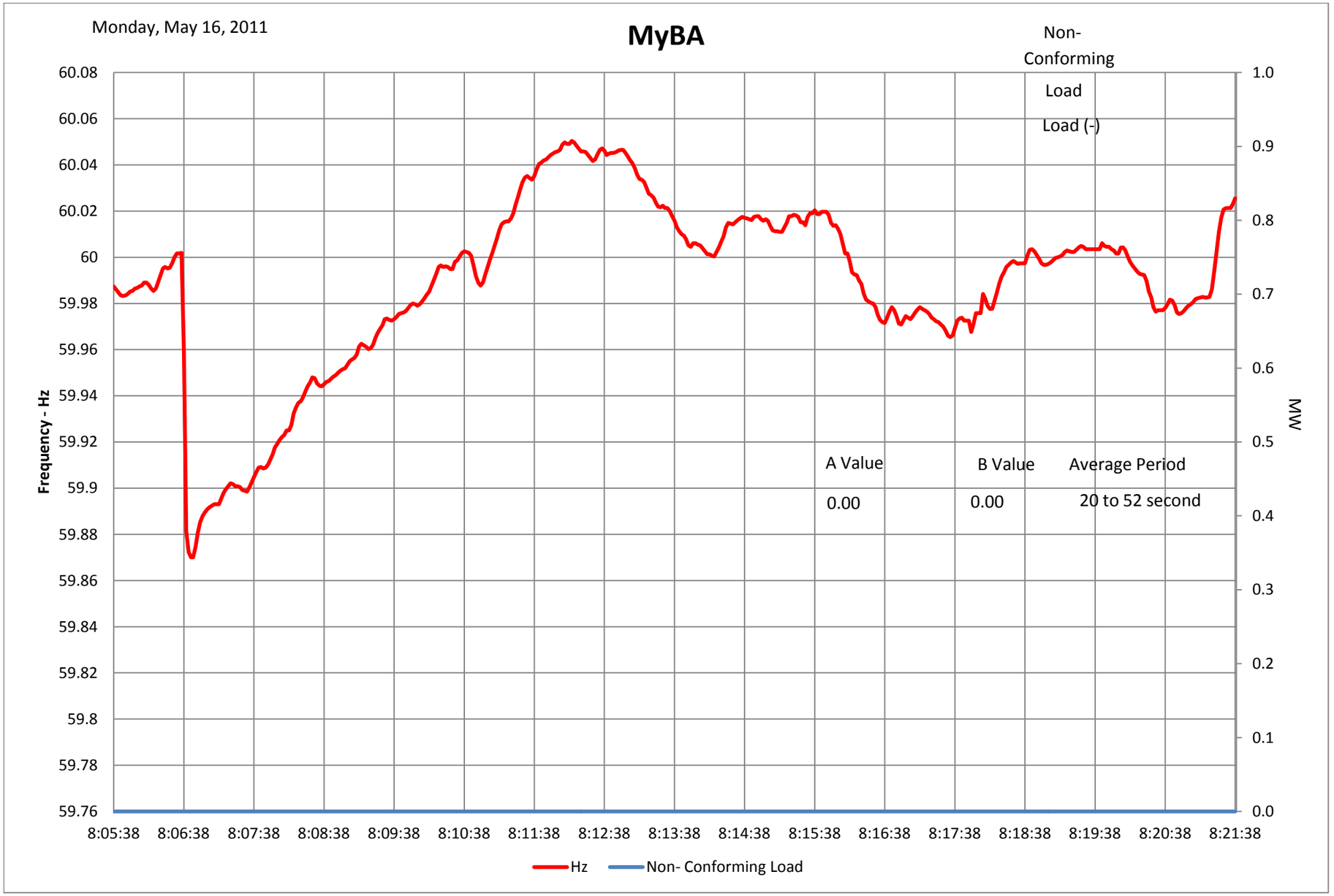
				Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points									
BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.
-653.00	30136.77	671.54	-653.00	0.738	0.860	1.323	1.532	2.309	0.738	0.860	1.323	1.532	2.309

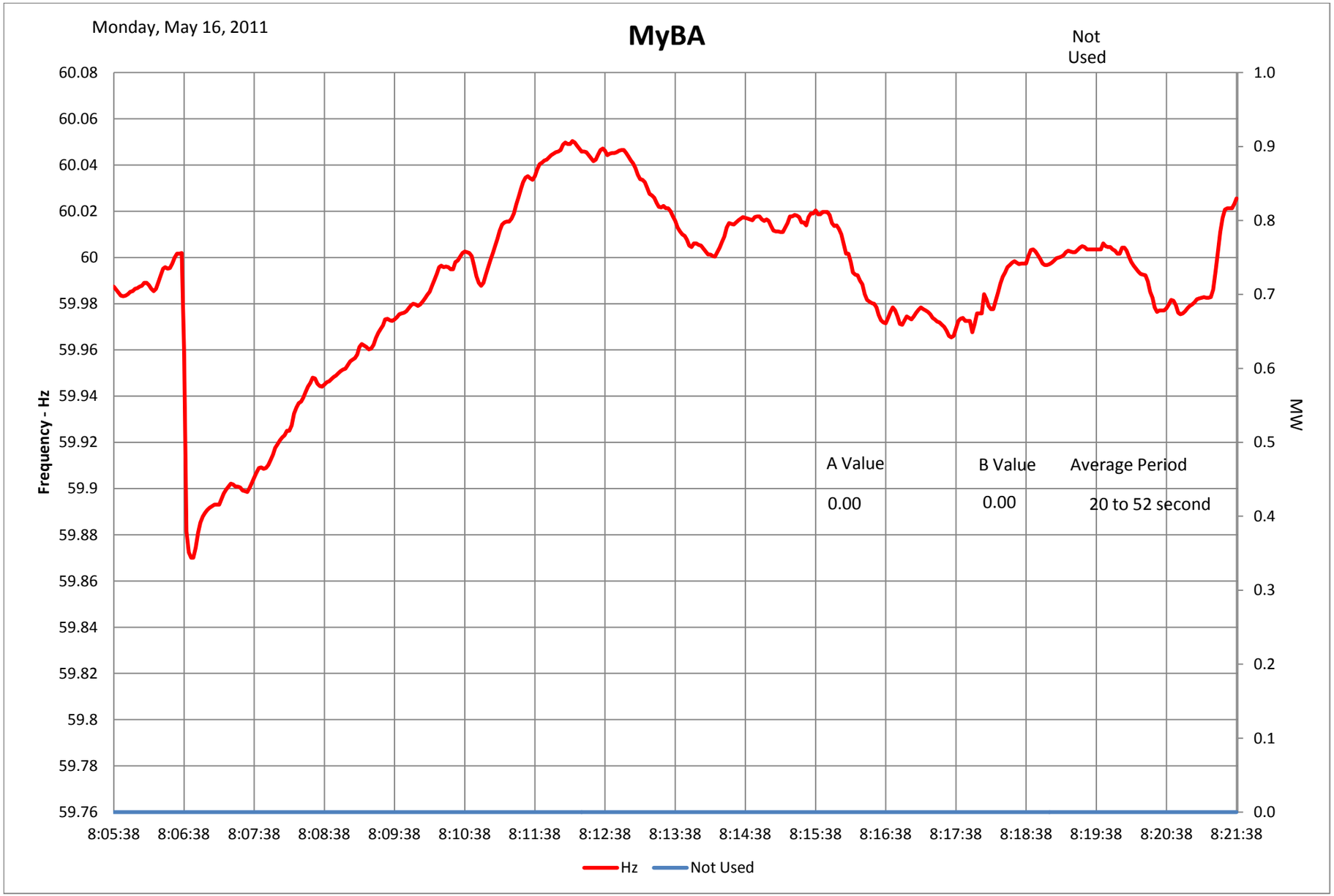
Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
-653.00	-653.00

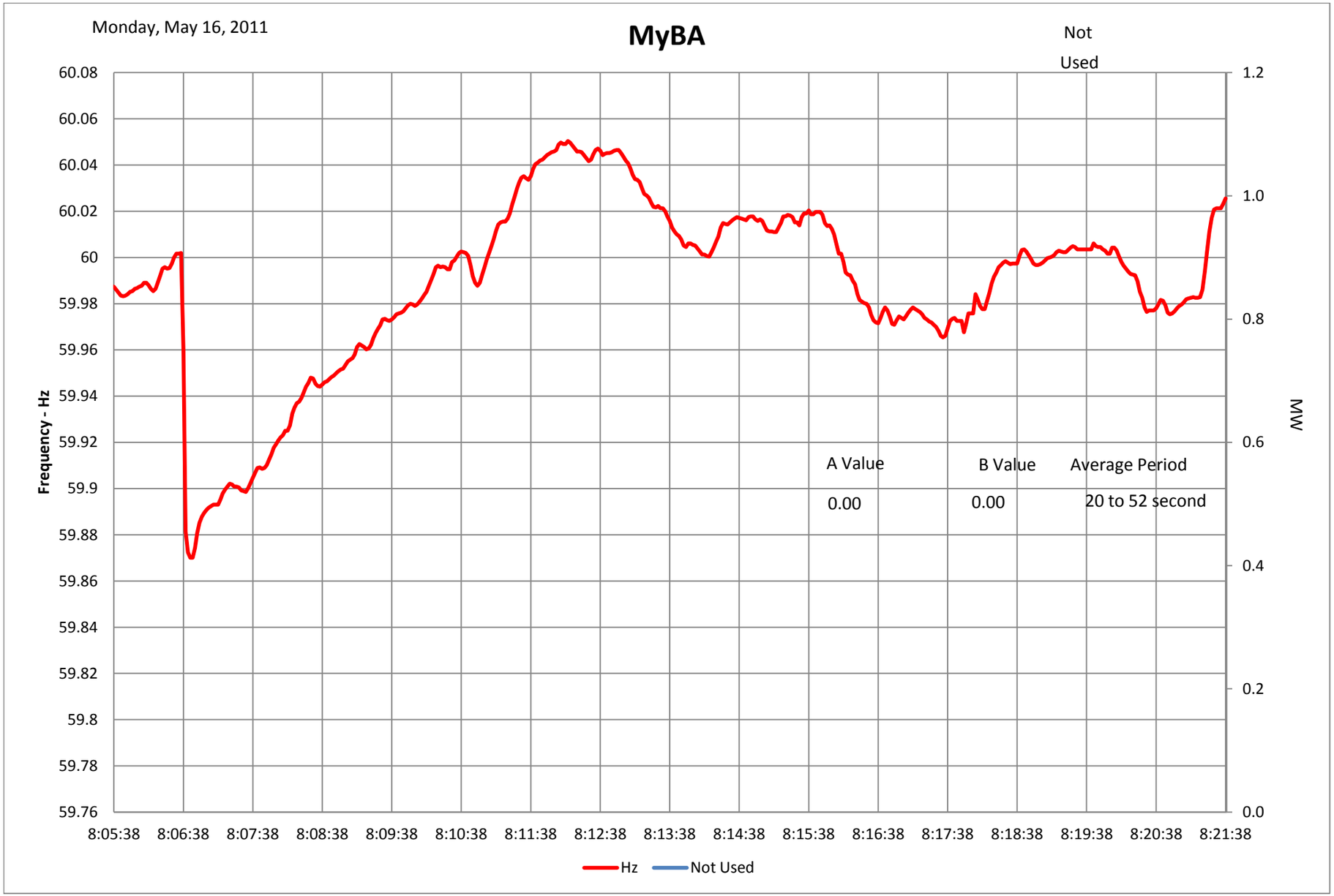
Steps	**To be completed for each event evaluated.**
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order: Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Contingent Resouce Lost MW or Lost Load Column D: Load Resources tripped during the event. Column E: Non Conforming Load Column F: Spare Column G: Not Used Column H: Spare Column I: Spare Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D & E are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data. Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time. If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary. To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events) This value controls the end of the "Sustained Frequency Response" evaluation period. Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

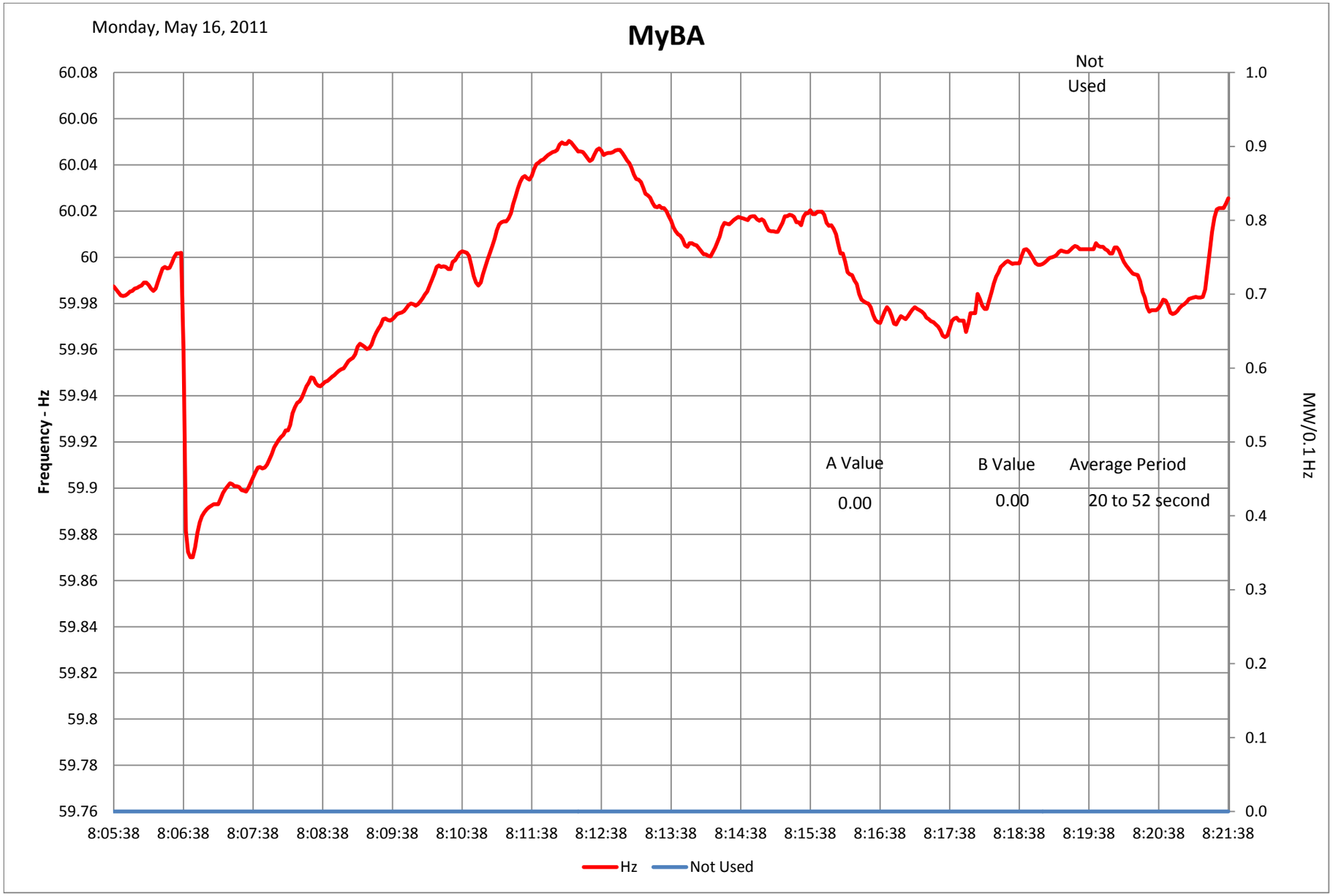
Steps	**To be completed the first time you use Form 2 for your BA.**
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "ERCOT".

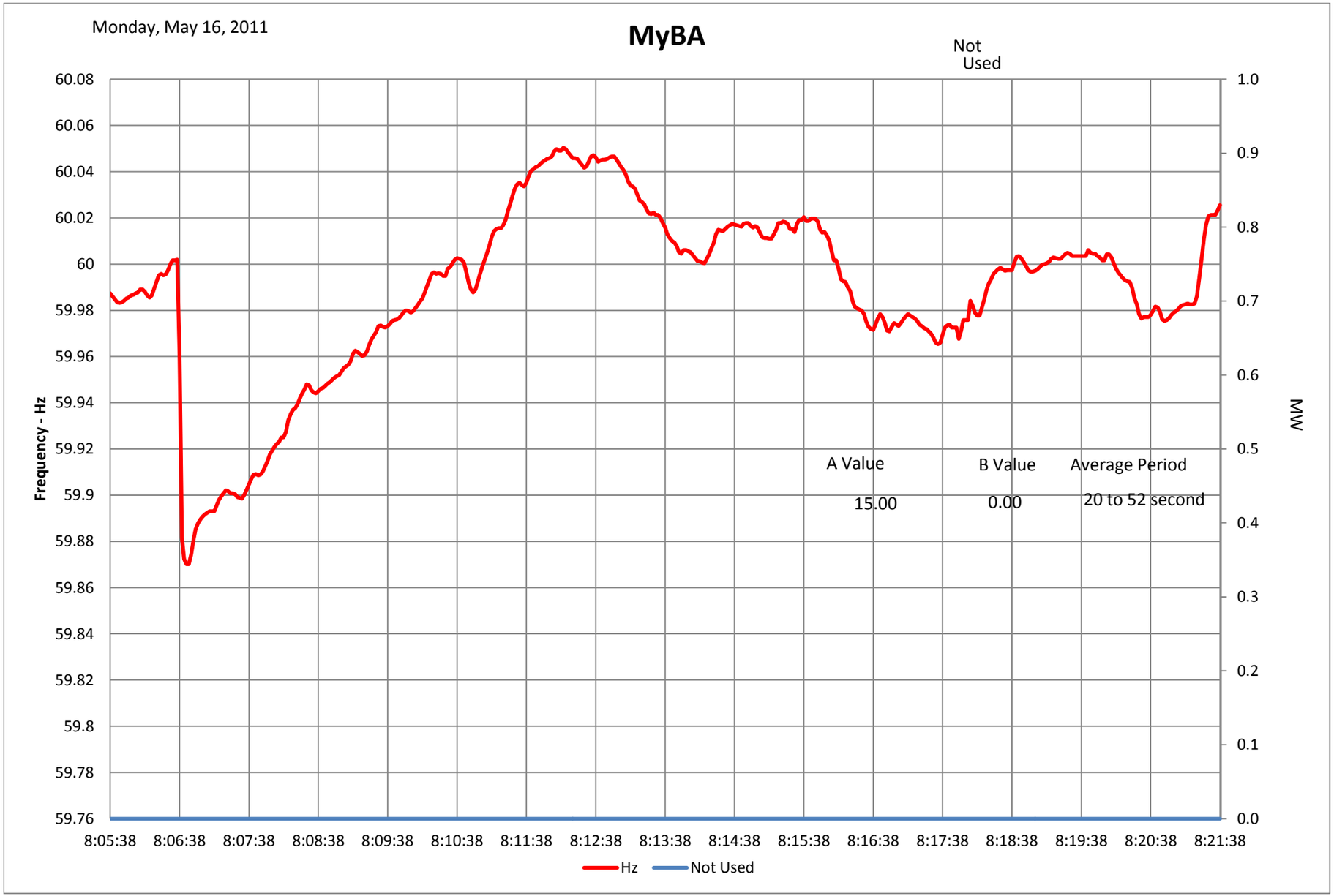

Monday, May 16, 2011
MyBA
Load Resources Tripped
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Initial Load Resources

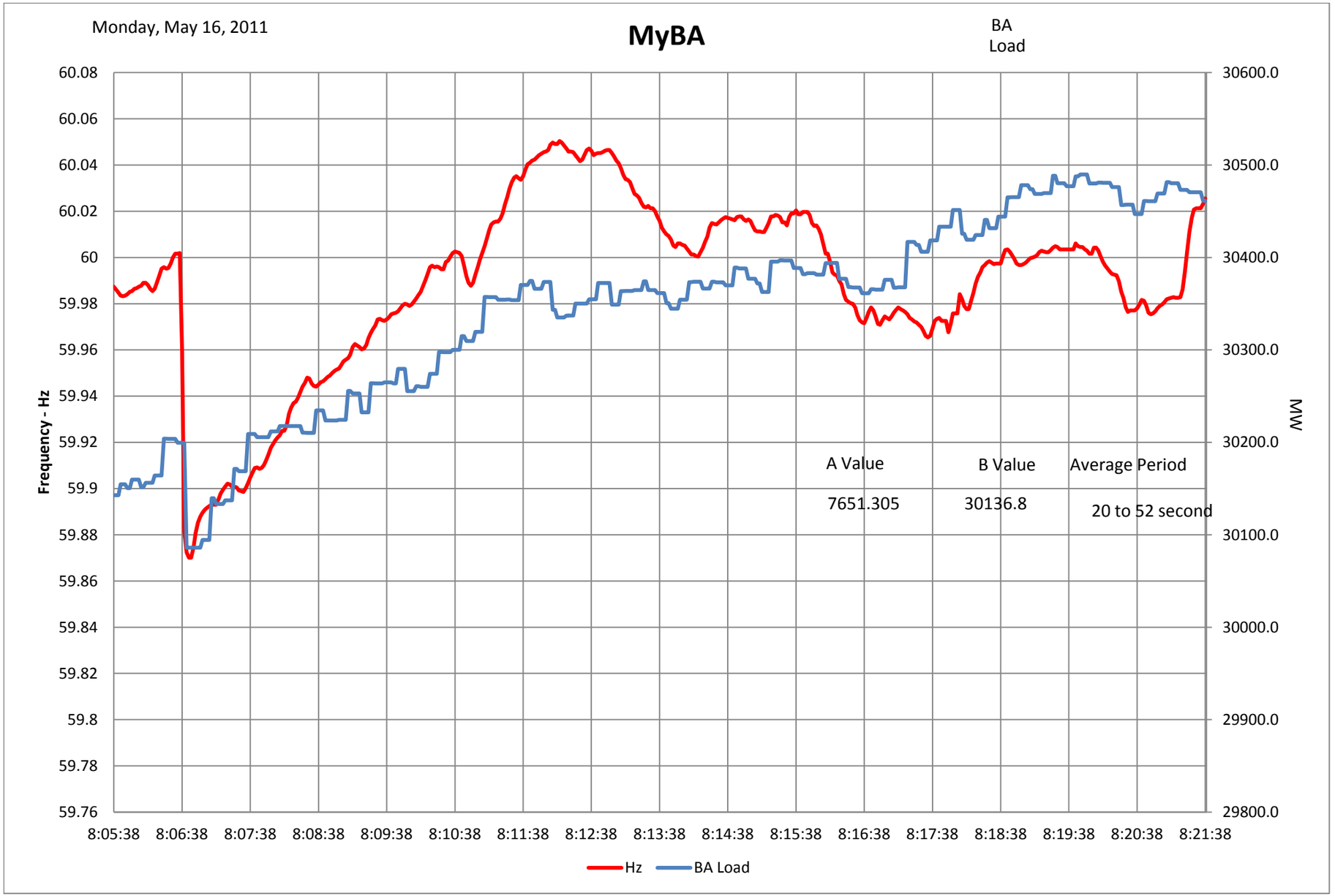

Monday, May 16, 2011
MyBA
Non-Conforming Load
Load (-)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Non- Conforming Load

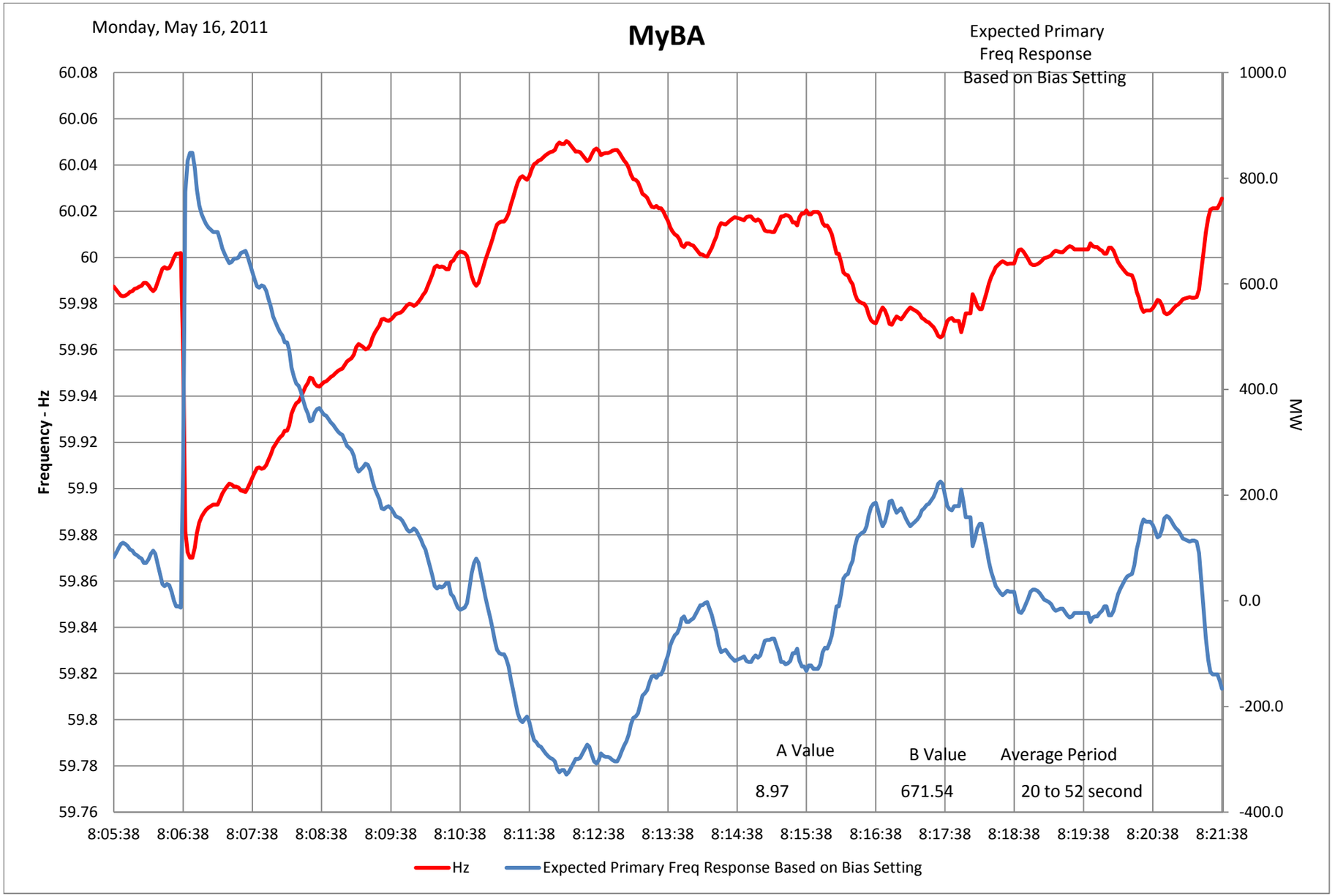

Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.2
1.0
0.8
0.6
0.4
0.2
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
15.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
BA Load
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
30600.0
30500.0
30400.0
30300.0
30200.0
30100.0
30000.0
29900.0
29800.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
7651.305
B Value
30136.8
Average Period
20 to 52 second
Hz
BA Load


Monday, May 16, 2011
MyBA
Expected Primary
Freq Response
Based on Bias Setting
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
MW
A Value
8.97
B Value
671.54
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Expected Primary Freq Response Based on Bias Setting

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 2:33:00 05:34	Max Absolute Delta Hz 0.126 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:17:26	60.007	3679.946	350	-331.852966	0	81.5	10	15	-103	7553.79		0				
10/12/09 02:17:28	60.009	3679.44	350	-331.852966	0	82	10	15	-103	7554.12	0	0	0	0.002	0.002	
10/12/09 02:17:30	60.009	3679.912	350	-331.852966	0	82.5	10	15	-103	7554.45	0	0	0	0.000	0.000	
10/12/09 02:17:32	60.006	3679.517	350	-331.852966	0	83	10	15	-103	7554.78	0	0	0	-0.003	0.003	
10/12/09 02:17:34	60.006	3679.888	350	-331.852966	0	83.5	10	15	-103	7555.11	0	0	0	0.000	0.000	
10/12/09 02:17:36	60.009	3679.608	350	-329.98822	0	84	10	15	-103	7555.44	0	0	0	0.003	0.003	
10/12/09 02:17:38	60.009	3679.06	350	-329.98822	0	84.5	10	15	-103	7555.77	0	0	0	0.000	0.000	
10/12/09 02:17:40	60.008	3679.261	350	-329.98822	0	85	10	15	-103	7556.1	0	0	0	-0.001	0.001	
10/12/09 02:17:42	60.009	3679.164	350	-329.98822	0	85.5	10	15	-103	7556.43	0	0	0	0.001	0.001	
10/12/09 02:17:44	60.009	3679.025	350	-329.98822	0	86	10	15	-103	7556.76	0	0	0	0.000	0.000	
10/12/09 02:17:46	60.005	3679.152	350	-255.444168	0	86.5	10	15	-103	7557.09	0	0	0	-0.004	0.004	
10/12/09 02:17:48	60.004	3678.572	350	-255.444168	0	87	10	15	-103	7557.42	0	0	0	-0.001	0.001	
10/12/09 02:17:50	60.001	3678.295	350	-255.444168	0	87.5	10	15	-103	7557.75	0	0	0	-0.003	0.003	
10/12/09 02:17:52	59.999	3678.249	350	-255.444168	0	88	10	15	-103	7558.08	0	0	0	-0.002	0.002	
10/12/09 02:17:54	59.993	3678.236	350	-255.444168	0	88.5	10	15	-103	7558.41	0	0	0	-0.006	0.006	
10/12/09 02:17:56	59.991	3677.83	350	-254.838303	0	89	10	15	-103	7558.74	0	0	0	-0.002	0.002	
10/12/09 02:17:58	59.994	3677.955	350	-254.838303	0	89.5	10	15	-103	7559.07	0	0	0	0.003	0.003	
10/12/09 02:18:00	59.992	3677.772	350	-254.838303	0	90	10	15	-103	7559.4	0	0	0	-0.002	0.002	
10/12/09 02:18:02	59.994	3676.666	350	-254.838303	0	90.5	10	15	-103	7559.73	0	0	0	0.002	0.002	
10/12/09 02:18:04	59.992	3677.093	350	-254.838303	0	91	10	15	-103	7560.06	0	0	0	-0.002	0.002	
10/12/09 02:18:06	59.994	3677.141	350	-257.146973	0	91.5	10	15	-103	7560.39	0	0	0	0.002	0.002	
10/12/09 02:18:08	59.995	3676.401	350	-257.146973	0	92	10	15	-103	7560.72	0	0	0	0.001	0.001	
10/12/09 02:18:10	59.993	3678.516	350	-257.146973	0	92.5	10	15	-103	7561.05	0	0	0	-0.002	0.002	
10/12/09 02:18:12	59.99	3679.872	350	-257.146973	0	93	10	15	-103	7561.38	0	0	0	-0.003	0.003	
10/12/09 02:18:14	59.99	3680.197	350	-257.146973	0	93.5	10	15	-103	7561.71	0	0	0	0.000	0.000	
10/12/09 02:18:16	59.987	3678.743	350	-262.289368	0	94	10	15	-103	7562.04	0	0	0	-0.003	0.003	
10/12/09 02:18:18	59.983	3678.428	350	-262.289368	0	94.5	10	15	-103	7562.37	0	0	0	-0.004	0.004	
10/12/09 02:18:20	59.977	3677.921	350	-262.289368	0	95	10	15	-103	7562.7	0	0	0	-0.006	0.006	
10/12/09 02:18:22	59.977	3680.254	350	-262.289368	0	95.5	10	15	-103	7563.03	0	0	0	0.000	0.000	
10/12/09 02:18:24	59.989	3682.07	350	-262.289368	0	96	10	15	-103	7563.36	0	0	0	0.012	0.012	
10/12/09 02:18:26	59.995	3681.329	350	-256.647949	0	96.5	10	15	-103	7563.69	0	0	0	0.006	0.006	
10/12/09 02:18:28	59.999	3678.656	350	-256.647949	0	97	10	15	-103	7564.02	0	0	0	0.004	0.004	
10/12/09 02:18:30	59.994	3678.077	350	-256.647949	0	97.5	10	15	-103	7564.35	0	0	0	-0.005	0.005	
10/12/09 02:18:32	59.989	3677.78	350	-256.647949	0	98	10	15	-103	7564.68	0	0	0	-0.005	0.005	
10/12/09 02:18:34	59.987	3678.427	350	-256.647949	0	98.5	10	15	-103	7565.01	0	0	0	-0.002	0.002	
10/12/09 02:18:36	59.986	3678.473	350	-256.307251	0	99	10	15	-103	7565.34	0	0	0	-0.001	0.001	
10/12/09 02:18:38	59.984	3678.278	350	-256.307251	0	99.5	10	15	-103	7565.67	0	0	0	-0.002	0.002	
10/12/09 02:18:40	59.983	3677.822	350	-256.307251	0	100	10	15	-103	7566	0	0	0	-0.001	0.001	
10/12/09 02:18:42	59.985	3676.615	350	-256.307251	0	100.5	10	15	-103	7566.33	0	0	0	0.002	0.002	
10/12/09 02:18:44	59.986	3677.397	350	-256.307251	0	101	10	15	-103	7566.66	0	0	0	0.001	0.001	
10/12/09 02:18:46	59.985	3677.917	350	-249.086395	0	101.5	10	15	-103	7566.99	0	0	0	-0.001	0.001	

10/12/09 02:18:48	59.986	3677.95	350	-249.086395	0	102	10	15	-103	7567.32	0	0	0	0.001	0.001
10/12/09 02:18:50	59.98	3678.617	350	-249.086395	0	102.5	10	15	-103	7567.65	0	0	0	-0.006	0.006
10/12/09 02:18:52	59.981	3678.963	350	-249.086395	0	103	10	15	-103	7567.98	0	0	0	0.001	0.001
10/12/09 02:18:54	59.981	3681.252	350	-249.086395	0	103.5	10	15	-103	7568.31	0	0	0	0.000	0.000
10/12/09 02:18:56	59.989	3680.737	350	-253.742477	0	104	10	15	-103	7568.64	0	0	0	0.008	0.008
10/12/09 02:18:58	59.998	3680.045	350	-253.742477	0	104.5	10	15	-103	7568.97	0	0	0	0.009	0.009
10/12/09 02:19:00	60.007	3678.161	350	-253.742477	0	105	10	15	-103	7569.3	0	0	0	0.009	0.009
10/12/09 02:19:02	60.007	3674.076	350	-253.742477	0	105.5	10	15	-103	7569.63	0	0	0	0.000	0.000
10/12/09 02:19:04	59.997	3676.222	350	-253.742477	0	106	10	15	-103	7569.96	0	0	0	-0.010	0.010
10/12/09 02:19:06	59.986	3676.669	350	-257.421204	0	106.5	10	15	-103	7570.29	0	0	0	-0.011	0.011
10/12/09 02:19:08	59.981	3677.497	350	-257.421204	0	107	10	15	-103	7570.62	0	0	0	-0.005	0.005
10/12/09 02:19:10	59.977	3677.49	350	-257.421204	0	107.5	10	15	-103	7570.95	0	0	0	-0.004	0.004
10/12/09 02:19:12	59.974	3675.186	350	-257.421204	0	108	10	15	-103	7571.28	0	0	0	-0.003	0.003
10/12/09 02:19:14	59.976	3675.437	350	-257.421204	0	108.5	10	15	-103	7571.61	0	0	0	0.002	0.002
10/12/09 02:19:16	59.974	3680.451	350	-261.73822	0	109	10	15	-103	7571.94	0	0	0	-0.002	0.002
10/12/09 02:19:18	59.974	3682.032	350	-261.73822	0	109.5	10	15	-103	7572.27	0	0	0	0.000	0.000
10/12/09 02:19:20	59.977	3683.829	350	-261.73822	0	110	10	15	-103	7572.6	0	0	0	0.003	0.003
10/12/09 02:19:22	59.979	3682.843	350	-261.73822	0	110.5	10	15	-103	7572.93	0	0	0	0.002	0.002
10/12/09 02:19:24	59.979	3681.108	350	-261.73822	0	111	10	15	-103	7573.26	0	0	0	0.000	0.000
10/12/09 02:19:26	59.982	3680.566	350	-271.875977	0	111.5	10	15	-103	7573.59	0	0	0	0.003	0.003
10/12/09 02:19:28	59.984	3678.229	350	-271.875977	0	112	10	15	-103	7573.92	0	0	0	0.002	0.002
10/12/09 02:19:30	59.987	3676.752	350	-271.875977	0	112.5	10	15	-103	7574.25	0	0	0	0.003	0.003
10/12/09 02:19:32	59.988	3675.759	350	-271.875977	0	113	10	15	-103	7574.58	0	0	0	0.001	0.001
10/12/09 02:19:34	59.988	3671.942	350	-271.875977	0	113.5	10	15	-103	7574.91	0	0	0	0.000	0.000
10/12/09 02:19:36	59.987	3671.166	350	-262.073486	0	114	10	15	-103	7575.24	0	0	0	-0.001	0.001
10/12/09 02:19:38	59.987	3670.476	350	-262.073486	0	114.5	10	15	-103	7575.57	0	0	0	0.000	0.000
10/12/09 02:19:40	59.987	3670.129	350	-262.073486	0	115	10	15	-103	7575.9	0	0	0	0.000	0.000
10/12/09 02:19:42	59.985	3671.542	350	-262.073486	0	115.5	10	15	-103	7576.23	0	0	0	-0.002	0.002
10/12/09 02:19:44	59.984	3672.048	350	-262.073486	0	116	10	15	-103	7576.56	0	0	0	-0.001	0.001
10/12/09 02:19:46	59.982	3671.576	350	-260.36441	0	116.5	10	15	-103	7576.89	0	0	0	-0.002	0.002
10/12/09 02:19:48	59.983	3672.104	350	-260.36441	0	117	10	15	-103	7577.22	0	0	0	0.001	0.001
10/12/09 02:19:50	59.989	3672.414	350	-260.36441	0	117.5	10	15	-103	7577.55	0	0	0	0.006	0.006
10/12/09 02:19:52	59.989	3671.882	350	-260.36441	0	118	10	15	-103	7577.88	0	0	0	0.000	0.000
10/12/09 02:19:54	59.988	3671.837	350	-260.36441	0	118.5	10	15	-103	7578.21	0	0	0	-0.001	0.001
10/12/09 02:19:56	59.984	3671.336	350	-352.644379	0	119	10	15	-103	7578.54	0	0	0	-0.004	0.004
10/12/09 02:19:58	59.982	3670.726	350	-352.644379	0	119.5	10	15	-103	7578.87	0	0	0	-0.002	0.002
10/12/09 02:20:00	59.983	3670.372	350	-352.644379	0	120	10	15	-103	7579.2	0	0	0	0.001	0.001
10/12/09 02:20:02	59.981	3671.364	350	-352.644379	0	120.5	10	15	-103	7579.53	0	0	0	-0.002	0.002
10/12/09 02:20:04	59.982	3671.401	350	-352.644379	0	121	10	15	-103	7579.86	0	0	0	0.001	0.001
10/12/09 02:20:06	59.983	3672.156	350	-354.89566	0	121.5	10	15	-103	7580.19	0	0	0	0.001	0.001
10/12/09 02:20:08	59.986	3672.181	350	-354.89566	0	122	10	15	-103	7580.52	0	0	0	0.003	0.003
10/12/09 02:20:10	59.989	3670.296	350	-354.89566	0	122.5	10	15	-103	7580.85	0	0	0	0.003	0.003
10/12/09 02:20:12	59.987	3668.071	350	-354.89566	0	123	10	15	-103	7581.18	0	0	0	-0.002	0.002
10/12/09 02:20:14	59.985	3668.59	350	-354.89566	0	123.5	10	15	-103	7581.51	0	0	0	-0.002	0.002
10/12/09 02:20:16	59.98	3669.908	350	-340.46936	0	124	10	15	-103	7581.84	0	0	0	-0.005	0.005
10/12/09 02:20:18	59.98	3670.399	350	-340.46936	0	124.5	10	15	-103	7582.17	0	0	0	0.000	0.000
10/12/09 02:20:20	59.983	3670.263	350	-340.46936	0	125	10	15	-103	7582.5	0	0	0	0.003	0.003
10/12/09 02:20:22	59.98	3669.382	350	-340.46936	0	125.5	10	15	-103	7582.83	0	0	0	-0.003	0.003
10/12/09 02:20:24	59.979	3670.102	350	-340.46936	0	126	10	15	-103	7583.16	0	0	0	-0.001	0.001

10/12/09 02:20:26	59.979	3670.438	350	-337.642914	0	126.5	10	15	-103	7583.49	0	0	0	0.000	0.000
10/12/09 02:20:28	59.981	3671.403	350	-337.642914	0	127	10	15	-103	7583.82	0	0	0	0.002	0.002
10/12/09 02:20:30	59.981	3672.442	350	-337.642914	0	127.5	10	15	-103	7584.15	0	0	0	0.000	0.000
10/12/09 02:20:32	59.98	3672.372	350	-337.642914	0	128	10	15	-103	7584.48	0	0	0	-0.001	0.001
10/12/09 02:20:34	59.98	3671.947	350	-337.642914	0	128.5	10	15	-103	7584.81	0	0	0	0.000	0.000
10/12/09 02:20:36	59.981	3670.938	350	-284.36084	0	129	10	15	-103	7585.14	0	0	0	0.001	0.001
10/12/09 02:20:38	59.98	3670.705	350	-284.36084	0	129.5	10	15	-103	7585.47	0	0	0	-0.001	0.001
10/12/09 02:20:40	59.98	3670.137	350	-284.36084	0	130	10	15	-103	7585.8	0	0	0	0.000	0.000
10/12/09 02:20:42	59.977	3669.279	350	-284.36084	0	130.5	10	15	-103	7586.13	0	0	0	-0.003	0.003
10/12/09 02:20:44	59.979	3672.391	350	-284.36084	0	131	10	15	-103	7586.46	0	0	0	0.002	0.002
10/12/09 02:20:46	59.981	3672.558	350	-260.467987	0	131.5	10	15	-103	7586.79	0	0	0	0.002	0.002
10/12/09 02:20:48	59.979	3674.052	350	-260.467987	0	132	10	15	-103	7587.12	0	0	0	-0.002	0.002
10/12/09 02:20:50	59.976	3672.626	350	-260.467987	0	132.5	10	15	-103	7587.45	0	0	0	-0.003	0.003
10/12/09 02:20:52	59.977	3671.8	350	-260.467987	0	133	10	15	-103	7587.78	0	0	0	0.001	0.001
10/12/09 02:20:54	59.972	3673.183	350	-260.467987	0	133.5	10	15	-103	7588.11	0	0	0	-0.005	0.005
10/12/09 02:20:56	59.971	3673.874	350	-253.141541	0	134	10	15	-103	7588.44	0	0	0	-0.001	0.001
10/12/09 02:20:58	59.973	3676.263	350	-253.141541	0	134.5	10	15	-103	7588.77	0	0	0	0.002	0.002
10/12/09 02:21:00	59.973	3676.623	350	-253.141541	0	135	10	15	-103	7589.1	0	0	0	0.000	0.000
10/12/09 02:21:02	59.973	3676.87	350	-253.141541	0	135.5	10	15	-103	7589.43	0	0	0	0.000	0.000
10/12/09 02:21:04	59.974	3676.543	350	-253.141541	0	136	10	15	-103	7589.76	0	0	0	0.001	0.001
10/12/09 02:21:06	59.971	3675.464	350	-251.929871	0	136.5	10	15	-103	7590.09	0	0	0	-0.003	0.003
10/12/09 02:21:08	59.975	3675.752	350	-251.929871	0	137	10	15	-103	7590.42	0	0	0	0.004	0.004
10/12/09 02:21:10	59.977	3675.256	350	-251.929871	0	137.5	10	15	-103	7590.75	0	0	0	0.002	0.002
10/12/09 02:21:12	59.977	3674.87	350	-251.929871	0	138	10	15	-103	7591.08	0	0	0	0.000	0.000
10/12/09 02:21:14	59.975	3671.277	350	-251.929871	0	138.5	10	15	-103	7591.41	0	0	0	-0.002	0.002
10/12/09 02:21:16	59.976	3671.593	350	-250.674194	0	139	10	15	-103	7591.74	0	0	0	0.001	0.001
10/12/09 02:21:18	59.98	3670.587	350	-250.674194	0	139.5	10	15	-103	7592.07	0	0	0	0.004	0.004
10/12/09 02:21:20	59.979	3669.963	350	-250.674194	0	140	10	15	-103	7592.4	0	0	0	-0.001	0.001
10/12/09 02:21:22	59.981	3669.54	350	-250.674194	0	140.5	10	15	-103	7592.73	0	0	0	0.002	0.002
10/12/09 02:21:24	59.982	3669.497	350	-250.674194	0	141	10	15	-103	7593.06	0	0	0	0.001	0.001
10/12/09 02:21:26	59.982	3668.706	350	-253.631866	0	141.5	10	15	-103	7593.39	0	0	0	0.000	0.000
10/12/09 02:21:28	59.982	3667.677	350	-253.631866	0	142	10	15	-103	7593.72	0	0	0	0.000	0.000
10/12/09 02:21:30	59.982	3666.482	350	-253.631866	0	142.5	10	15	-103	7594.05	0	0	0	0.000	0.000
10/12/09 02:21:32	59.981	3666.599	350	-253.631866	0	143	10	15	-103	7594.38	0	0	0	-0.001	0.001
10/12/09 02:21:34	59.982	3666.911	350	-253.631866	0	143.5	10	15	-103	7594.71	0	0	0	0.001	0.001
10/12/09 02:21:36	59.984	3666.442	350	-246.957306	0	144	10	15	-103	7595.04	0	0	0	0.002	0.002
10/12/09 02:21:38	59.985	3666.405	350	-246.957306	0	144.5	10	15	-103	7595.37	0	0	0	0.001	0.001
10/12/09 02:21:40	59.987	3667.456	350	-246.957306	0	145	10	15	-103	7595.7	0	0	0	0.002	0.002
10/12/09 02:21:42	59.989	3666.38	350	-246.957306	0	145.5	10	15	-103	7596.03	0	0	0	0.002	0.002
10/12/09 02:21:44	59.993	3665.262	350	-246.957306	0	146	10	15	-103	7596.36	0	0	0	0.004	0.004
10/12/09 02:21:46	59.996	3664.031	350	-254.541779	0	146.5	10	15	-103	7596.69	0	0	0	0.003	0.003
10/12/09 02:21:48	59.998	3663.825	350	-254.541779	0	147	10	15	-103	7597.02	0	0	0	0.002	0.002
10/12/09 02:21:50	59.998	3663.229	350	-254.541779	0	147.5	10	15	-103	7597.35	0	0	0	0.000	0.000
10/12/09 02:21:52	60.004	3662.055	350	-254.541779	0	148	10	15	-103	7597.68	0	0	0	0.006	0.006
10/12/09 02:21:54	60.007	3661.695	350	-254.541779	0	148.5	10	15	-103	7598.01	0	0	0	0.003	0.003
10/12/09 02:21:56	60.01	3662.076	350	-256.571594	0	149	10	15	-103	7598.34	0	0	0	0.003	0.003
10/12/09 02:21:58	60.013	3662.224	350	-256.571594	0	149.5	10	15	-103	7598.67	0	0	0	0.003	0.003
10/12/09 02:22:00	60.014	3662.959	350	-256.571594	0	150	10	15	-103	7599	0	0	0	0.001	0.001
10/12/09 02:22:02	60.013	3663.794	350	-256.571594	0	150.5	10	15	-103	7599.33	0	0	0	-0.001	0.001

10/12/09 02:22:04	60.008	3664.139	350	-256.571594	0	151	10	15	-103	7599.66	0	0	0	-0.005	0.005
10/12/09 02:22:06	60.008	3665.278	350	-258.37262	0	151.5	10	15	-103	7599.99	0	0	0	0.000	0.000
10/12/09 02:22:08	60.01	3664.159	350	-258.37262	0	152	10	15	-103	7600.32	0	0	0	0.002	0.002
10/12/09 02:22:10	60.019	3663.265	350	-258.37262	0	152.5	10	15	-103	7600.65	0	0	0	0.009	0.009
10/12/09 02:22:12	60.019	3663.184	350	-258.37262	0	153	10	15	-103	7600.98	0	0	0	0.000	0.000
10/12/09 02:22:14	60.023	3661.929	350	-258.37262	0	153.5	10	15	-103	7601.31	0	0	0	0.004	0.004
10/12/09 02:22:16	60.021	3661.512	350	-263.047363	0	154	10	15	-103	7601.64	0	0	0	-0.002	0.002
10/12/09 02:22:18	60.02	3659.172	350	-263.047363	0	154.5	10	15	-103	7601.97	0	0	0	-0.001	0.001
10/12/09 02:22:20	60.021	3658.661	350	-263.047363	0	155	10	15	-103	7602.3	0	0	0	0.001	0.001
10/12/09 02:22:22	60.021	3656.785	350	-263.047363	0	155.5	10	15	-103	7602.63	0	0	0	0.000	0.000
10/12/09 02:22:24	60.02	3657.571	350	-263.047363	0	156	10	15	-103	7602.96	0	0	0	-0.001	0.001
10/12/09 02:22:26	60.019	3658.126	350	-260.984375	0	156.5	10	15	-103	7603.29	0	0	0	-0.001	0.001
10/12/09 02:22:28	60.019	3657.71	350	-260.984375	0	157	10	15	-103	7603.62	0	0	0	0.000	0.000
10/12/09 02:22:30	60.022	3658.015	350	-260.984375	0	157.5	10	15	-103	7603.95	0	0	0	0.003	0.003
10/12/09 02:22:32	60.025	3660.228	350	-260.984375	0	158	10	15	-103	7604.28	0	0	0	0.003	0.003
10/12/09 02:22:34	60.025	3659.224	350	-260.984375	0	158.5	10	15	-103	7604.61	0	0	0	0.000	0.000
10/12/09 02:22:36	60.026	3658.698	350	-261.318329	0	159	10	15	-103	7604.94	0	0	0	0.001	0.001
10/12/09 02:22:38	60.02	3658.669	350	-261.318329	0	159.5	10	15	-103	7605.27	0	0	0	-0.006	0.006
10/12/09 02:22:40	60.02	3658.155	350	-261.318329	0	160	10	15	-103	7605.6	0	0	0	0.000	0.000
10/12/09 02:22:42	60.018	3659.13	350	-261.318329	0	160.5	10	15	-103	7605.93	0	0	0	-0.002	0.002
10/12/09 02:22:44	60.018	3659.778	350	-261.318329	0	161	10	15	-103	7606.26	0	0	0	0.000	0.000
10/12/09 02:22:46	60.02	3660.82	350	-262.1026	0	161.5	10	15	-103	7606.59	0	0	0	0.002	0.002
10/12/09 02:22:48	60.019	3662.531	350	-262.1026	0	162	10	15	-103	7606.92	0	0	0	-0.001	0.001
10/12/09 02:22:50	60.019	3662.387	350	-262.1026	0	162.5	10	15	-103	7607.25	0	0	0	0.000	0.000
10/12/09 02:22:52	60.023	3662.079	350	-262.1026	0	163	10	15	-103	7607.58	0	0	0	0.004	0.004
10/12/09 02:22:54	60.022	3662.39	350	-262.1026	0	163.5	10	15	-103	7607.91	0	0	0	-0.001	0.001
10/12/09 02:22:56	60.022	3662.678	350	-262.71701	0	164	10	15	-103	7608.24	0	0	0	0.000	0.000
10/12/09 02:22:58	60.025	3663.577	350	-262.71701	0	164.5	10	15	-103	7608.57	0	0	0	0.003	0.003
10/12/09 02:23:00	60.02	3663.539	350	-262.71701	0	165	10	15	-103	7608.9	0	0	0	-0.005	0.005
10/12/09 02:23:02	60.02	3662.959	350	-262.71701	0	165.5	10	15	-103	7609.23	0	0	0	0.000	0.000
10/12/09 02:23:04	60.02	3662.552	350	-262.71701	0	166	10	15	-103	7609.56	0	0	0	0.000	0.000
10/12/09 02:23:06	60.02	3662.543	350	-260.016479	0	166.5	10	15	-103	7609.89	0	0	0	0.000	0.000
10/12/09 02:23:08	60.02	3663.601	350	-260.016479	0	167	10	15	-103	7610.22	0	0	0	0.000	0.000
10/12/09 02:23:10	60.021	3663.91	350	-260.016479	0	167.5	10	15	-103	7610.55	0	0	0	0.001	0.001
10/12/09 02:23:12	60.021	3663.69	350	-260.016479	0	168	10	15	-103	7610.88	0	0	0	0.000	0.000
10/12/09 02:23:14	60.018	3662.791	350	-260.016479	0	168.5	10	15	-103	7611.21	0	0	0	-0.003	0.003
10/12/09 02:23:16	60.014	3663.396	350	-263.87323	0	169	10	15	-103	7611.54	0	0	0	-0.004	0.004
10/12/09 02:23:18	60.014	3663.698	350	-263.87323	0	169.5	10	15	-103	7611.87	0	0	0	0.000	0.000
10/12/09 02:23:20	60.014	3664.315	350	-263.87323	0	170	10	15	-103	7612.2	0	0	0	0.000	0.000
10/12/09 02:23:22	60.013	3665.313	350	-263.87323	0	170.5	10	15	-103	7612.53	0	0	0	-0.001	0.001
10/12/09 02:23:24	60.013	3665.798	350	-263.87323	0	171	10	15	-103	7612.86	0	0	0	0.000	0.000
10/12/09 02:23:26	60.01	3666.141	350	-264.5979	0	171.5	10	15	-103	7613.19	0	0	0	-0.003	0.003
10/12/09 02:23:28	60.008	3666.726	350	-264.5979	0	172	10	15	-103	7613.52	0	0	0	-0.002	0.002
10/12/09 02:23:30	60.011	3667.677	350	-264.5979	0	172.5	10	15	-103	7613.85	0	0	0	0.003	0.003
10/12/09 02:23:32	60.011	3667.545	350	-264.5979	0	173	10	15	-103	7614.18	0	0	0	0.000	0.000
10/12/09 02:23:34	60.012	3666.688	350	-264.5979	0	173.5	10	15	-103	7614.51	0	0	0	0.001	0.001
10/12/09 02:23:36	60.012	3666.449	350	-262.415924	0	174	10	15	-103	7614.84	0	0	0	0.000	0.000
10/12/09 02:23:38	60.009	3666.71	350	-262.415924	0	174.5	10	15	-103	7615.17	0	0	0	-0.003	0.003
10/12/09 02:23:40	60.009	3667.696	350	-262.415924	0	175	10	15	-103	7615.5	0	0	0	0.000	0.000

10/12/09 02:23:42	60.009	3667.398	350	-262.415924	0	175.5	10	15	-103	7615.83	0	0	0	0.000	0.000
10/12/09 02:23:44	60.009	3667.043	350	-262.415924	0	176	10	15	-103	7616.16	0	0	0	0.000	0.000
10/12/09 02:23:46	60.005	3666.624	350	-259.685242	0	176.5	10	15	-103	7616.49	0	0	0	-0.004	0.004
10/12/09 02:23:48	60.002	3666.223	350	-259.685242	0	177	10	15	-103	7616.82	0	0	0	-0.003	0.003
10/12/09 02:23:50	59.999	3665.88	350	-259.685242	0	177.5	10	15	-103	7617.15	0	0	0	-0.003	0.003
10/12/09 02:23:52	59.996	3665.403	350	-259.685242	0	178	10	15	-103	7617.48	0	0	0	-0.003	0.003
10/12/09 02:23:54	59.995	3665.802	350	-259.685242	0	178.5	10	15	-103	7617.81	0	0	0	-0.001	0.001
10/12/09 02:23:56	59.997	3665.68	350	-255.911011	0	179	10	15	-103	7618.14	0	0	0	0.002	0.002
10/12/09 02:23:58	59.998	3665.352	350	-255.911011	0	179.5	10	15	-103	7618.47	0	0	0	0.001	0.001
10/12/09 02:24:00	59.998	3664.948	350	-255.911011	0	180	10	15	-103	7618.8	0	0	0	0.000	0.000
10/12/09 02:24:02	59.998	3665.065	350	-255.911011	0	180.5	10	15	-103	7619.13	0	0	0	0.000	0.000
10/12/09 02:24:04	59.998	3666.133	350	-255.911011	0	181	10	15	-103	7619.46	0	0	0	0.000	0.000
10/12/09 02:24:06	59.995	3666.64	350	-258.148193	0	181.5	10	15	-103	7619.79	0	0	0	-0.003	0.003
10/12/09 02:24:08	59.995	3666.735	350	-258.148193	0	182	10	15	-103	7620.12	0	0	0	0.000	0.000
10/12/09 02:24:10	59.992	3667.084	350	-258.148193	0	182.5	10	15	-103	7620.45	0	0	0	-0.003	0.003
10/12/09 02:24:12	59.993	3667.557	350	-258.148193	0	183	10	15	-103	7620.78	0	0	0	0.001	0.001
10/12/09 02:24:14	59.988	3667.337	350	-258.148193	0	183.5	10	15	-103	7621.11	0	0	0	-0.005	0.005
10/12/09 02:24:16	59.988	3667.853	350	-258.873596	0	184	10	15	-103	7621.44	0	0	0	0.000	0.000
10/12/09 02:24:18	59.982	3668.116	350	-258.873596	0	184.5	10	15	-103	7621.77	0	0	0	-0.006	0.006
10/12/09 02:24:20	59.982	3668.691	350	-258.873596	0	185	10	15	-103	7622.1	0	0	0	0.000	0.000
10/12/09 02:24:22	59.982	3669.399	350	-258.873596	0	185.5	10	15	-103	7622.43	0	0	0	0.000	0.000
10/12/09 02:24:24	59.982	3669.606	350	-258.873596	0	186	10	15	-103	7622.76	0	0	0	0.000	0.000
10/12/09 02:24:26	59.984	3671.228	350	-249.33757	0	186.5	10	15	-103	7623.09	0	0	0	0.002	0.002
10/12/09 02:24:28	59.982	3670.25	350	-249.33757	0	187	10	15	-103	7623.42	0	0	0	-0.002	0.002
10/12/09 02:24:30	59.978	3670.265	350	-249.33757	0	187.5	10	15	-103	7623.75	0	0	0	-0.004	0.004
10/12/09 02:24:32	59.978	3671.549	350	-249.33757	0	188	10	15	-103	7624.08	0	0	0	0.000	0.000
10/12/09 02:24:34	59.976	3673.243	350	-249.33757	0	188.5	10	15	-103	7624.41	0	0	0	-0.002	0.002
10/12/09 02:24:36	59.975	3674.263	350	-258.278168	0	189	10	15	-103	7624.74	0	0	0	-0.001	0.001
10/12/09 02:24:38	59.974	3675.824	350	-258.278168	0	189.5	10	15	-103	7625.07	0	0	0	-0.001	0.001
10/12/09 02:24:40	59.974	3676.418	350	-258.278168	0	190	10	15	-103	7625.4	0	0	0	0.000	0.000
10/12/09 02:24:42	59.979	3676.306	350	-258.278168	0	190.5	10	15	-103	7625.73	0	0	0	0.005	0.005
10/12/09 02:24:44	59.98	3674.637	350	-258.278168	0	191	10	15	-103	7626.06	0	0	0	0.001	0.001
10/12/09 02:24:46	59.981	3675.329	350	-258.406372	0	191.5	10	15	-103	7626.39	0	0	0	0.001	0.001
10/12/09 02:24:48	59.98	3675.226	350	-258.406372	0	192	10	15	-103	7626.72	0	0	0	-0.001	0.001
10/12/09 02:24:50	59.984	3674.768	350	-258.406372	0	192.5	10	15	-103	7627.05	0	0	0	0.004	0.004
10/12/09 02:24:52	59.987	3674.399	350	-258.406372	0	193	10	15	-103	7627.38	0	0	0	0.003	0.003
10/12/09 02:24:54	59.988	3673.514	350	-258.406372	0	193.5	10	15	-103	7627.71	0	0	0	0.001	0.001
10/12/09 02:24:56	59.988	3673.04	350	-260.538879	0	194	10	15	-103	7628.04	0	0	0	0.000	0.000
10/12/09 02:24:58	59.99	3672.442	350	-260.538879	0	194.5	10	15	-103	7628.37	0	0	0	0.002	0.002
10/12/09 02:25:00	59.992	3673.056	350	-260.538879	0	195	10	15	-103	7628.7	0	0	0	0.002	0.002
10/12/09 02:25:02	59.991	3671.68	350	-260.538879	0	195.5	10	15	-103	7629.03	0	0	0	-0.001	0.001
10/12/09 02:25:04	59.991	3671.493	350	-260.538879	0	196	10	15	-103	7629.36	0	0	0	0.000	0.000
10/12/09 02:25:06	59.991	3669.53	350	-257.88208	0	196.5	10	15	-103	7629.69	0	0	0	0.000	0.000
10/12/09 02:25:08	59.993	3670.066	350	-257.88208	0	197	10	15	-103	7630.02	0	0	0	0.002	0.002
10/12/09 02:25:10	59.993	3670.028	350	-257.88208	0	197.5	10	15	-103	7630.35	0	0	0	0.000	0.000
10/12/09 02:25:12	59.996	3671.744	350	-257.88208	0	198	10	15	-103	7630.68	0	0	0	0.003	0.003
10/12/09 02:25:14	60.002	3671.578	350	-257.88208	0	198.5	10	15	-103	7631.01	0	0	0	0.006	0.006
10/12/09 02:25:16	60.002	3672.625	350	-258.588654	0	199	10	15	-103	7631.34	0	0	0	0.000	0.000
10/12/09 02:25:18	60.003	3672.674	350	-258.588654	0	199.5	10	15	-103	7631.67	0	0	0	0.001	0.001

10/12/09 02:25:20	60.004	3673.819	350	-258.588654	0	200	10	15	-103	7632	0	0	0	0.001	0.001
10/12/09 02:25:22	60.005	3673.25	350	-258.588654	0	200.5	10	15	-103	7632.33	0	0	0	0.001	0.001
10/12/09 02:25:24	60.004	3673.182	350	-258.588654	0	201	10	15	-103	7632.66	0	0	0	-0.001	0.001
10/12/09 02:25:26	60.002	3673.496	350	-261.906158	0	201.5	10	15	-103	7632.99	0	0	0	-0.002	0.002
10/12/09 02:25:28	60.004	3672.418	350	-261.906158	0	202	10	15	-103	7633.32	0	0	0	0.002	0.002
10/12/09 02:25:30	60.008	3672.363	350	-261.906158	0	202.5	10	15	-103	7633.65	0	0	0	0.004	0.004
10/12/09 02:25:32	60.01	3672.217	350	-261.906158	0	203	10	15	-103	7633.98	0	0	0	0.002	0.002
10/12/09 02:25:34	60.01	3672.261	350	-261.906158	0	203.5	10	15	-103	7634.31	0	0	0	0.000	0.000
10/12/09 02:25:36	60.01	3673.182	350	-256.747803	0	204	10	15	-103	7634.64	0	0	0	0.000	0.000
10/12/09 02:25:38	60.011	3673.603	350	-256.747803	0	204.5	10	15	-103	7634.97	0	0	0	0.001	0.001
10/12/09 02:25:40	60.013	3673.553	350	-256.747803	0	205	10	15	-103	7635.3	0	0	0	0.002	0.002
10/12/09 02:25:42	60.014	3674.312	350	-256.747803	0	205.5	10	15	-103	7635.63	0	0	0	0.001	0.001
10/12/09 02:25:44	60.013	3674.537	350	-256.747803	0	206	10	15	-103	7635.96	0	0	0	-0.001	0.001
10/12/09 02:25:46	60.012	3673.813	350	-167.431976	0	206.5	10	15	-103	7636.29	0	0	0	-0.001	0.001
10/12/09 02:25:48	60.011	3673.204	350	-167.431976	0	207	10	15	-103	7636.62	0	0	0	-0.001	0.001
10/12/09 02:25:50	60.011	3672.563	350	-167.431976	0	207.5	10	15	-103	7636.95	0	0	0	0.000	0.000
10/12/09 02:25:52	60.017	3673.068	350	-167.431976	0	208	10	15	-103	7637.28	0	0	0	0.006	0.006
10/12/09 02:25:54	60.022	3672.388	350	-167.431976	0	208.5	10	15	-103	7637.61	0	0	0	0.005	0.005
10/12/09 02:25:56	60.017	3672.52	350	-164.973404	0	209	10	15	-103	7637.94	0	0	0	-0.005	0.005
10/12/09 02:25:58	60.014	3671.25	350	-164.973404	0	209.5	10	15	-103	7638.27	0	0	0	-0.003	0.003
10/12/09 02:26:00	60.013	3671.288	350	-164.973404	0	210	10	15	-103	7638.6	0	0	0	-0.001	0.001
10/12/09 02:26:02	60.014	3672.989	350	-164.973404	0	210.5	10	15	-103	7638.93	0	0	0	0.001	0.001
10/12/09 02:26:04	60.017	3672.982	350	-164.973404	0	211	10	15	-103	7639.26	0	0	0	0.003	0.003
10/12/09 02:26:06	60.017	3672.915	350	-157.628082	0	211.5	10	15	-103	7639.59	0	0	0	0.000	0.000
10/12/09 02:26:08	60.019	3671.952	350	-157.628082	0	212	10	15	-103	7639.92	0	0	0	0.002	0.002
10/12/09 02:26:10	60.019	3671.193	350	-157.628082	0	212.5	10	15	-103	7640.25	0	0	0	0.000	0.000
10/12/09 02:26:12	60.019	3671.627	350	-157.628082	0	213	10	15	-103	7640.58	0	0	0	0.000	0.000
10/12/09 02:26:14	60.027	3671.189	350	-157.628082	0	213.5	10	15	-103	7640.91	0	0	0	0.008	0.008
10/12/09 02:26:16	60.026	3668.611	350	-155.531708	0	214	10	15	-103	7641.24	0	0	0	-0.001	0.001
10/12/09 02:26:18	60.026	3665.232	350	-155.531708	0	214.5	10	15	-103	7641.57	0	0	0	0.000	0.000
10/12/09 02:26:20	60.022	3664.495	350	-155.531708	0	215	10	15	-103	7641.9	0	0	0	-0.004	0.004
10/12/09 02:26:22	60.019	3666.062	350	-155.531708	0	215.5	10	15	-103	7642.23	0	0	0	-0.003	0.003
10/12/09 02:26:24	60.017	3666.821	350	-155.531708	0	216	10	15	-103	7642.56	0	0	0	-0.002	0.002
10/12/09 02:26:26	60.019	3666.787	350	-160.447235	0	216.5	10	15	-103	7642.89	0	0	0	0.002	0.002
10/12/09 02:26:28	60.02	3670.454	350	-160.447235	0	217	10	15	-103	7643.22	0	0	0	0.001	0.001
10/12/09 02:26:30	60.019	3670.267	350	-160.447235	0	217.5	10	15	-103	7643.55	0	0	0	-0.001	0.001
10/12/09 02:26:32	60.021	3671.668	350	-160.447235	0	218	10	15	-103	7643.88	0	0	0	0.002	0.002
10/12/09 02:26:34	60.021	3672.493	350	-160.447235	0	218.5	10	15	-103	7644.21	0	0	0	0.000	0.000
10/12/09 02:26:36	60.021	3672.685	350	-163.958603	0	219	10	15	-103	7644.54	0	0	0	0.000	0.000
10/12/09 02:26:38	60.019	3672.857	350	-163.958603	0	219.5	10	15	-103	7644.87	0	0	0	-0.002	0.002
10/12/09 02:26:40	60.018	3672.164	350	-163.958603	0	220	10	15	-103	7645.2	0	0	0	-0.001	0.001
10/12/09 02:26:42	60.022	3671.413	350	-163.958603	0	220.5	10	15	-103	7645.53	0	0	0	0.004	0.004
10/12/09 02:26:44	60.031	3669.983	350	-163.958603	0	221	10	15	-103	7645.86	0	0	0	0.009	0.009
10/12/09 02:26:46	60.037	3666.467	350	-166.072449	0	221.5	10	15	-103	7646.19	0	0	0	0.006	0.006
10/12/09 02:26:48	60.037	3663.758	350	-166.072449	0	222	10	15	-103	7646.52	0	0	0	0.000	0.000
10/12/09 02:26:50	60.036	3661.599	350	-166.072449	0	222.5	10	15	-103	7646.85	0	0	0	-0.001	0.001
10/12/09 02:26:52	60.037	3660.672	350	-166.072449	0	223	10	15	-103	7647.18	0	0	0	0.001	0.001
10/12/09 02:26:54	60.046	3651.492	350	-166.072449	0	223.5	10	15	-103	7647.51	0	0	0	0.009	0.009
10/12/09 02:26:56	60.048	3649.19	350	-163.766586	0	224	10	15	-103	7647.84	0	0	0	0.002	0.002

10/12/09 02:26:58	60.048	3650.025	350	-163.766586	0	224.5	10	15	-103	7648.17	0	0	0	0.000	0.000
10/12/09 02:27:00	60.043	3648.246	350	-163.766586	0	225	10	15	-103	7648.5	0	0	0	-0.005	0.005
10/12/09 02:27:02	60.041	3649.512	350	-163.766586	0	225.5	10	15	-103	7648.83	0	0	0	-0.002	0.002
10/12/09 02:27:04	60.041	3654.294	350	-163.766586	0	226	10	15	-103	7649.16	0	0	0	0.000	0.000
10/12/09 02:27:06	60.041	3655.007	350	-165.101685	0	226.5	10	15	-103	7649.49	0	0	0	0.000	0.000
10/12/09 02:27:08	60.039	3651.874	350	-165.101685	0	227	10	15	-103	7649.82	0	0	0	-0.002	0.002
10/12/09 02:27:10	60.041	3651.059	350	-165.101685	0	227.5	10	15	-103	7650.15	0	0	0	0.002	0.002
10/12/09 02:27:12	60.043	3649.187	350	-165.101685	0	228	10	15	-103	7650.48	0	0	0	0.002	0.002
10/12/09 02:27:14	60.045	3648.236	350	-165.101685	0	228.5	10	15	-103	7650.81	0	0	0	0.002	0.002
10/12/09 02:27:16	60.046	3645.387	350	-165.476395	0	229	10	15	-103	7651.14	0	0	0	0.001	0.001
10/12/09 02:27:18	60.041	3644.628	350	-165.476395	0	229.5	10	15	-103	7651.47	0	0	0	-0.005	0.005
10/12/09 02:27:20	60.041	3645.446	350	-165.476395	0	230	10	15	-103	7651.8	0	0	0	0.000	0.000
10/12/09 02:27:22	60.041	3640.682	350	-165.476395	0	230.5	10	15	-103	7652.13	0	0	0	0.000	0.000
10/12/09 02:27:24	60.039	3641.191	350	-165.476395	0	231	10	15	-103	7652.46	0	0	0	-0.002	0.002
10/12/09 02:27:26	59.978	3659.465	350	-206.459106	0	231.5	10	15	-103	7652.79	0	0	1	-0.061	0.061
10/12/09 02:27:28	59.852	3696.362	350	-206.459106	0	232	10	0	-103	7616	1	0	1	-0.126	0.126
10/12/09 02:27:30	59.836	3734.904	335	-206.459106	0	232.5	10	0	-103	7626	1	0	1	-0.016	0.016
10/12/09 02:27:32	59.869	3734.673	335	-206.459106	0	233	10	0	-103	7632	1	0	1	0.033	0.033
10/12/09 02:27:34	59.892	3737.157	335	-206.459106	0	233.5	10	0	-103	7632	1	0	1	0.023	0.023
10/12/09 02:27:36	59.891	3761.25	335	-211.256042	0	234	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:27:38	59.88	3766.113	335	-211.256042	1	234.5	10	0	-103	7632	1	0	1	-0.011	0.011
10/12/09 02:27:40	59.876	3766.194	335	-211.256042	1	235	10	0	-103	7632	1	0	1	-0.004	0.004
10/12/09 02:27:42	59.875	3768.877	335	-211.256042	1	235.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:27:44	59.883	3769.925	335	-211.256042	1	236	10	0	-103	7632	1	0	1	0.008	0.008
10/12/09 02:27:46	59.887	3780.621	335	-214.346695	1	236.5	10	0	-103	7632	1	0	1	0.004	0.004
10/12/09 02:27:48	59.886	3781.592	335	-214.346695	1	237	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:27:50	59.885	3782.5	335	-214.346695	1	237.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:27:52	59.887	3784.962	335	-214.346695	2	238	10	0	-103	7632	1	0	1	0.002	0.002
10/12/09 02:27:54	59.888	3784.73	335	-214.346695	3	238.5	10	0	-103	7632	1	0	1	0.001	0.001
10/12/09 02:27:56	59.89	3784.419	335	-212.172699	4	239	10	0	-103	7632	1	0	1	0.002	0.002
10/12/09 02:27:58	59.895	3788.072	335	-212.172699	5	239.5	10	0	-103	7632	1	0	1	0.005	0.005
10/12/09 02:28:00	59.894	3788.328	335	-212.172699	6	240	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:02	59.893	3788.868	335	-212.172699	7	240.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:04	59.894	3788.472	335	-212.172699	8	241	10	0	-103	7632	1	0	1	0.001	0.001
10/12/09 02:28:06	59.894	3792.276	335	-215.598175	9	241.5	10	0	-103	7632	1	0	1	0.000	0.000
10/12/09 02:28:08	59.891	3793.074	335	-215.598175	10	242	10	0	-103	7632	1	0	1	-0.003	0.003
10/12/09 02:28:10	59.89	3794.374	335	-215.598175	11	242.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:12	59.885	3799.428	335	-215.598175	12	243	10	0	-103	7632	1	0	1	-0.005	0.005
10/12/09 02:28:14	59.885	3800.427	335	-215.598175	13	243.5	10	0	-103	7632	1	0	1	0.000	0.000
10/12/09 02:28:16	59.888	3799.959	335	-218.327255	14	244	10	0	-103	7632	1	0	1	0.003	0.003
10/12/09 02:28:18	59.887	3803.625	335	-218.327255	15	244.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:20	59.888	3802.925	335	-218.327255	16	245	10	0	-103	7632	1	0	1	0.001	0.001
10/12/09 02:28:22	59.888	3802.951	335	-218.327255	16	245.5	10	0	-103	7632	1	0	1	0.000	0.000
10/12/09 02:28:24	59.89	3804.388	335	-218.327255	16	246	10	0	-103	7632	1	0	1	0.002	0.002
10/12/09 02:28:26	59.889	3805.496	335	-217.379425	16	246.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:28	59.882	3805.617	335	-217.379425	16	247	10	0	-103	7632	1	0	1	-0.007	0.007
10/12/09 02:28:30	59.873	3809.237	335	-217.379425	16	247.5	10	0	-103	7631	1	0	1	-0.009	0.009
10/12/09 02:28:32	59.857	3811.503	335	-217.379425	16	248	10	0	-103	7625	1	0	1	-0.016	0.016
10/12/09 02:28:34	59.849	3814.862	335	-217.379425	16	248.5	10	0	-103	7623	1	0	1	-0.008	0.008

10/12/09 02:28:36	59.852	3815.889	335	-214.830353	16	249	10	0	-103	7621	1	0	1	0.003	0.003
10/12/09 02:28:38	59.858	3825.643	335	-214.830353	16	249.5	10	0	-103	7623	1	0	1	0.006	0.006
10/12/09 02:28:40	59.863	3826.053	335	-214.830353	16	250	10	0	-103	7625	1	0	1	0.005	0.005
10/12/09 02:28:42	59.866	3826.002	335	-214.830353	16	250.5	10	0	-103	7627	1	0	1	0.003	0.003
10/12/09 02:28:44	59.865	3827.524	335	-214.830353	16	251	10	0	-103	7628	1	0	1	-0.001	0.001
10/12/09 02:28:46	59.867	3826.753	335	-227.655914	16	251.5	10	0	-103	7628	1	0	1	0.002	0.002
10/12/09 02:28:48	59.866	3826.783	335	-227.655914	16	252	10	0	-103	7629	1	0	1	-0.001	0.001
10/12/09 02:28:50	59.871	3826.454	335	-227.655914	16	252.5	10	0	-103	7630	1	0	1	0.005	0.005
10/12/09 02:28:52	59.874	3825.713	335	-227.655914	16	253	10	0	-103	7631	1	0	1	0.003	0.003
10/12/09 02:28:54	59.879	3823.826	335	-227.655914	16	253.5	10	0	-103	7635	1	0	1	0.005	0.005
10/12/09 02:28:56	59.88	3822.505	335	-225.018082	16	254	10	0	-103	7638	1	0	1	0.001	0.001
10/12/09 02:28:58	59.883	3819.081	335	-225.018082	16	254.5	10	0	-103	7639	1	0	1	0.003	0.003
10/12/09 02:29:00	59.886	3818.055	335	-225.018082	16	255	10	0	-103	7642	1	0	1	0.003	0.003
10/12/09 02:29:02	59.89	3816.815	335	-225.018082	16	255.5	10	0	-103	7644	1	0	1	0.004	0.004
10/12/09 02:29:04	59.892	3815.01	335	-225.018082	16	256	10	0	-103	7645	1	0	1	0.002	0.002
10/12/09 02:29:06	59.889	3813.783	335	-228.365158	16	256.5	10	0	-103	7647	1	0	1	-0.003	0.003
10/12/09 02:29:08	59.893	3811.838	335	-228.365158	16	257	10	0	-103	7648	1	0	1	0.004	0.004
10/12/09 02:29:10	59.899	3809.652	335	-228.365158	16	257.5	10	0	-103	7649	1	0	1	0.006	0.006
10/12/09 02:29:12	59.903	3806.972	335	-228.365158	16	258	10	0	-103	7650	1	0	1	0.004	0.004
10/12/09 02:29:14	59.902	3805.593	335	-228.365158	16	258.5	10	0	-103	7651	1	0	1	-0.001	0.001
10/12/09 02:29:16	59.902	3804.188	335	-234.075333	16	259	10	0	-103	7652	1	0	1	0.000	0.000
10/12/09 02:29:18	59.904	3796.078	335	-234.075333	16	259.5	10	0	-103	7653	1	0	1	0.002	0.002
10/12/09 02:29:20	59.907	3793.975	335	-234.075333	16	260	10	0	-103	7654	1	0	1	0.003	0.003
10/12/09 02:29:22	59.911	3792.169	335	-234.075333	16	260.5	10	0	-103	7655	1	0	1	0.004	0.004
10/12/09 02:29:24	59.916	3791.502	335	-234.075333	16	261	10	0	-103	7655	1	0	1	0.005	0.005
10/12/09 02:29:26	59.916	3789.534	335	-228.798157	16	261.5	10	0	-103	7656	1	0	1	0.000	0.000
10/12/09 02:29:28	59.917	3788.132	335	-228.798157	16	262	10	0	-103	7656	1	0	1	0.001	0.001
10/12/09 02:29:30	59.918	3784.563	335	-228.798157	16	262.5	10	0	-103	7657	1	0	1	0.001	0.001
10/12/09 02:29:32	59.92	3783.028	335	-228.798157	16	263	10	0	-103	7657	1	0	1	0.002	0.002
10/12/09 02:29:34	59.921	3781.701	335	-228.798157	16	263.5	10	0	-103	7658	1	0	1	0.001	0.001
10/12/09 02:29:36	59.92	3776.358	335	-229.466965	16	264	10	0	-103	7658	1	0	1	-0.001	0.001
10/12/09 02:29:38	59.917	3775.635	335	-229.466965	16	264.5	10	0	-103	7659	1	0	1	-0.003	0.003
10/12/09 02:29:40	59.92	3774.604	335	-229.466965	16	265	10	0	-103	7659	1	0	1	0.003	0.003
10/12/09 02:29:42	59.921	3773.334	335	-229.466965	16	265.5	10	0	-103	7659	1	0	1	0.001	0.001
10/12/09 02:29:44	59.923	3773.958	335	-229.466965	16	266	10	0	-103	7660	1	0	1	0.002	0.002
10/12/09 02:29:46	59.926	3772.722	335	-228.980164	16	266.5	10	0	-103	7660	1	0	1	0.003	0.003
10/12/09 02:29:48	59.925	3771.67	335	-228.980164	16	267	10	0	-103	7661	1	0	1	-0.001	0.001
10/12/09 02:29:50	59.928	3769.63	335	-228.980164	16	267.5	10	0	-103	7661	1	0	1	0.003	0.003
10/12/09 02:29:52	59.927	3768.707	335	-228.980164	16	268	10	0	-103	7662	1	0	1	-0.001	0.001
10/12/09 02:29:54	59.932	3767.643	335	-228.980164	16	268.5	10	0	-103	7662	1	0	1	0.005	0.005
10/12/09 02:29:56	59.927	3767.021	335	-219.975555	16	269	10	0	-103	7663	1	0	1	-0.005	0.005
10/12/09 02:29:58	59.928	3767.408	335	-219.975555	16	269.5	10	0	-103	7663	1	0	1	0.001	0.001
10/12/09 02:30:00	59.931	3766.788	335	-219.975555	16	270	10	0	-103	7664	1	0	1	0.003	0.003
10/12/09 02:30:02	59.929	3766.259	335	-219.975555	16	270.5	10	0	-103	7664	1	0	1	-0.002	0.002
10/12/09 02:30:04	59.931	3765.672	335	-219.975555	16	271	10	0	-103	7665	1	0	1	0.002	0.002
10/12/09 02:30:06	59.933	3766.123	335	-229.089249	16	271.5	10	0	-103	7666	1	0	1	0.002	0.002
10/12/09 02:30:08	59.937	3764.243	335	-229.089249	16	272	10	0	-103	7666	1	0	1	0.004	0.004
10/12/09 02:30:10	59.937	3765.105	335	-229.089249	16	272.5	10	0	-103	7667	1	0	1	0.000	0.000
10/12/09 02:30:12	59.945	3762.935	335	-229.089249	16	273	10	0	-103	7668	1	0	1	0.008	0.008

10/12/09 02:30:14	59.949	3758.387	335	-229.089249	16	273.5	10	0	-103	7668	1	0	1	0.004	0.004
10/12/09 02:30:16	59.947	3753.922	335	-229.663269	16	274	10	0	-103	7669	1	0	1	-0.002	0.002
10/12/09 02:30:18	59.942	3749.867	335	-229.663269	16	274.5	10	0	-103	7669	1	0	1	-0.005	0.005
10/12/09 02:30:20	59.941	3746.889	335	-229.663269	16	275	10	0	-103	7670	1	0	1	-0.001	0.001
10/12/09 02:30:22	59.942	3747.875	335	-229.663269	16	275.5	10	0	-103	7670	1	0	1	0.001	0.001
10/12/09 02:30:24	59.945	3749.593	335	-229.663269	16	276	10	0	-103	7671	1	0	1	0.003	0.003
10/12/09 02:30:26	59.948	3748.661	335	-229.233856	16	276.5	10	0	-103	7671	1	0	1	0.003	0.003
10/12/09 02:30:28	59.947	3746.706	335	-229.233856	16	277	10	0	-103	7672	1	0	1	-0.001	0.001
10/12/09 02:30:30	59.949	3749.077	335	-229.233856	16	277.5	10	0	-103	7673	1	0	1	0.002	0.002
10/12/09 02:30:32	59.951	3742.741	335	-229.233856	16	278	10	0	-103	7673	1	0	1	0.002	0.002
10/12/09 02:30:34	59.952	3740.259	350	-229.233856	16	278.5	10	0	-103	7673	1	0	1	0.001	0.001
10/12/09 02:30:36	59.953	3736.139	350	-231.409882	16	279	10	0	-103	7673	1	0	1	0.001	0.001
10/12/09 02:30:38	59.951	3731.382	350	-231.409882	16	279.5	10	0	-103	7673	1	0	1	-0.002	0.002
10/12/09 02:30:40	59.952	3727.838	350	-231.409882	16	280	10	0	-103	7673	1	0	1	0.001	0.001
10/12/09 02:30:42	59.952	3725.952	350	-231.409882	16	280.5	10	0	-103	7673	1	0	1	0.000	0.000
10/12/09 02:30:44	59.952	3722.649	350	-231.409882	16	281	10	0	-103	7673	1	0	1	0.000	0.000
10/12/09 02:30:46	59.955	3720.578	350	-218.622284	16	281.5	10	0	-103	7673	1	0	1	0.003	0.003
10/12/09 02:30:48	59.952	3717.996	350	-218.622284	16	282	10	0	-103	7673	1	0	1	-0.003	0.003
10/12/09 02:30:50	59.954	3718.142	350	-218.622284	16	282.5	10	0	-103	7673	1	0	1	0.002	0.002
10/12/09 02:30:52	59.952	3715.753	350	-218.622284	16	283	10	0	-103	7673	1	0	1	-0.002	0.002
10/12/09 02:30:54	59.953	3713.694	350	-218.622284	16	283.5	10	0	-103	7673	1	0	1	0.001	0.001
10/12/09 02:30:56	59.953	3713.484	350	-213.535858	16	284	10	0	-103	7673	1	0	1	0.000	0.000
10/12/09 02:30:58	59.952	3710.848	350	-213.535858	16	284.5	10	0	-103	7673	1	0	1	-0.001	0.001
10/12/09 02:31:00	59.954	3710.81	350	-213.535858	16	285	10	0	-103	7673	1	0	1	0.002	0.002
10/12/09 02:31:02	59.954	3712.092	350	-213.535858	16	285.5	10	0	-103	7674	1	0	1	0.000	0.000
10/12/09 02:31:04	59.959	3714.623	350	-213.535858	16	286	10	0	-103	7675	1	0	1	0.005	0.005
10/12/09 02:31:06	59.957	3715.13	350	-225.651855	16	286.5	10	0	-103	7676	1	0	1	-0.002	0.002
10/12/09 02:31:08	59.956	3716.168	350	-225.651855	16	287	10	0	-103	7677	1	0	1	-0.001	0.001
10/12/09 02:31:10	59.954	3716.461	350	-225.651855	16	287.5	10	0	-103	7678	1	0	1	-0.002	0.002
10/12/09 02:31:12	59.956	3716.98	350	-225.651855	16	288	10	0	-103	7679	1	0	1	0.002	0.002
10/12/09 02:31:14	59.955	3717.759	350	-225.651855	16	288.5	10	0	-103	7680	1	0	1	-0.001	0.001
10/12/09 02:31:16	59.958	3722.361	350	-212.573639	16	289	10	0	-103	7681	1	0	1	0.003	0.003
10/12/09 02:31:18	59.961	3721.973	350	-212.573639	16	289.5	10	0	-103	7682	1	0	1	0.003	0.003
10/12/09 02:31:20	59.962	3722.658	350	-212.573639	16	290	10	0	-103	7684	1	0	1	0.001	0.001
10/12/09 02:31:22	59.962	3722.267	350	-212.573639	16	290.5	10	0	-103	7685	1	0	1	0.000	0.000
10/12/09 02:31:24	59.968	3722.278	350	-212.573639	16	291	10	0	-103	7687	1	0	1	0.006	0.006
10/12/09 02:31:26	59.966	3721.787	350	-219.897293	16	291.5	10	0	-103	7689	1	0	1	-0.002	0.002
10/12/09 02:31:28	59.966	3723.091	350	-219.897293	16	292	10	0	-103	7690	1	0	1	0.000	0.000
10/12/09 02:31:30	59.968	3723.984	350	-219.897293	16	292.5	10	0	-103	7692	1	0	1	0.002	0.002
10/12/09 02:31:32	59.97	3723.435	350	-219.897293	16	293	10	0	-103	7692	1	0	1	0.002	0.002
10/12/09 02:31:34	59.974	3723.893	350	-219.897293	16	293.5	10	0	-103	7693	1	0	1	0.004	0.004
10/12/09 02:31:36	59.97	3725.403	350	-231.1754	16	294	10	0	-103	7693	1	0	1	-0.004	0.004
10/12/09 02:31:38	59.969	3727.121	350	-231.1754	16	294.5	10	0	-103	7694	1	0	1	-0.001	0.001
10/12/09 02:31:40	59.969	3728.053	350	-231.1754	16	295	10	0	-103	7694	1	0	1	0.000	0.000
10/12/09 02:31:42	59.97	3731.13	350	-231.1754	16	295.5	10	0	-103	7695	1	0	1	0.001	0.001
10/12/09 02:31:44	59.971	3732.53	350	-231.1754	16	296	10	0	-103	7695	1	0	1	0.001	0.001
10/12/09 02:31:46	59.973	3733.327	350	-226.634125	16	296.5	10	0	-103	7695	1	0	1	0.002	0.002
10/12/09 02:31:48	59.973	3736.535	350	-226.634125	16	297	10	0	-103	7696	1	0	1	0.000	0.000
10/12/09 02:31:50	59.976	3736.907	350	-226.634125	16	297.5	10	0	-103	7696	1	0	1	0.003	0.003

10/12/09 02:31:52	59.978	3736.822	350	-226.634125	16	298	10	0	-103	7697	1	0	1	0.002	0.002
10/12/09 02:31:54	59.978	3738.699	350	-226.634125	16	298.5	10	0	-103	7697	1	0	1	0.000	0.000
10/12/09 02:31:56	59.976	3739.944	350	-227.255066	16	299	10	0	-103	7697	1	0	1	-0.002	0.002
10/12/09 02:31:58	59.978	3740.877	350	-227.255066	16	299.5	10	0	-103	7698	1	0	1	0.002	0.002
10/12/09 02:32:00	59.976	3741.794	350	-227.255066	16	300	10	0	-103	7698	1	0	1	-0.002	0.002
10/12/09 02:32:02	59.978	3745.234	350	-227.255066	16	300.5	10	0	-103	7698.33	1	0	1	0.002	0.002
10/12/09 02:32:04	59.977	3746.608	350	-227.255066	16	301	10	0	-103	7698.66	1	0	1	-0.001	0.001
10/12/09 02:32:06	59.98	3748.3	350	-229.290222	16	301.5	10	0	-103	7698.99	1	0	1	0.003	0.003
10/12/09 02:32:08	59.982	3750.716	350	-229.290222	16	302	10	0	-103	7699.32	1	0	1	0.002	0.002
10/12/09 02:32:10	59.981	3751.558	350	-229.290222	16	302.5	10	0	-103	7699.65	1	0	1	-0.001	0.001
10/12/09 02:32:12	59.98	3752.748	350	-229.290222	16	303	10	0	-103	7699.98	1	0	1	-0.001	0.001
10/12/09 02:32:14	59.979	3755.599	350	-229.290222	16	303.5	10	0	-103	7700.31	1	0	1	-0.001	0.001
10/12/09 02:32:16	59.98	3756.407	350	-221.461365	16	304	10	0	-103	7700.64	1	0	1	0.001	0.001
10/12/09 02:32:18	59.979	3756.975	350	-221.461365	16	304.5	10	0	-103	7700.97	1	0	1	-0.001	0.001
10/12/09 02:32:20	59.983	3760.405	350	-221.461365	16	305	10	0	-103	7701.3	1	0	1	0.004	0.004
10/12/09 02:32:22	59.983	3760.982	350	-221.461365	16	305.5	10	0	-103	7701.63	1	0	1	0.000	0.000
10/12/09 02:32:24	59.984	3761.407	350	-221.461365	16	306	10	0	-103	7701.96	1	0	1	0.001	0.001
10/12/09 02:32:26	59.988	3762.737	350	-241.274368	16	306.5	10	0	-103	7702.29	1	0	1	0.004	0.004
10/12/09 02:32:28	59.989	3763.212	350	-241.274368	16	307	10	0	-103	7702.62	1	0	1	0.001	0.001
10/12/09 02:32:30	59.987	3764.958	350	-241.274368	16	307.5	10	0	-103	7702.95	1	0	1	-0.002	0.002
10/12/09 02:32:32	59.987	3766.085	350	-241.274368	16	308	10	0	-103	7703.28	1	0	1	0.000	0.000
10/12/09 02:32:34	59.991	3766.433	350	-241.274368	16	308.5	10	0	-103	7703.61	1	0	1	0.004	0.004
10/12/09 02:32:36	59.993	3767.251	350	-243.071854	16	309	10	0	-103	7703.94	1	0	1	0.002	0.002
10/12/09 02:32:38	59.992	3767.792	350	-243.071854	16	309.5	10	0	-103	7704.27	1	0	1	-0.001	0.001
10/12/09 02:32:40	59.991	3768.634	350	-243.071854	16	310	10	0	-103	7704.6	1	0	1	-0.001	0.001
10/12/09 02:32:42	59.989	3771.146	350	-243.071854	16	310.5	10	0	-103	7704.93	1	0	1	-0.002	0.002
10/12/09 02:32:44	59.986	3772.445	350	-243.071854	16	311	10	0	-103	7705.26	1	0	1	-0.003	0.003
10/12/09 02:32:46	59.983	3773.695	350	-241.670212	16	311.5	10	0	-103	7705.59	1	0	1	-0.003	0.003
10/12/09 02:32:48	59.983	3774.668	350	-241.670212	16	312	10	0	-103	7705.92	1	0	1	0.000	0.000
10/12/09 02:32:50	59.988	3775.841	350	-241.670212	16	312.5	10	0	-103	7706.25	1	0	1	0.005	0.005
10/12/09 02:32:52	59.993	3775.363	350	-241.670212	16	313	10	0	-103	7706.58	1	0	1	0.005	0.005
10/12/09 02:32:54	59.996	3774.866	350	-241.670212	16	313.5	10	0	-103	7706.91	1	0	1	0.003	0.003
10/12/09 02:32:56	59.998	3775.492	350	-228.149307	16	314	10	0	-103	7707.24	1	0	1	0.002	0.002
10/12/09 02:32:58	59.999	3776.42	350	-228.149307	16	314.5	10	0	-103	7707.57	1	0	1	0.001	0.001
10/12/09 02:33:00	60.001	3778.554	350	-228.149307	16	315	10	0	-103	7707.9	1	1	1	0.002	0.002
10/12/09 02:33:02	59.999	3779.692	350	-228.149307	16	315.5	10	0	-103	7708.23	1	0	1	-0.002	0.002
10/12/09 02:33:04	59.999	3781.256	350	-228.149307	16	316	10	0	-103	7708.56	1	0	1	0.000	0.000
10/12/09 02:33:06	59.999	3780.595	350	-235.128983	16	316.5	10	0	-103	7708.89	1	0	1	0.000	0.000
10/12/09 02:33:08	60.002	3783.092	350	-235.128983	16	317	10	0	-103	7709.22	1	1	1	0.003	0.003
10/12/09 02:33:10	60.005	3783.896	350	-235.128983	16	317.5	10	0	-103	7709.55	1	1	1	0.003	0.003
10/12/09 02:33:12	60.007	3784.421	350	-235.128983	16	318	10	0	-103	7709.88	1	1	1	0.002	0.002
10/12/09 02:33:14	60.008	3785.768	350	-235.128983	16	318.5	10	0	-103	7710.21	1	1	1	0.001	0.001
10/12/09 02:33:16	60.011	3785.463	350	-246.433136	16	319	10	0	-103	7710.54	1	1	1	0.003	0.003
10/12/09 02:33:18	60.014	3786.85	350	-246.433136	16	319.5	10	0	-103	7710.87	1	1	1	0.003	0.003
10/12/09 02:33:20	60.017	3786.304	350	-246.433136	16	320	10	0	-103	7711.2	1	1	1	0.003	0.003
10/12/09 02:33:22	60.019	3787.259	350	-246.433136	16	320.5	10	0	-103	7711.53	1	1	1	0.002	0.002
10/12/09 02:33:24	60.021	3787.516	350	-246.433136	16	321	10	0	-103	7711.86	1	1	1	0.002	0.002
10/12/09 02:33:26	60.017	3787.955	350	-236.553543	16	321.5	10	0	-103	7712.19	1	1	1	-0.004	0.004
10/12/09 02:33:28	60.017	3788.03	350	-236.553543	16	322	10	0	-103	7712.52	1	1	1	0.000	0.000

10/12/09 02:33:30	60.019	3788.607	350	-236.553543	16	322.5	10	0	-103	7712.85	1	1	1	0.002	0.002
10/12/09 02:33:32	60.023	3789.216	350	-236.553543	16	323	10	0	-103	7713.18	1	1	1	0.004	0.004
10/12/09 02:33:34	60.024	3787.537	350	-236.553543	16	323.5	10	0	-103	7713.51	1	1	1	0.001	0.001
10/12/09 02:33:36	60.025	3785.842	350	-230.297562	16	324	10	0	-103	7713.84	1	1	1	0.001	0.001
10/12/09 02:33:38	60.021	3786.077	350	-230.297562	16	324.5	10	0	-103	7714.17	1	1	1	-0.004	0.004
10/12/09 02:33:40	60.019	3787.93	350	-230.297562	16	325	10	0	-103	7714.5	1	1	1	-0.002	0.002
10/12/09 02:33:42	60.024	3788.76	350	-230.297562	16	325.5	10	0	-103	7714.83	1	1	1	0.005	0.005
10/12/09 02:33:44	60.024	3786.875	350	-230.297562	16	326	10	0	-103	7715.16	1	1	1	0.000	0.000
10/12/09 02:33:46	60.021	3786.55	350	-231.175537	16	326.5	10	0	-103	7715.49	1	1	1	-0.003	0.003
10/12/09 02:33:48	60.02	3787.358	350	-231.175537	16	327	10	0	-103	7715.82	1	1	1	-0.001	0.001
10/12/09 02:33:50	60.025	3785.018	350	-231.175537	16	327.5	10	0	-103	7716.15	1	1	1	0.005	0.005
10/12/09 02:33:52	60.024	3785.614	350	-231.175537	16	328	10	0	-103	7716.48	1	1	1	-0.001	0.001
10/12/09 02:33:54	60.02	3785.949	350	-231.175537	16	328.5	10	0	-103	7716.81	1	1	1	-0.004	0.004
10/12/09 02:33:56	60.02	3785.804	350	-225.61763	16	329	10	0	-103	7717.14	1	1	1	0.000	0.000
10/12/09 02:33:58	60.022	3786.864	350	-225.61763	16	329.5	10	0	-103	7717.47	1	1	1	0.002	0.002
10/12/09 02:34:00	60.022	3786.877	350	-225.61763	16	330	10	0	-103	7717.8	1	1	1	0.000	0.000
10/12/09 02:34:02	60.022	3785.254	350	-225.61763	16	330.5	10	0	-103	7718.13	1	1	1	0.000	0.000
10/12/09 02:34:04	60.021	3785.726	350	-225.61763	16	331	10	0	-103	7718.46	1	1	1	-0.001	0.001
10/12/09 02:34:06	60.021	3786.347	350	-230.734421	16	331.5	10	0	-103	7718.79	1	1	1	0.000	0.000
10/12/09 02:34:08	60.023	3785.821	350	-230.734421	16	332	10	0	-103	7719.12	1	1	1	0.002	0.002
10/12/09 02:34:10	60.023	3785.798	350	-230.734421	16	332.5	10	0	-103	7719.45	1	1	1	0.000	0.000
10/12/09 02:34:12	60.022	3786.284	350	-230.734421	16	333	10	0	-103	7719.78	1	1	1	-0.001	0.001
10/12/09 02:34:14	60.019	3786.939	350	-230.734421	16	333.5	10	0	-103	7720.11	1	1	1	-0.003	0.003
10/12/09 02:34:16	60.016	3787.627	350	-234.847107	16	334	10	0	-103	7720.44	1	1	1	-0.003	0.003
10/12/09 02:34:18	60.018	3789.444	350	-234.847107	16	334.5	10	0	-103	7720.77	1	1	1	0.002	0.002
10/12/09 02:34:20	60.018	3789.673	350	-234.847107	16	335	10	0	-103	7721.1	1	1	1	0.000	0.000
10/12/09 02:34:22	60.018	3789.404	350	-234.847107	16	335.5	10	0	-103	7721.43	1	1	1	0.000	0.000
10/12/09 02:34:24	60.019	3788.479	350	-234.847107	16	336	10	0	-103	7721.76	1	1	1	0.001	0.001
10/12/09 02:34:26	60.019	3789.183	350	-228.960922	16	336.5	10	0	-103	7722.09	1	1	1	0.000	0.000
10/12/09 02:34:28	60.016	3789.369	350	-228.960922	16	337	10	0	-103	7722.42	1	1	1	-0.003	0.003
10/12/09 02:34:30	60.015	3789.005	350	-228.960922	16	337.5	10	0	-103	7722.75	1	1	1	-0.001	0.001
10/12/09 02:34:32	60.016	3788.665	350	-228.960922	16	338	10	0	-103	7723.08	1	1	1	0.001	0.001
10/12/09 02:34:34	60.014	3788.933	350	-228.960922	16	338.5	10	0	-103	7723.41	1	1	1	-0.002	0.002
10/12/09 02:34:36	60.013	3790.667	350	-231.177917	16	339	10	0	-103	7723.74	1	1	1	-0.001	0.001
10/12/09 02:34:38	60.012	3790.805	350	-231.177917	16	339.5	10	0	-103	7724.07	1	1	1	-0.001	0.001
10/12/09 02:34:40	60.012	3790.411	350	-231.177917	16	340	10	0	-103	7724.4	1	1	1	0.000	0.000
10/12/09 02:34:42	60.01	3789.769	350	-231.177917	16	340.5	10	0	-103	7724.73	1	1	1	-0.002	0.002
10/12/09 02:34:44	60.007	3791.54	350	-231.177917	16	341	10	0	-103	7725.06	1	1	1	-0.003	0.003
10/12/09 02:34:46	60.007	3792.945	350	-236.489288	16	341.5	10	0	-103	7725.39	1	1	1	0.000	0.000
10/12/09 02:34:48	60.009	3791.027	350	-236.489288	16	342	10	0	-103	7725.72	1	1	1	0.002	0.002
10/12/09 02:34:50	60.009	3791.443	350	-236.489288	16	342.5	10	0	-103	7726.05	1	1	1	0.000	0.000
10/12/09 02:34:52	60.01	3791.426	350	-236.489288	16	343	10	0	-103	7726.38	1	1	1	0.001	0.001
10/12/09 02:34:54	60.003	3790.603	350	-236.489288	16	343.5	10	0	-103	7726.71	1	1	1	-0.007	0.007
10/12/09 02:34:56	59.999	3790.457	350	-245.038925	16	344	10	0	-103	7727.04	1	0	1	-0.004	0.004
10/12/09 02:34:58	59.995	3790.216	350	-245.038925	16	344.5	10	0	-103	7727.37	1	0	1	-0.004	0.004
10/12/09 02:35:00	59.992	3789.585	350	-245.038925	16	345	10	0	-103	7727.7	1	0	1	-0.003	0.003
10/12/09 02:35:02	59.991	3788.457	350	-245.038925	16	345.5	10	0	-103	7728.03	1	0	1	-0.001	0.001
10/12/09 02:35:04	59.992	3788.105	350	-245.038925	16	346	10	0	-103	7728.36	1	0	1	0.001	0.001
10/12/09 02:35:06	59.992	3788.057	350	-223.605682	16	346.5	10	0	-103	7728.69	1	0	1	0.000	0.000

10/12/09 02:35:08	59.988	3788.189	350	-223.605682	16	347	10	0	-103	7729.02	1	0	1	-0.004	0.004
10/12/09 02:35:10	59.986	3788.497	350	-223.605682	16	347.5	10	0	-103	7729.35	1	0	1	-0.002	0.002
10/12/09 02:35:12	59.985	3788.54	350	-223.605682	16	348	10	0	-103	7729.68	1	0	1	-0.001	0.001
10/12/09 02:35:14	59.984	3788.571	350	-223.605682	16	348.5	10	0	-103	7730.01	1	0	1	-0.001	0.001
10/12/09 02:35:16	59.985	3788.101	350	-231.119354	16	349	10	0	-103	7730.34	1	0	1	0.001	0.001
10/12/09 02:35:18	59.984	3787.133	350	-231.119354	16	349.5	10	0	-103	7730.67	1	0	1	-0.001	0.001
10/12/09 02:35:20	59.982	3786.453	350	-231.119354	16	350	10	0	-103	7731	1	0	1	-0.002	0.002
10/12/09 02:35:22	59.981	3787.732	350	-231.119354	16	350.5	10	0	-103	7731.33	1	0	1	-0.001	0.001
10/12/09 02:35:24	59.982	3788.813	350	-231.119354	16	351	10	0	-103	7731.66	1	0	1	0.001	0.001
10/12/09 02:35:26	59.979	3789.285	350	-237.20665	16	351.5	10	0	-103	7731.99	1	0	1	-0.003	0.003
10/12/09 02:35:28	59.977	3788.256	350	-237.20665	16	352	10	0	-103	7732.32	1	0	1	-0.002	0.002
10/12/09 02:35:30	59.976	3788.41	350	-237.20665	16	352.5	10	0	-103	7732.65	1	0	1	-0.001	0.001
10/12/09 02:35:32	59.976	3790.467	350	-237.20665	16	353	10	0	-103	7732.98	1	0	1	0.000	0.000
10/12/09 02:35:34	59.979	3790.665	350	-237.20665	16	353.5	10	0	-103	7733.31	1	0	1	0.003	0.003
10/12/09 02:35:36	59.982	3790.42	350	-240.516373	16	354	10	0	-103	7733.64	1	0	1	0.003	0.003
10/12/09 02:35:38	59.978	3789.674	350	-240.516373	16	354.5	10	0	-103	7733.97	1	0	1	-0.004	0.004
10/12/09 02:35:40	59.976	3789.267	350	-240.516373	16	355	10	0	-103	7734.3	1	0	1	-0.002	0.002
10/12/09 02:35:42	59.974	3789.148	350	-240.516373	16	355.5	10	0	-103	7734.63	1	0	1	-0.002	0.002
10/12/09 02:35:44	59.976	3790.43	350	-240.516373	16	356	10	0	-103	7734.96	1	0	1	0.002	0.002
10/12/09 02:35:46	59.977	3789.914	350	-237.566055	16	356.5	10	0	-103	7735.29	1	0	1	0.001	0.001
10/12/09 02:35:48	59.977	3786.243	350	-237.566055	16	357	10	0	-103	7735.62	1	0	1	0.000	0.000
10/12/09 02:35:50	59.975	3787.442	350	-237.566055	16	357.5	10	0	-103	7735.95	1	0	1	-0.002	0.002
10/12/09 02:35:52	59.973	3788.963	350	-237.566055	16	358	10	0	-103	7736.28	1	0	1	-0.002	0.002
10/12/09 02:35:54	59.969	3790.602	350	-237.566055	16	358.5	10	0	-103	7736.61	1	0	1	-0.004	0.004
10/12/09 02:35:56	59.97	3791.877	350	-231.581421	16	359	10	0	-103	7736.94	1	0	1	0.001	0.001
10/12/09 02:35:58	59.971	3792.911	350	-231.581421	16	359.5	10	0	-103	7737.27	1	0	1	0.001	0.001
10/12/09 02:36:00	59.973	3792.311	350	-231.581421	16	360	10	0	-103	7737.6	1	0	1	0.002	0.002
10/12/09 02:36:02	59.978	3789.125	350	-231.581421	16	360.5	10	0	-103	7737.93	1	0	1	0.005	0.005
10/12/09 02:36:04	59.981	3788.08	350	-231.581421	16	361	10	0	-103	7738.26	1	0	1	0.003	0.003
10/12/09 02:36:06	59.978	3787.844	350	-235.850845	16	361.5	10	0	-103	7738.59	1	0	1	-0.003	0.003
10/12/09 02:36:08	59.975	3787.135	350	-235.850845	16	362	10	0	-103	7738.92	1	0	1	-0.003	0.003
10/12/09 02:36:10	59.972	3787.164	350	-235.850845	16	362.5	10	0	-103	7739.25	1	0	1	-0.003	0.003
10/12/09 02:36:12	59.976	3786.996	350	-235.850845	16	363	10	0	-103	7739.58	1	0	1	0.004	0.004
10/12/09 02:36:14	59.975	3787.405	350	-235.850845	16	363.5	10	0	-103	7739.91	1	0	1	-0.001	0.001
10/12/09 02:36:16	59.973	3786.487	350	-233.559982	16	364	10	0	-103	7740.24	1	0	1	-0.002	0.002
10/12/09 02:36:18	59.969	3787.079	350	-233.559982	16	364.5	10	0	-103	7740.57	1	0	1	-0.004	0.004
10/12/09 02:36:20	59.966	3789.214	350	-233.559982	16	365	10	0	-103	7740.9	1	0	1	-0.003	0.003
10/12/09 02:36:22	59.965	3790.512	350	-233.559982	16	365.5	10	0	-103	7741.23	1	0	1	-0.001	0.001
10/12/09 02:36:24	59.966	3791.221	350	-233.559982	16	366	10	0	-103	7741.56	1	0	1	0.001	0.001
10/12/09 02:36:26	59.969	3792.218	350	-219.009995	16	366.5	10	0	-103	7741.89	1	0	1	0.003	0.003
10/12/09 02:36:28	59.97	3790.959	350	-219.009995	16	367	10	0	-103	7742.22	1	0	1	0.001	0.001
10/12/09 02:36:30	59.968	3788.824	350	-219.009995	16	367.5	10	0	-103	7742.55	1	0	1	-0.002	0.002
10/12/09 02:36:32	59.965	3789.026	350	-219.009995	16	368	10	0	-103	7742.88	1	0	1	-0.003	0.003
10/12/09 02:36:34	59.964	3789.167	350	-219.009995	16	368.5	10	0	-103	7743.21	1	0	1	-0.001	0.001
10/12/09 02:36:36	59.97	3787.394	350	-205.338913	16	369	10	0	-103	7743.54	1	0	1	0.006	0.006
10/12/09 02:36:38	59.972	3785.69	350	-205.338913	16	369.5	10	0	-103	7743.87	1	0	1	0.002	0.002
10/12/09 02:36:40	59.967	3784.831	350	-205.338913	16	370	10	0	-103	7744.2	1	0	1	-0.005	0.005
10/12/09 02:36:42	59.967	3785.01	350	-205.338913	16	370.5	10	0	-103	7744.53	1	0	1	0.000	0.000
10/12/09 02:36:44	59.969	3784.32	350	-205.338913	16	371	10	0	-103	7744.86	1	0	1	0.002	0.002

10/12/09 02:36:46	59.968	3782.809	350	-236.285355	16	371.5	10	0	-103	7745.19	1	0	1	-0.001	0.001
10/12/09 02:36:48	59.969	3782.11	350	-236.285355	16	372	10	0	-103	7745.52	1	0	1	0.001	0.001
10/12/09 02:36:50	59.967	3779.352	350	-236.285355	16	372.5	10	0	-103	7745.85	1	0	1	-0.002	0.002
10/12/09 02:36:52	59.967	3779.056	350	-236.285355	16	373	10	0	-103	7746.18	1	0	1	0.000	0.000
10/12/09 02:36:54	59.966	3778.633	350	-236.285355	16	373.5	10	0	-103	7746.51	1	0	1	-0.001	0.001
10/12/09 02:36:56	59.965	3779.212	350	-223.015732	16	374	10	0	-103	7746.84	1	0	1	-0.001	0.001
10/12/09 02:36:58	59.971	3779.335	350	-223.015732	16	374.5	10	0	-103	7747.17	1	0	1	0.006	0.006
10/12/09 02:37:00	59.967	3776.429	350	-223.015732	16	375	10	0	-103	7747.5	1	0	1	-0.004	0.004
10/12/09 02:37:02	59.965	3775.647	350	-223.015732	16	375.5	10	0	-103	7747.83	1	0	1	-0.002	0.002
10/12/09 02:37:04	59.962	3776.597	350	-223.015732	16	376	10	0	-103	7748.16	1	0	1	-0.003	0.003
10/12/09 02:37:06	59.964	3776.559	350	-223.015732	16	376.5	10	0	-103	7748.49	1	0	1	0.002	0.002
10/12/09 02:37:08	59.97	3776.023	350	-223.015732	16	377	10	0	-103	7748.82	1	0	1	0.006	0.006
10/12/09 02:37:10	59.967	3773.17	350	-223.015732	16	377.5	10	0	-103	7749.15	1	0	1	-0.003	0.003
10/12/09 02:37:12	59.969	3771.73	350	-223.015732	16	378	10	0	-103	7749.48	1	0	1	0.002	0.002
10/12/09 02:37:14	59.968	3768.793	350	-223.015732	16	378.5	10	0	-103	7749.81	1	0	1	-0.001	0.001
10/12/09 02:37:16	59.963	3768.503	350	-223.015732	16	379	10	0	-103	7750.14	1	0	1	-0.005	0.005
10/12/09 02:37:18	59.965	3768.917	350	-223.015732	16	379.5	10	0	-103	7750.47	1	0	1	0.002	0.002
10/12/09 02:37:20	59.97	3767.366	350	-223.015732	16	380	10	0	-103	7750.8	1	0	1	0.005	0.005
10/12/09 02:37:22	59.973	3764.786	350	-223.015732	16	380.5	10	0	-103	7751.13	1	0	1	0.003	0.003
10/12/09 02:37:24	59.968	3760.295	350	-223.015732	16	381	10	0	-103	7751.46	1	0	1	-0.005	0.005
10/12/09 02:37:26	59.965	3759.592	350	-223.015732	16	381.5	10	0	-103	7751.79	1	0	1	-0.003	0.003
10/12/09 02:37:28	59.968	3761.894	350	-223.015732	16	382	10	0	-103	7752.12	1	0	1	0.003	0.003
10/12/09 02:37:30	59.969	3761.777	350	-223.015732	16	382.5	10	0	-103	7752.45	1	0	1	0.001	0.001
10/12/09 02:37:32	59.967	3760.583	350	-223.015732	16	383	10	0	-103	7752.78	1	0	1	-0.002	0.002
10/12/09 02:37:34	59.964	3760.157	350	-223.015732	16	383.5	10	0	-103	7753.11	1	0	1	-0.003	0.003
10/12/09 02:37:36	59.966	3759.781	350	-223.015732	16	384	10	0	-103	7753.44	1	0	1	0.002	0.002
10/12/09 02:37:38	59.979	3759.495	350	-223.015732	16	384.5	10	0	-103	7753.77	1	0	1	0.013	0.013
10/12/09 02:37:40	59.99	3757.773	350	-223.015732	16	385	10	0	-103	7754.1	1	0	1	0.011	0.011
10/12/09 02:37:42	59.983	3753.277	350	-223.015732	16	385.5	10	0	-103	7754.43	1	0	1	-0.007	0.007
10/12/09 02:37:44	59.974	3753.087	350	-223.015732	16	386	10	0	-103	7754.76	1	0	1	-0.009	0.009
10/12/09 02:37:46	59.967	3751.637	350	-223.015732	16	386.5	10	0	-103	7755.09	1	0	1	-0.007	0.007
10/12/09 02:37:48	59.965	3753.751	350	-223.015732	16	387	10	0	-103	7755.42	1	0	1	-0.002	0.002
10/12/09 02:37:50	59.962	3758.225	350	-223.015732	16	387.5	10	0	-103	7755.75	1	0	1	-0.003	0.003
10/12/09 02:37:52	59.962	3759.25	350	-223.015732	16	388	10	0	-103	7756.08	1	0	1	0.000	0.000
10/12/09 02:37:54	59.961	3758.041	350	-223.015732	16	388.5	10	0	-103	7756.41	1	0	1	-0.001	0.001
10/12/09 02:37:56	59.961	3760.965	350	-223.015732	16	389	10	0	-103	7756.74	1	0	1	0.000	0.000
10/12/09 02:37:58	59.96	3762.022	350	-223.015732	16	389.5	10	0	-103	7757.07	1	0	1	-0.001	0.001
10/12/09 02:38:00	59.963	3763.822	350	-223.015732	16	390	10	0	-103	7757.4	1	0	1	0.003	0.003
10/12/09 02:38:02	59.959	3763.1	350	-223.015732	16	390.5	10	0	-103	7757.73	1	0	1	-0.004	0.004
10/12/09 02:38:04	59.956	3763.858	350	-223.015732	16	391	10	0	-103	7758.06	1	0	1	-0.003	0.003
10/12/09 02:38:06	59.951	3764.158	350	-223.015732	16	391.5	10	0	-103	7758.39	1	0	1	-0.005	0.005
10/12/09 02:38:08	59.953	3766.127	350	-223.015732	16	392	10	0	-103	7758.72	1	0	1	0.002	0.002
10/12/09 02:38:10	59.954	3768.339	350	-223.015732	16	392.5	10	0	-103	7759.05	1	0	1	0.001	0.001
10/12/09 02:38:12	59.957	3767.972	350	-223.015732	16	393	10	0	-103	7759.38	1	0	1	0.003	0.003
10/12/09 02:38:14	59.956	3767.438	350	-223.015732	16	393.5	10	0	-103	7759.71	1	0	1	-0.001	0.001
10/12/09 02:38:16	59.961	3765.606	350	-223.015732	16	394	10	0	-103	7760.04	1	0	1	0.005	0.005
10/12/09 02:38:18	59.963	3762.688	350	-223.015732	16	394.5	10	0	-103	7760.37	1	0	1	0.002	0.002
10/12/09 02:38:20	59.961	3761.57	350	-223.015732	16	395	10	0	-103	7760.7	1	0	1	-0.002	0.002
10/12/09 02:38:22	59.959	3761.92	350	-223.015732	16	395.5	10	0	-103	7761.03	1	0	1	-0.002	0.002

10/12/09 02:38:24	59.963	3759.627	350	-223.015732	16	396	10	0	-103	7761.36	1	0	1	0.004	0.004
10/12/09 02:38:26	59.963	3758.522	350	-223.015732	16	396.5	10	0	-103	7761.69	1	0	1	0.000	0.000
10/12/09 02:38:28	59.965	3752.429	350	-223.015732	16	397	10	0	-103	7762.02	1	0	1	0.002	0.002
10/12/09 02:38:30	59.968	3750.102	350	-223.015732	16	397.5	10	0	-103	7762.35	1	0	1	0.003	0.003
10/12/09 02:38:32	59.968	3753.83	350	-223.015732	16	398	10	0	-103	7762.68	1	0	1	0.000	0.000
10/12/09 02:38:34	59.968	3753.51	350	-223.015732	16	398.5	10	0	-103	7763.01	1	0	1	0.000	0.000
10/12/09 02:38:36	59.97	3753.523	350	-223.015732	16	399	10	0	-103	7763.34	1	0	1	0.002	0.002
10/12/09 02:38:38	59.973	3752.741	350	-223.015732	16	399.5	10	0	-103	7763.67	1	0	1	0.003	0.003
10/12/09 02:38:40	59.971	3753.178	350	-223.015732	16	400	10	0	-103	7764	1	0	1	-0.002	0.002
10/12/09 02:38:42	59.965	3752.729	350	-223.015732	16	400.5	10	0	-103	7764.33	1	0	1	-0.006	0.006
10/12/09 02:38:44	59.967	3753.291	350	-223.015732	16	401	10	0	-103	7764.66	1	0	1	0.002	0.002
10/12/09 02:38:46	59.967	3752.872	350	-223.015732	16	401.5	10	0	-103	7764.99	1	0	1	0.000	0.000
10/12/09 02:38:48	59.972	3752.359	350	-223.015732	16	402	10	0	-103	7765.32	1	0	1	0.005	0.005
10/12/09 02:38:50	59.976	3749.398	350	-223.015732	16	402.5	10	0	-103	7765.65	1	0	1	0.004	0.004
10/12/09 02:38:52	59.975	3747.476	350	-223.015732	16	403	10	0	-103	7765.98	1	0	1	-0.001	0.001
10/12/09 02:38:54	59.969	3740.37	350	-223.015732	16	403.5	10	0	-103	7766.31	1	0	1	-0.006	0.006
10/12/09 02:38:56	59.973	3741.285	350	-223.015732	16	404	10	0	-103	7766.64	1	0	1	0.004	0.004
10/12/09 02:38:58	59.974	3746.651	350	-223.015732	16	404.5	10	0	-103	7766.97	1	0	1	0.001	0.001
10/12/09 02:39:00	59.978	3745.738	350	-223.015732	16	405	10	0	-103	7767.3	1	0	1	0.004	0.004
10/12/09 02:39:02	59.981	3743.351	350	-223.015732	16	405.5	10	0	-103	7767.63	1	0	1	0.003	0.003
10/12/09 02:39:04	59.981	3741.618	350	-223.015732	16	406	10	0	-103	7767.96	1	0	1	0.000	0.000
10/12/09 02:39:06	59.981	3740.306	350	-223.015732	16	406.5	10	0	-103	7768.29	1	0	1	0.000	0.000
10/12/09 02:39:08	59.982	3738.484	350	-223.015732	16	407	10	0	-103	7768.62	1	0	1	0.001	0.001
10/12/09 02:39:10	59.982	3738.901	350	-223.015732	16	407.5	10	0	-103	7768.95	1	0	1	0.000	0.000
10/12/09 02:39:12	59.984	3737.404	350	-223.015732	16	408	10	0	-103	7769.28	1	0	1	0.002	0.002
10/12/09 02:39:14	59.982	3737.273	350	-223.015732	16	408.5	10	0	-103	7769.61	1	0	1	-0.002	0.002
10/12/09 02:39:16	59.981	3736.308	350	-223.015732	16	409	10	0	-103	7769.94	1	0	1	-0.001	0.001
10/12/09 02:39:18	59.979	3736.272	350	-223.015732	16	409.5	10	0	-103	7770.27	1	0	1	-0.002	0.002
10/12/09 02:39:20	59.98	3735.448	350	-223.015732	16	410	10	0	-103	7770.6	1	0	1	0.001	0.001
10/12/09 02:39:22	59.978	3735.65	350	-223.015732	16	410.5	10	0	-103	7770.93	1	0	1	-0.002	0.002
10/12/09 02:39:24	59.978	3737.541	350	-223.015732	16	411	10	0	-103	7771.26	1	0	1	0.000	0.000
10/12/09 02:39:26	59.98	3738.012	350	-223.015732	16	411.5	10	0	-103	7771.59	1	0	1	0.002	0.002
10/12/09 02:39:28	59.981	3736.748	350	-223.015732	16	412	10	0	-103	7771.92	1	0	1	0.001	0.001
10/12/09 02:39:30	59.98	3736.693	350	-223.015732	16	412.5	10	0	-103	7772.25	1	0	1	-0.001	0.001
10/12/09 02:39:32	59.978	3736.067	350	-223.015732	16	413	10	0	-103	7772.58	1	0	1	-0.002	0.002
10/12/09 02:39:34	59.976	3736.094	350	-223.015732	16	413.5	10	0	-103	7772.91	1	0	1	-0.002	0.002
10/12/09 02:39:36	59.972	3736.575	350	-223.015732	16	414	10	0	-103	7773.24	1	0	1	-0.004	0.004
10/12/09 02:39:38	59.971	3738.571	350	-223.015732	16	414.5	10	0	-103	7773.57	1	0	1	-0.001	0.001
10/12/09 02:39:40	59.969	3738.875	350	-223.015732	16	415	10	0	-103	7773.9	1	0	1	-0.002	0.002
10/12/09 02:39:42	59.974	3738.935	350	-223.015732	16	415.5	10	0	-103	7774.23	1	0	1	0.005	0.005
10/12/09 02:39:44	59.975	3738.647	350	-223.015732	16	416	10	0	-103	7774.56	1	0	1	0.001	0.001
10/12/09 02:39:46	59.976	3737.684	350	-223.015732	16	416.5	10	0	-103	7774.89	1	0	1	0.001	0.001
10/12/09 02:39:48	59.972	3737.382	350	-223.015732	16	417	10	0	-103	7775.22	1	0	1	-0.004	0.004
10/12/09 02:39:50	59.969	3737.892	350	-223.015732	16	417.5	10	0	-103	7775.55	1	0	1	-0.003	0.003
10/12/09 02:39:52	59.971	3740.017	350	-223.015732	16	418	10	0	-103	7775.88	1	0	1	0.002	0.002
10/12/09 02:39:54	59.974	3740.329	350	-223.015732	16	418.5	10	0	-103	7776.21	1	0	1	0.003	0.003
10/12/09 02:39:56	59.972	3742.053	350	-223.015732	16	419	10	0	-103	7776.54	1	0	1	-0.002	0.002
10/12/09 02:39:58	59.972	3742.424	350	-223.015732	16	419.5	10	0	-103	7776.87	1	0	1	0.000	0.000
10/12/09 02:40:00	59.972	3742.524	350	-223.015732	16	420	10	0	-103	7777.2	1	0	1	0.000	0.000

10/12/09 02:40:02	59.977	3742.245	350	-223.015732	16	420.5	10	0	-103	7777.53	1	0	1	0.005	0.005
10/12/09 02:40:04	59.982	3741.723	350	-223.015732	16	421	10	0	-103	7777.86	1	0	1	0.005	0.005
10/12/09 02:40:06	59.978	3740.085	350	-223.015732	16	421.5	10	0	-103	7778.19	1	0	1	-0.004	0.004
10/12/09 02:40:08	59.976	3740.629	350	-223.015732	16	422	10	0	-103	7778.52	1	0	1	-0.002	0.002
10/12/09 02:40:10	59.973	3739.964	350	-223.015732	16	422.5	10	0	-103	7778.85	1	0	1	-0.003	0.003
10/12/09 02:40:12	59.974	3740.775	350	-223.015732	16	423	10	0	-103	7779.18	1	0	1	0.001	0.001
10/12/09 02:40:14	59.977	3742.833	350	-223.015732	16	423.5	10	0	-103	7779.51	1	0	1	0.003	0.003
10/12/09 02:40:16	59.977	3741.268	350	-223.015732	16	424	10	0	-103	7779.84	1	0	1	0.000	0.000
10/12/09 02:40:18	59.978	3739.776	350	-223.015732	16	424.5	10	0	-103	7780.17	1	0	1	0.001	0.001
10/12/09 02:40:20	59.979	3738.966	350	-223.015732	16	425	10	0	-103	7780.5	1	0	1	0.001	0.001
10/12/09 02:40:22	59.981	3738.706	350	-223.015732	16	425.5	10	0	-103	7780.83	1	0	1	0.002	0.002
10/12/09 02:40:24	59.977	3738.879	350	-223.015732	16	426	10	0	-103	7781.16	1	0	1	-0.004	0.004
10/12/09 02:40:26	59.974	3739.86	350	-223.015732	16	426.5	10	0	-103	7781.49	1	0	1	-0.003	0.003
10/12/09 02:40:28	59.971	3738.102	350	-223.015732	16	427	10	0	-103	7781.82	1	0	1	-0.003	0.003
10/12/09 02:40:30	59.971	3738.558	350	-223.015732	16	427.5	10	0	-103	7782.15	1	0	1	0.000	0.000
10/12/09 02:40:32	59.971	3743.507	350	-223.015732	16	428	10	0	-103	7782.48	1	0	1	0.000	0.000
10/12/09 02:40:34	59.972	3743.419	350	-223.015732	16	428.5	10	0	-103	7782.81	1	0	1	0.001	0.001
10/12/09 02:40:36	59.968	3745.251	350	-223.015732	16	429	10	0	-103	7783.14	1	0	1	-0.004	0.004
10/12/09 02:40:38	59.966	3745.744	350	-223.015732	16	429.5	10	0	-103	7783.47	1	0	1	-0.002	0.002
10/12/09 02:40:40	59.966	3747.34	350	-223.015732	16	430	10	0	-103	7783.8	1	0	1	0.000	0.000
10/12/09 02:40:42	59.971	3750.7	350	-223.015732	16	430.5	10	0	-103	7784.13	1	0	1	0.005	0.005
10/12/09 02:40:44	59.973	3749.75	350	-223.015732	16	431	10	0	-103	7784.46	1	0	1	0.002	0.002
10/12/09 02:40:46	59.972	3746.217	350	-223.015732	16	431.5	10	0	-103	7784.79	1	0	1	-0.001	0.001
10/12/09 02:40:48	59.969	3744.683	350	-223.015732	16	432	10	0	-103	7785.12	1	0	1	-0.003	0.003
10/12/09 02:40:50	59.972	3743.745	350	-223.015732	16	432.5	10	0	-103	7785.45	1	0	1	0.003	0.003
10/12/09 02:40:52	59.974	3743.149	350	-223.015732	16	433	10	0	-103	7785.78	1	0	1	0.002	0.002
10/12/09 02:40:54	59.973	3740.299	350	-223.015732	16	433.5	10	0	-103	7786.11	1	0	1	-0.001	0.001
10/12/09 02:40:56	59.97	3739.453	350	-223.015732	16	434	10	0	-103	7786.44	1	0	1	-0.003	0.003
10/12/09 02:40:58	59.971	3733.376	350	-223.015732	16	434.5	10	0	-103	7786.77	1	0	1	0.001	0.001
10/12/09 02:41:00	59.974	3731.83	350	-223.015732	16	435	10	0	-103	7787.1	1	0	1	0.003	0.003
10/12/09 02:41:02	59.982	3737.583	350	-223.015732	16	435.5	10	0	-103	7787.43	1	0	1	0.008	0.008
10/12/09 02:41:04	59.985	3736.229	350	-223.015732	16	436	10	0	-103	7787.76	1	0	1	0.003	0.003
10/12/09 02:41:06	59.985	3734.897	350	-223.015732	16	436.5	10	0	-103	7788.09	1	0	1	0.000	0.000
10/12/09 02:41:08	59.985	3733.434	350	-223.015732	16	437	10	0	-103	7788.42	1	0	1	0.000	0.000
10/12/09 02:41:10	59.987	3733.115	350	-223.015732	16	437.5	10	0	-103	7788.75	1	0	1	0.002	0.002
10/12/09 02:41:12	59.989	3730.51	350	-223.015732	16	438	10	0	-103	7789.08	1	0	1	0.002	0.002
10/12/09 02:41:14	59.989	3729.18	350	-223.015732	16	438.5	10	0	-103	7789.41	1	0	1	0.000	0.000
10/12/09 02:41:16	59.986	3725.459	350	-223.015732	16	439	10	0	-103	7789.74	1	0	1	-0.003	0.003
10/12/09 02:41:18	59.987	3724.785	350	-223.015732	16	439.5	10	0	-103	7790.07	1	0	1	0.001	0.001
10/12/09 02:41:20	59.99	3720.108	350	-223.015732	16	440	10	0	-103	7790.4	1	0	1	0.003	0.003
10/12/09 02:41:22	59.994	3720.938	350	-223.015732	16	440.5	10	0	-103	7790.73	1	0	1	0.004	0.004
10/12/09 02:41:24	59.996	3725.661	350	-223.015732	16	441	10	0	-103	7791.06	1	0	1	0.002	0.002
10/12/09 02:41:26	60.001	3725.677	350	-223.015732	16	441.5	10	0	-103	7791.39	1	1	1	0.005	0.005
10/12/09 02:41:28	60.003	3727.754	350	-223.015732	16	442	10	0	-103	7791.72	1	1	1	0.002	0.002
10/12/09 02:41:30	60.004	3727.825	350	-223.015732	16	442.5	10	0	-103	7792.05	1	1	1	0.001	0.001
10/12/09 02:41:32	60.006	3727.683	350	-223.015732	16	443	10	0	-103	7792.38	1	1	1	0.002	0.002
10/12/09 02:41:34	60.012	3727.231	350	-223.015732	16	443.5	10	0	-103	7792.71	1	1	1	0.006	0.006
10/12/09 02:41:36	60.014	3725.012	350	-223.015732	16	444	10	0	-103	7793.04	1	1	1	0.002	0.002
10/12/09 02:41:38	60.019	3726.446	350	-223.015732	16	444.5	10	0	-103	7793.37	1	1	1	0.005	0.005

10/12/09 02:41:40	60.021	3726.016	350	-223.015732	16	445	10	0	-103	7793.7	1	1	1	0.002	0.002
10/12/09 02:41:42	60.025	3719.123	350	-223.015732	16	445.5	10	0	-103	7794.03	1	1	1	0.004	0.004
10/12/09 02:41:44	60.026	3716.375	350	-223.015732	16	446	10	0	-103	7794.36	1	1	1	0.001	0.001
10/12/09 02:41:46	60.027	3717.333	350	-223.015732	16	446.5	10	0	-103	7794.69	1	1	1	0.001	0.001
10/12/09 02:41:48	60.029	3717.56	350	-223.015732	16	447	10	0	-103	7795.02	1	1	1	0.002	0.002
10/12/09 02:41:50	60.029	3717.142	350	-223.015732	16	447.5	10	0	-103	7795.35	1	1	1	0.000	0.000
10/12/09 02:41:52	60.037	3715.166	350	-223.015732	16	448	10	0	-103	7795.68	1	1	1	0.008	0.008
10/12/09 02:41:54	60.036	3713.632	350	-223.015732	16	448.5	10	0	-103	7796.01	1	1	1	-0.001	0.001
10/12/09 02:41:56	60.037	3710.283	350	-223.015732	16	449	10	0	-103	7796.34	1	1	1	0.001	0.001
10/12/09 02:41:58	60.037	3710.158	350	-223.015732	16	449.5	10	0	-103	7796.67	1	1	1	0.000	0.000
10/12/09 02:42:00	60.036	3699.356	350	-223.015732	16	450	10	0	-103	7797	1	1	1	-0.001	0.001
10/12/09 02:42:02	60.041	3698.591	350	-223.015732	16	450.5	10	0	-103	7797.33	1	1	1	0.005	0.005
10/12/09 02:42:04	60.043	3704.591	350	-223.015732	16	451	10	0	-103	7797.66	1	1	1	0.002	0.002
10/12/09 02:42:06	60.044	3703.275	350	-223.015732	16	451.5	10	0	-103	7797.99	1	1	1	0.001	0.001
10/12/09 02:42:08	60.043	3702.482	350	-223.015732	16	452	10	0	-103	7798.32	1	1	1	-0.001	0.001
10/12/09 02:42:10	60.046	3701.316	350	-223.015732	16	452.5	10	0	-103	7798.65	1	1	1	0.003	0.003
10/12/09 02:42:12	60.048	3700.826	350	-223.015732	16	453	10	0	-103	7798.98	1	1	1	0.002	0.002
10/12/09 02:42:14	60.046	3699.529	350	-223.015732	16	453.5	10	0	-103	7799.31	1	1	1	-0.002	0.002
10/12/09 02:42:16	60.046	3699.726	350	-223.015732	16	454	10	0	-103	7799.64	1	1	1	0.000	0.000
10/12/09 02:42:18	60.043	3690.1	350	-223.015732	16	454.5	10	0	-103	7799.97	1	1	1	-0.003	0.003
10/12/09 02:42:20	60.043	3690.477	350	-223.015732	16	455	10	0	-103	7800.3	1	1	1	0.000	0.000
10/12/09 02:42:22	60.044	3696.865	350	-223.015732	16	455.5	10	0	-103	7800.63	1	1	1	0.001	0.001
10/12/09 02:42:24	60.043	3696.877	350	-223.015732	16	456	10	0	-103	7800.96	1	1	1	-0.001	0.001
10/12/09 02:42:26	60.043	3696.182	350	-223.015732	16	456.5	10	0	-103	7801.29	1	1	1	0.000	0.000
10/12/09 02:42:28	60.045	3696.541	350	-223.015732	16	457	10	0	-103	7801.62	1	1	1	0.002	0.002
10/12/09 02:42:30	60.04	3696.968	350	-223.015732	16	457.5	10	0	-103	7801.95	1	1	1	-0.005	0.005
10/12/09 02:42:32	60.041	3698.686	350	-223.015732	16	458	10	0	-103	7802.28	1	1	1	0.001	0.001
10/12/09 02:42:34	60.039	3699.631	350	-223.015732	16	458.5	10	0	-103	7802.61	1	1	1	-0.002	0.002
10/12/09 02:42:36	60.039	3698.787	350	-223.015732	16	459	10	0	-103	7802.94	1	1	1	0.000	0.000
10/12/09 02:42:38	60.036	3699.712	350	-223.015732	16	459.5	10	0	-103	7803.27	1	1	1	-0.003	0.003
10/12/09 02:42:40	60.038	3700.106	350	-223.015732	16	460	10	0	-103	7803.6	1	1	1	0.002	0.002
10/12/09 02:42:42	60.033	3699.968	350	-223.015732	16	460.5	10	0	-103	7803.93	1	1	1	-0.005	0.005
10/12/09 02:42:44	60.034	3701.122	350	-223.015732	16	461	10	0	-103	7804.26	1	1	1	0.001	0.001
10/12/09 02:42:46	60.037	3701.865	350	-223.015732	16	461.5	10	0	-103	7804.59	1	1	1	0.003	0.003
10/12/09 02:42:48	60.037	3701.614	350	-223.015732	16	462	10	0	-103	7804.92	1	1	1	0.000	0.000
10/12/09 02:42:50	60.035	3701.998	350	-223.015732	16	462.5	10	0	-103	7805.25	1	1	1	-0.002	0.002
10/12/09 02:42:52	60.03	3702.913	350	-223.015732	16	463	10	0	-103	7805.58	1	1	1	-0.005	0.005
10/12/09 02:42:54	60.033	3703.909	350	-223.015732	16	463.5	10	0	-103	7805.91	1	1	1	0.003	0.003
10/12/09 02:42:56	60.036	3705.522	350	-223.015732	16	464	10	0	-103	7806.24	1	1	1	0.003	0.003
10/12/09 02:42:58	60.033	3704.967	350	-223.015732	16	464.5	10	0	-103	7806.57	1	1	1	-0.003	0.003
10/12/09 02:43:00	60.034	3704.087	350	-223.015732	16	465	10	0	-103	7806.9	1	1	1	0.001	0.001
10/12/09 02:43:02	60.032	3702.771	350	-223.015732	16	465.5	10	0	-103	7807.23	1	1	1	-0.002	0.002
10/12/09 02:43:04	60.032	3703.706	350	-223.015732	16	466	10	0	-103	7807.56	1	1	1	0.000	0.000
10/12/09 02:43:06	60.034	3704.905	350	-223.015732	16	466.5	10	0	-103	7807.89	1	1	1	0.002	0.002
10/12/09 02:43:08	60.033	3705.435	350	-223.015732	16	467	10	0	-103	7808.22	1	1	1	-0.001	0.001
10/12/09 02:43:10	60.037	3704.36	350	-223.015732	16	467.5	10	0	-103	7808.55	1	1	1	0.004	0.004
10/12/09 02:43:12	60.035	3702.588	350	-223.015732	16	468	10	0	-103	7808.88	1	1	1	-0.002	0.002
10/12/09 02:43:14	60.035	3702.204	350	-223.015732	16	468.5	10	0	-103	7809.21	1	1	1	0.000	0.000
10/12/09 02:43:16	60.036	3701.942	350	-223.015732	16	469	10	0	-103	7809.54	1	1	1	0.001	0.001

10/12/09 02:43:18	60.039	3702.25	350	-223.015732	16	469.5	10	0	-103	7809.87	1	1	1	0.003	0.003
10/12/09 02:43:20	60.037	3703.318	350	-223.015732	16	470	10	0	-103	7810.2	1	1	1	-0.002	0.002
10/12/09 02:43:22	60.039	3702.457	350	-223.015732	16	470.5	10	0	-103	7810.53	1	1	1	0.002	0.002
10/12/09 02:43:24	60.036	3702.525	350	-223.015732	16	471	10	0	-103	7810.86	1	1	1	-0.003	0.003
10/12/09 02:43:26	60.034	3703.269	350	-223.015732	16	471.5	10	0	-103	7811.19	1	1	1	-0.002	0.002
10/12/09 02:43:28	60.038	3703.844	350	-223.015732	16	472	10	0	-103	7811.52	1	1	1	0.004	0.004
10/12/09 02:43:30	60.037	3702.865	350	-223.015732	16	472.5	10	0	-103	7811.85	1	1	1	-0.001	0.001
10/12/09 02:43:32	60.037	3702.518	350	-223.015732	16	473	10	0	-103	7812.18	1	1	1	0.000	0.000
10/12/09 02:43:34	60.037	3702.28	350	-223.015732	16	473.5	10	0	-103	7812.51	1	1	1	0.000	0.000
10/12/09 02:43:36	60.038	3692.427	350	-223.015732	16	474	10	0	-103	7812.84	1	1	1	0.001	0.001
10/12/09 02:43:38	60.04	3692.178	350	-223.015732	16	474.5	10	0	-103	7813.17	1	1	1	0.002	0.002
10/12/09 02:43:40	60.043	3700.276	350	-223.015732	16	475	10	0	-103	7813.5	1	1	1	0.003	0.003
10/12/09 02:43:42	60.045	3698.755	350	-223.015732	16	475.5	10	0	-103	7813.83	1	1	1	0.002	0.002
10/12/09 02:43:44	60.045	3697.729	350	-223.015732	16	476	10	0	-103	7814.16	1	1	1	0.000	0.000
10/12/09 02:43:46	60.042	3696.916	350	-223.015732	16	476.5	10	0	-103	7814.49	1	1	1	-0.003	0.003
10/12/09 02:43:48	60.043	3697.368	350	-223.015732	16	477	10	0	-103	7814.82	1	1	1	0.001	0.001
10/12/09 02:43:50	60.04	3697.346	350	-223.015732	16	477.5	10	0	-103	7815.15	1	1	1	-0.003	0.003
10/12/09 02:43:52	60.044	3698.429	350	-223.015732	16	478	10	0	-103	7815.48	1	1	1	0.004	0.004
10/12/09 02:43:54	60.046	3694.763	350	-223.015732	16	478.5	10	0	-103	7815.81	1	1	1	0.002	0.002
10/12/09 02:43:56	60.042	3693.584	350	-223.015732	16	479	10	0	-103	7816.14	1	1	1	-0.004	0.004
10/12/09 02:43:58	60.034	3693.241	350	-223.015732	16	479.5	10	0	-103	7816.47	1	1	1	-0.008	0.008
10/12/09 02:44:00	60.039	3696.798	350	-223.015732	16	480	10	0	-103	7816.8	1	1	1	0.005	0.005
10/12/09 02:44:02	60.039	3699.364	350	-223.015732	16	480.5	10	0	-103	7817.13	1	1	1	0.000	0.000
10/12/09 02:44:04	60.036	3701.791	350	-223.015732	16	481	10	0	-103	7817.46	1	1	1	-0.003	0.003
10/12/09 02:44:06	60.037	3700.708	350	-223.015732	16	481.5	10	0	-103	7817.79	1	1	1	0.001	0.001
10/12/09 02:44:08	60.034	3700.753	350	-223.015732	16	482	10	0	-103	7818.12	1	1	1	-0.003	0.003
10/12/09 02:44:10	60.033	3702.148	350	-223.015732	16	482.5	10	0	-103	7818.45	1	1	1	-0.001	0.001
10/12/09 02:44:12	60.032	3705.213	350	-223.015732	16	483	10	0	-103	7818.78	1	1	1	-0.001	0.001
10/12/09 02:44:14	60.031	3707.521	350	-223.015732	16	483.5	10	0	-103	7819.11	1	1	1	-0.001	0.001
10/12/09 02:44:16	60.033	3707.287	350	-223.015732	16	484	10	0	-103	7819.44	1	1	1	0.002	0.002
10/12/09 02:44:18	60.027	3706.988	350	-223.015732	16	484.5	10	0	-103	7819.77	1	1	1	-0.006	0.006
10/12/09 02:44:20	60.031	3707.34	350	-223.015732	16	485	10	0	-103	7820.1	1	1	1	0.004	0.004
10/12/09 02:44:22	60.032	3707.917	350	-223.015732	16	485.5	10	0	-103	7820.43	1	1	1	0.001	0.001
10/12/09 02:44:24	60.031	3707.384	350	-223.015732	16	486	10	0	-103	7820.76	1	1	1	-0.001	0.001
10/12/09 02:44:26	60.031	3706.857	350	-223.015732	16	486.5	10	0	-103	7821.09	1	1	1	0.000	0.000
10/12/09 02:44:28	60.033	3707.615	350	-223.015732	16	487	10	0	-103	7821.42	1	1	1	0.002	0.002
10/12/09 02:44:30	60.039	3706.823	350	-223.015732	16	487.5	10	0	-103	7821.75	1	1	1	0.006	0.006
10/12/09 02:44:32	60.039	3703.746	350	-223.015732	16	488	10	0	-103	7822.08	1	1	1	0.000	0.000
10/12/09 02:44:34	60.038	3701.582	350	-223.015732	16	488.5	10	0	-103	7822.41	1	1	1	-0.001	0.001
10/12/09 02:44:36	60.037	3700.847	350	-223.015732	16	489	10	0	-103	7822.74	1	1	1	-0.001	0.001
10/12/09 02:44:38	60.035	3701.208	350	-223.015732	16	489.5	10	0	-103	7823.07	1	1	1	-0.002	0.002
10/12/09 02:44:40	60.037	3702.212	350	-223.015732	16	490	10	0	-103	7823.4	1	1	1	0.002	0.002
10/12/09 02:44:42	60.04	3701.686	350	-223.015732	16	490.5	10	0	-103	7823.73	1	1	1	0.003	0.003
10/12/09 02:44:44	60.042	3700.397	350	-223.015732	16	491	10	0	-103	7824.06	1	1	1	0.002	0.002
10/12/09 02:44:46	60.035	3699.69	350	-223.015732	16	491.5	10	0	-103	7824.39	1	1	1	-0.007	0.007
10/12/09 02:44:48	60.036	3700.366	350	-223.015732	16	492	10	0	-103	7824.72	1	1	1	0.001	0.001
10/12/09 02:44:50	60.04	3700.827	350	-223.015732	16	492.5	10	0	-103	7825.05	1	1	1	0.004	0.004
10/12/09 02:44:52	60.045	3700.662	350	-223.015732	16	493	10	0	-103	7825.38	1	1	1	0.005	0.005
10/12/09 02:44:54	60.045	3696.935	350	-223.015732	16	493.5	10	0	-103	7825.71	1	1	1	0.000	0.000

10/12/09 02:44:56	60.048	3695.688	350	-223.015732	16	494	10	0	-103	7826.04	1	1	1	0.003	0.003
10/12/09 02:44:58	60.042	3695.819	350	-223.015732	16	494.5	10	0	-103	7826.37	1	1	1	-0.006	0.006
10/12/09 02:45:00	60.044	3693.824	350	-223.015732	16	495	10	0	-103	7826.7	1	1	1	0.002	0.002
10/12/09 02:45:02	60.044	3694.799	350	-223.015732	16	495.5	10	0	-103	7827.03	1	1	1	0.000	0.000
10/12/09 02:45:04	60.044	3696.897	350	-223.015732	16	496	10	0	-103	7827.36	1	1	1	0.000	0.000
10/12/09 02:45:06	60.041	3696.023	350	-223.015732	16	496.5	10	0	-103	7827.69	1	1	1	-0.003	0.003
10/12/09 02:45:08	60.04	3697.502	350	-223.015732	16	497	10	0	-103	7828.02	1	1	1	-0.001	0.001
10/12/09 02:45:10	60.04	3698.424	350	-223.015732	16	497.5	10	0	-103	7828.35	1	1	1	0.000	0.000
10/12/09 02:45:12	60.045	3699.427	350	-223.015732	16	498	10	0	-103	7828.68	1	1	1	0.005	0.005
10/12/09 02:45:14	60.044	3700.177	350	-223.015732	16	498.5	10	0	-103	7829.01	1	1	1	-0.001	0.001
10/12/09 02:45:16	60.042	3699.806	350	-223.015732	16	499	10	0	-103	7829.34	1	1	1	-0.002	0.002
10/12/09 02:45:18	60.039	3697.577	350	-223.015732	16	499.5	10	0	-103	7829.67	1	1	1	-0.003	0.003
10/12/09 02:45:20	60.042	3697.681	350	-223.015732	16	500	10	0	-103	7830	1	1	1	0.003	0.003
10/12/09 02:45:22	60.042	3698.507	350	-223.015732	16	500.5	10	0	-103	7830.33	1	1	1	0.000	0.000
10/12/09 02:45:24	60.041	3698.359	350	-223.015732	16	501	10	0	-103	7830.66	1	1	1	-0.001	0.001
10/12/09 02:45:26	60.038	3698.466	350	-223.015732	16	501.5	10	0	-103	7830.99	1	1	1	-0.003	0.003
10/12/09 02:45:28	60.036	3699.077	350	-223.015732	16	502	10	0	-103	7831.32	1	1	1	-0.002	0.002
10/12/09 02:45:30	60.037	3700.262	350	-223.015732	16	502.5	10	0	-103	7831.65	1	1	1	0.001	0.001
10/12/09 02:45:32	60.039	3701.592	350	-223.015732	16	503	10	0	-103	7831.98	1	1	1	0.002	0.002
10/12/09 02:45:34	60.038	3700.902	350	-223.015732	16	503.5	10	0	-103	7832.31	1	1	1	-0.001	0.001
10/12/09 02:45:36	60.04	3700.143	350	-223.015732	16	504	10	0	-103	7832.64	1	1	1	0.002	0.002
10/12/09 02:45:38	60.039	3700.27	350	-223.015732	16	504.5	10	0	-103	7832.97	1	1	1	-0.001	0.001
10/12/09 02:45:40	60.037	3701.139	350	-223.015732	16	505	10	0	-103	7833.3	1	1	1	-0.002	0.002
10/12/09 02:45:42	60.038	3701.586	350	-223.015732	16	505.5	10	0	-103	7833.63	1	1	1	0.001	0.001
10/12/09 02:45:44	60.039	3700.264	350	-223.015732	16	506	10	0	-103	7833.96	1	1	1	0.001	0.001
10/12/09 02:45:46	60.04	3699.458	350	-223.015732	16	506.5	10	0	-103	7834.29	1	1	1	0.001	0.001
10/12/09 02:45:48	60.037	3699.721	350	-223.015732	16	507	10	0	-103	7834.62	1	1	1	-0.003	0.003
10/12/09 02:45:50	60.037	3700.458	350	-223.015732	16	507.5	10	0	-103	7834.95	1	1	1	0.000	0.000
10/12/09 02:45:52	60.037	3699.505	350	-223.015732	16	508	10	0	-103	7835.28	1	1	1	0.000	0.000
10/12/09 02:45:54	60.039	3698.794	350	-223.015732	16	508.5	10	0	-103	7835.61	1	1	1	0.002	0.002
10/12/09 02:45:56	60.038	3699.216	350	-223.015732	16	509	10	0	-103	7835.94	1	1	1	-0.001	0.001
10/12/09 02:45:58	60.036	3699.4	350	-223.015732	16	509.5	10	0	-103	7836.27	1	1	1	-0.002	0.002
10/12/09 02:46:00	60.035	3700.661	350	-223.015732	16	510	10	0	-103	7836.6	1	1	1	-0.001	0.001
10/12/09 02:46:02	60.033	3702.173	350	-223.015732	16	510.5	10	0	-103	7836.93	1	1	1	-0.002	0.002
10/12/09 02:46:04	60.031	3702.968	350	-223.015732	16	511	10	0	-103	7837.26	1	1	1	-0.002	0.002
10/12/09 02:46:06	60.03	3705.195	350	-223.015732	16	511.5	10	0	-103	7837.59	1	1	1	-0.001	0.001
10/12/09 02:46:08	60.032	3704.952	350	-223.015732	16	512	10	0	-103	7837.92	1	1	1	0.002	0.002
10/12/09 02:46:10	60.032	3705.775	350	-223.015732	16	512.5	10	0	-103	7838.25	1	1	1	0.000	0.000
10/12/09 02:46:12	60.037	3705.621	350	-223.015732	16	513	10	0	-103	7838.58	1	1	1	0.005	0.005
10/12/09 02:46:14	60.042	3703.744	350	-223.015732	16	513.5	10	0	-103	7838.91	1	1	1	0.005	0.005
10/12/09 02:46:16	60.041	3701.981	350	-223.015732	16	514	10	0	-103	7839.24	1	1	1	-0.001	0.001
10/12/09 02:46:18	60.036	3700.756	350	-223.015732	16	514.5	10	0	-103	7839.57	1	1	1	-0.005	0.005
10/12/09 02:46:20	60.031	3700.747	350	-223.015732	16	515	10	0	-103	7839.9	1	1	1	-0.005	0.005
10/12/09 02:46:22	60.032	3702.213	350	-223.015732	16	515.5	10	0	-103	7840.23	1	1	1	0.001	0.001
10/12/09 02:46:24	60.031	3705.059	350	-223.015732	16	516	10	0	-103	7840.56	1	1	1	-0.001	0.001
10/12/09 02:46:26	60.034	3705.514	350	-223.015732	16	516.5	10	0	-103	7840.89	1	1	1	0.003	0.003
10/12/09 02:46:28	60.034	3704.449	350	-223.015732	16	517	10	0	-103	7841.22	1	1	1	0.000	0.000
10/12/09 02:46:30	60.032	3703.831	350	-223.015732	16	517.5	10	0	-103	7841.55	1	1	1	-0.002	0.002
10/12/09 02:46:32	60.038	3703.62	350	-223.015732	16	518	10	0	-103	7841.88	1	1	1	0.006	0.006

10/12/09 02:46:34	60.043	3702.795	350	-223.015732	16	518.5	10	0	-103	7842.21	1	1	1	0.005	0.005
10/12/09 02:46:36	60.044	3701.432	350	-223.015732	16	519	10	0	-103	7842.54	1	1	1	0.001	0.001
10/12/09 02:46:38	60.042	3697.38	350	-223.015732	16	519.5	10	0	-103	7842.87	1	1	1	-0.002	0.002
10/12/09 02:46:40	60.045	3696.25	350	-223.015732	16	520	10	0	-103	7843.2	1	1	1	0.003	0.003
10/12/09 02:46:42	60.04	3696.302	350	-223.015732	16	520.5	10	0	-103	7843.53	1	1	1	-0.005	0.005
10/12/09 02:46:44	60.04	3693.518	350	-223.015732	16	521	10	0	-103	7843.86	1	1	1	0.000	0.000
10/12/09 02:46:46	60.043	3693.577	350	-223.015732	16	521.5	10	0	-103	7844.19	1	1	1	0.003	0.003
10/12/09 02:46:48	60.043	3695.197	350	-223.015732	16	522	10	0	-103	7844.52	1	1	1	0.000	0.000
10/12/09 02:46:50	60.041	3695.186	350	-223.015732	16	522.5	10	0	-103	7844.85	1	1	1	-0.002	0.002
10/12/09 02:46:52	60.04	3693.786	350	-223.015732	16	523	10	0	-103	7845.18	1	1	1	-0.001	0.001
10/12/09 02:46:54	60.038	3694.753	350	-223.015732	16	523.5	10	0	-103	7845.51	1	1	1	-0.002	0.002
10/12/09 02:46:56	60.043	3694.926	350	-223.015732	16	524	10	0	-103	7845.84	1	1	1	0.005	0.005
10/12/09 02:46:58	60.044	3694.938	350	-223.015732	16	524.5	10	0	-103	7846.17	1	1	1	0.001	0.001
10/12/09 02:47:00	60.042	3694.159	350	-223.015732	16	525	10	0	-103	7846.5	1	1	1	-0.002	0.002
10/12/09 02:47:02	60.036	3691.33	350	-223.015732	16	525.5	10	0	-103	7846.83	1	1	1	-0.006	0.006
10/12/09 02:47:04	60.043	3692.686	350	-223.015732	16	526	10	0	-103	7847.16	1	1	1	0.007	0.007
10/12/09 02:47:06	60.041	3693.238	350	-223.015732	16	526.5	10	0	-103	7847.49	1	1	1	-0.002	0.002
10/12/09 02:47:08	60.042	3693.39	350	-223.015732	16	527	10	0	-103	7847.82	1	1	1	0.001	0.001
10/12/09 02:47:10	60.043	3692.357	350	-223.015732	16	527.5	10	0	-103	7848.15	1	1	1	0.001	0.001
10/12/09 02:47:12	60.043	3690.951	350	-223.015732	16	528	10	0	-103	7848.48	1	1	1	0.000	0.000
10/12/09 02:47:14	60.036	3690.836	350	-223.015732	16	528.5	10	0	-103	7848.81	1	1	1	-0.007	0.007
10/12/09 02:47:16	60.039	3692.042	350	-223.015732	16	529	10	0	-103	7849.14	1	1	1	0.003	0.003
10/12/09 02:47:18	60.039	3693.114	350	-223.015732	16	529.5	10	0	-103	7849.47	1	1	1	0.000	0.000
10/12/09 02:47:20	60.037	3694.117	350	-223.015732	16	530	10	0	-103	7849.8	1	1	1	-0.002	0.002
10/12/09 02:47:22	60.034	3695.258	350	-223.015732	16	530.5	10	0	-103	7850.13	1	1	1	-0.003	0.003
10/12/09 02:47:24	60.035	3695.581	350	-223.015732	16	531	10	0	-103	7850.46	1	1	1	0.001	0.001
10/12/09 02:47:26	60.035	3695.949	350	-223.015732	16	531.5	10	0	-103	7850.79	1	1	1	0.000	0.000
10/12/09 02:47:28	60.035	3695.491	350	-223.015732	16	532	10	0	-103	7851.12	1	1	1	0.000	0.000
10/12/09 02:47:30	60.036	3696.305	350	-223.015732	16	532.5	10	0	-103	7851.45	1	1	1	0.001	0.001
10/12/09 02:47:32	60.03	3696.486	350	-223.015732	16	533	10	0	-103	7851.78	1	1	1	-0.006	0.006
10/12/09 02:47:34	60.03	3697.336	350	-223.015732	16	533.5	10	0	-103	7852.11	1	1	1	0.000	0.000
10/12/09 02:47:36	60.03	3699.171	350	-223.015732	16	534	10	0	-103	7852.44	1	1	1	0.000	0.000
10/12/09 02:47:38	60.031	3699.357	350	-223.015732	16	534.5	10	0	-103	7852.77	1	1	1	0.001	0.001
10/12/09 02:47:40	60.031	3699.251	350	-223.015732	16	535	10	0	-103	7853.1	1	1	1	0.000	0.000
10/12/09 02:47:42	60.032	3699.117	350	-223.015732	16	535.5	10	0	-103	7853.43	1	1	1	0.001	0.001
10/12/09 02:47:44	60.031	3699.105	350	-223.015732	16	536	10	0	-103	7853.76	1	1	1	-0.001	0.001
10/12/09 02:47:46	60.032	3699.126	350	-223.015732	16	536.5	10	0	-103	7854.09	1	1	1	0.001	0.001
10/12/09 02:47:48	60.032	3698.954	350	-223.015732	16	537	10	0	-103	7854.42	1	1	1	0.000	0.000
10/12/09 02:47:50	60.032	3698.136	350	-223.015732	16	537.5	10	0	-103	7854.75	1	1	1	0.000	0.000
10/12/09 02:47:52	60.033	3698.277	350	-223.015732	16	538	10	0	-103	7855.08	1	1	1	0.001	0.001
10/12/09 02:47:54	60.037	3697.412	350	-223.015732	16	538.5	10	0	-103	7855.41	1	1	1	0.004	0.004
10/12/09 02:47:56	60.04	3695.94	350	-223.015732	16	539	10	0	-103	7855.74	1	1	1	0.003	0.003
10/12/09 02:47:58	60.039	3693.736	350	-223.015732	16	539.5	10	0	-103	7856.07	1	1	1	-0.001	0.001
10/12/09 02:48:00	60.042	3693.224	350	-223.015732	16	540	10	0	-103	7856.4	1	1	1	0.003	0.003
10/12/09 02:48:02	60.036	3691.759	350	-223.015732	16	540.5	10	0	-103	7856.73	1	1	1	-0.006	0.006
10/12/09 02:48:04	60.039	3691.919	350	-223.015732	16	541	10	0	-103	7857.06	1	1	1	0.003	0.003
10/12/09 02:48:06	60.041	3692.798	350	-223.015732	16	541.5	10	0	-103	7857.39	1	1	1	0.002	0.002
10/12/09 02:48:08	60.04	3691.582	350	-223.015732	16	542	10	0	-103	7857.72	1	1	1	-0.001	0.001
10/12/09 02:48:10	60.035	3692.374	350	-223.015732	16	542.5	10	0	-103	7858.05	1	1	1	-0.005	0.005

10/12/09 02:48:12	60.036	3693.302	350	-223.015732	16	543	10	0	-103	7858.38	1	1	1	0.001	0.001
10/12/09 02:48:14	60.038	3694.71	350	-223.015732	16	543.5	10	0	-103	7858.71	1	1	1	0.002	0.002
10/12/09 02:48:16	60.037	3694.331	350	-223.015732	16	544	10	0	-103	7859.04	1	1	1	-0.001	0.001
10/12/09 02:48:18	60.041	3693.815	350	-223.015732	16	544.5	10	0	-103	7859.37	1	1	1	0.004	0.004
10/12/09 02:48:20	60.04	3693.617	350	-223.015732	16	545	10	0	-103	7859.7	1	1	1	-0.001	0.001
10/12/09 02:48:22	60.036	3694.324	350	-223.015732	16	545.5	10	0	-103	7860.03	1	1	1	-0.004	0.004
10/12/09 02:48:24	60.033	3694.27	350	-223.015732	16	546	10	0	-103	7860.36	1	1	1	-0.003	0.003
10/12/09 02:48:26	60.034	3694.66	350	-223.015732	16	546.5	10	0	-103	7860.69	1	1	1	0.001	0.001
10/12/09 02:48:28	60.038	3693.748	350	-223.015732	16	547	10	0	-103	7861.02	1	1	1	0.004	0.004
10/12/09 02:48:30	60.04	3692.532	350	-223.015732	16	547.5	10	0	-103	7861.35	1	1	1	0.002	0.002
10/12/09 02:48:32	60.041	3691.445	350	-223.015732	16	548	10	0	-103	7861.68	1	1	1	0.001	0.001
10/12/09 02:48:34	60.037	3691.012	350	-223.015732	16	548.5	10	0	-103	7862.01	1	1	1	-0.004	0.004
10/12/09 02:48:36	60.037	3691.799	350	-223.015732	16	549	10	0	-103	7862.34	1	1	1	0.000	0.000
10/12/09 02:48:38	60.036	3693.077	350	-223.015732	16	549.5	10	0	-103	7862.67	1	1	1	-0.001	0.001
10/12/09 02:48:40	60.037	3693.727	350	-223.015732	16	550	10	0	-103	7863	1	1	1	0.001	0.001
10/12/09 02:48:42	60.038	3693.117	350	-223.015732	16	550.5	10	0	-103	7863.33	1	1	1	0.001	0.001
10/12/09 02:48:44	60.039	3692.641	350	-223.015732	16	551	10	0	-103	7863.66	1	1	1	0.001	0.001
10/12/09 02:48:46	60.038	3688.159	350	-223.015732	16	551.5	10	0	-103	7863.99	1	1	1	-0.001	0.001
10/12/09 02:48:48	60.034	3689.02	350	-223.015732	16	552	10	0	-103	7864.32	1	1	1	-0.004	0.004
10/12/09 02:48:50	60.033	3688.208	350	-223.015732	16	552.5	10	0	-103	7864.65	1	1	1	-0.001	0.001
10/12/09 02:48:52	60.031	3690.092	350	-223.015732	16	553	10	0	-103	7864.98	1	1	1	-0.002	0.002
10/12/09 02:48:54	60.034	3693.172	350	-223.015732	16	553.5	10	0	-103	7865.31	1	1	1	0.003	0.003
10/12/09 02:48:56	60.029	3693.321	350	-223.015732	16	554	10	0	-103	7865.64	1	1	1	-0.005	0.005
10/12/09 02:48:58	60.029	3694.593	350	-223.015732	16	554.5	10	0	-103	7865.97	1	1	1	0.000	0.000
10/12/09 02:49:00	60.031	3695.225	350	-223.015732	16	555	10	0	-103	7866.3	1	1	1	0.002	0.002
10/12/09 02:49:02	60.03	3694.609	350	-223.015732	16	555.5	10	0	-103	7866.63	1	1	1	-0.001	0.001
10/12/09 02:49:04	60.03	3693.412	350	-223.015732	16	556	10	0	-103	7866.96	1	1	1	0.000	0.000
10/12/09 02:49:06	60.026	3693.509	350	-223.015732	16	556.5	10	0	-103	7867.29	1	1	1	-0.004	0.004
10/12/09 02:49:08	60.022	3696.026	350	-223.015732	16	557	10	0	-103	7867.62	1	1	1	-0.004	0.004
10/12/09 02:49:10	60.021	3698.012	350	-223.015732	16	557.5	10	0	-103	7867.95	1	1	1	-0.001	0.001
10/12/09 02:49:12	60.024	3699.062	350	-223.015732	16	558	10	0	-103	7868.28	1	1	1	0.003	0.003
10/12/09 02:49:14	60.023	3699.414	350	-223.015732	16	558.5	10	0	-103	7868.61	1	1	1	-0.001	0.001
10/12/09 02:49:16	60.02	3698.935	350	-223.015732	16	559	10	0	-103	7868.94	1	1	1	-0.003	0.003
10/12/09 02:49:18	60.021	3700.084	350	-223.015732	16	559.5	10	0	-103	7869.27	1	1	1	0.001	0.001
10/12/09 02:49:20	60.023	3700.544	350	-223.015732	16	560	10	0	-103	7869.6	1	1	1	0.002	0.002
10/12/09 02:49:22	60.025	3700.486	350	-223.015732	16	560.5	10	0	-103	7869.93	1	1	1	0.002	0.002
10/12/09 02:49:24	60.026	3698.596	350	-223.015732	16	561	10	0	-103	7870.26	1	1	1	0.001	0.001
10/12/09 02:49:26	60.026	3697.961	350	-223.015732	16	561.5	10	0	-103	7870.59	1	1	1	0.000	0.000
10/12/09 02:49:28	60.025	3699.914	350	-223.015732	16	562	10	0	-103	7870.92	1	1	1	-0.001	0.001
10/12/09 02:49:30	60.024	3700.802	350	-223.015732	16	562.5	10	0	-103	7871.25	1	1	1	-0.001	0.001
10/12/09 02:49:32	60.024	3701.301	350	-223.015732	16	563	10	0	-103	7871.58	1	1	1	0.000	0.000
10/12/09 02:49:34	60.025	3701.45	350	-223.015732	16	563.5	10	0	-103	7871.91	1	1	1	0.001	0.001
10/12/09 02:49:36	60.023	3701.349	350	-223.015732	16	564	10	0	-103	7872.24	1	1	1	-0.002	0.002
10/12/09 02:49:38	60.023	3701.094	350	-223.015732	16	564.5	10	0	-103	7872.57	1	1	1	0.000	0.000
10/12/09 02:49:40	60.022	3701.702	350	-223.015732	16	565	10	0	-103	7872.9	1	1	1	-0.001	0.001
10/12/09 02:49:42	60.026	3702.07	350	-223.015732	16	565.5	10	0	-103	7873.23	1	1	1	0.004	0.004
10/12/09 02:49:44	60.029	3701.965	350	-223.015732	16	566	10	0	-103	7873.56	1	1	1	0.003	0.003
10/12/09 02:49:46	60.026	3700.269	350	-223.015732	16	566.5	10	0	-103	7873.89	1	1	1	-0.003	0.003
10/12/09 02:49:48	60.024	3700.241	350	-223.015732	16	567	10	0	-103	7874.22	1	1	1	-0.002	0.002

10/12/09 02:49:50	60.021	3701.09	350	-223.015732	16	567.5	10	0	-103	7874.55	1	1	1	-0.003	0.003
10/12/09 02:49:52	60.025	3701.268	350	-223.015732	16	568	10	0	-103	7874.88	1	1	1	0.004	0.004
10/12/09 02:49:54	60.025	3701.205	350	-223.015732	16	568.5	10	0	-103	7875.21	1	1	1	0.000	0.000
10/12/09 02:49:56	60.025	3700.587	350	-223.015732	16	569	10	0	-103	7875.54	1	1	1	0.000	0.000
10/12/09 02:49:58	60.023	3700.532	350	-223.015732	16	569.5	10	0	-103	7875.87	1	1	1	-0.002	0.002
10/12/09 02:50:00	60.026	3700.177	350	-223.015732	16	570	10	0	-103	7876.2	1	1	1	0.003	0.003
10/12/09 02:50:02	60.024	3700.295	350	-223.015732	16	570.5	10	0	-103	7876.53	1	1	1	-0.002	0.002
10/12/09 02:50:04	60.022	3700.277	350	-223.015732	16	571	10	0	-103	7876.86	1	1	1	-0.002	0.002
10/12/09 02:50:06	60.023	3700.841	350	-223.015732	16	571.5	10	0	-103	7877.19	1	1	1	0.001	0.001
10/12/09 02:50:08	60.026	3700.863	350	-223.015732	16	572	10	0	-103	7877.52	1	1	1	0.003	0.003
10/12/09 02:50:10	60.025	3700.26	350	-223.015732	16	572.5	10	0	-103	7877.85	1	1	1	-0.001	0.001
10/12/09 02:50:12	60.02	3700.052	350	-223.015732	16	573	10	0	-103	7878.18	1	1	1	-0.005	0.005
10/12/09 02:50:14	60.02	3699.926	350	-223.015732	16	573.5	10	0	-103	7878.51	1	1	1	0.000	0.000
10/12/09 02:50:16	60.019	3700.965	350	-223.015732	16	574	10	0	-103	7878.84	1	1	1	-0.001	0.001
10/12/09 02:50:18	60.015	3702.581	350	-223.015732	16	574.5	10	0	-103	7879.17	1	1	1	-0.004	0.004
10/12/09 02:50:20	60.016	3703.516	350	-223.015732	16	575	10	0	-103	7879.5	1	1	1	0.001	0.001
10/12/09 02:50:22	60.017	3703.824	350	-223.015732	16	575.5	10	0	-103	7879.83	1	1	1	0.001	0.001
10/12/09 02:50:24	60.015	3703.672	350	-223.015732	16	576	10	0	-103	7880.16	1	1	1	-0.002	0.002
10/12/09 02:50:26	60.015	3703.689	350	-223.015732	16	576.5	10	0	-103	7880.49	1	1	1	0.000	0.000
10/12/09 02:50:28	60.017	3703.003	350	-223.015732	16	577	10	0	-103	7880.82	1	1	1	0.002	0.002
10/12/09 02:50:30	60.017	3702.921	350	-223.015732	16	577.5	10	0	-103	7881.15	1	1	1	0.000	0.000
10/12/09 02:50:32	60.012	3703	350	-223.015732	16	578	10	0	-103	7881.48	1	1	1	-0.005	0.005
10/12/09 02:50:34	60.01	3703.167	350	-223.015732	16	578.5	10	0	-103	7881.81	1	1	1	-0.002	0.002
10/12/09 02:50:36	60.008	3703.918	350	-223.015732	16	579	10	0	-103	7882.14	1	1	1	-0.002	0.002
10/12/09 02:50:38	60.002	3703.616	350	-223.015732	16	579.5	10	0	-103	7882.47	1	1	1	-0.006	0.006
10/12/09 02:50:40	59.999	3703.775	350	-223.015732	16	580	10	0	-103	7882.8	1	0	1	-0.003	0.003
10/12/09 02:50:42	59.999	3703.751	350	-223.015732	16	580.5	10	0	-103	7883.13	1	0	1	0.000	0.000
10/12/09 02:50:44	60.002	3701.534	350	-223.015732	16	581	10	0	-103	7883.46	1	1	1	0.003	0.003
10/12/09 02:50:46	60.003	3700.617	350	-223.015732	16	581.5	10	0	-103	7883.79	1	1	1	0.001	0.001
10/12/09 02:50:48	60.004	3700.88	350	-223.015732	16	582	10	0	-103	7884.12	1	1	1	0.001	0.001
10/12/09 02:50:50	60.001	3700.625	350	-223.015732	16	582.5	10	0	-103	7884.45	1	1	1	-0.003	0.003
10/12/09 02:50:52	59.996	3701.389	350	-223.015732	16	583	10	0	-103	7884.78	1	0	1	-0.005	0.005
10/12/09 02:50:54	59.993	3701.737	350	-223.015732	16	583.5	10	0	-103	7885.11	1	0	1	-0.003	0.003
10/12/09 02:50:56	59.992	3700.671	350	-223.015732	16	584	10	0	-103	7885.44	1	0	1	-0.001	0.001
10/12/09 02:50:58	59.989	3700.826	350	-223.015732	16	584.5	10	0	-103	7885.77	1	0	1	-0.003	0.003
10/12/09 02:51:00	59.987	3700.977	350	-223.015732	16	585	10	0	-103	7886.1	1	0	1	-0.002	0.002
10/12/09 02:51:02	59.985	3700.7	350	-223.015732	16	585.5	10	0	-103	7886.43	1	0	1	-0.002	0.002
10/12/09 02:51:04	59.985	3699.854	350	-223.015732	16	586	10	0	-103	7886.76	1	0	1	0.000	0.000
10/12/09 02:51:06	59.986	3700.237	350	-223.015732	16	586.5	10	0	-103	7887.09	1	0	1	0.001	0.001
10/12/09 02:51:08	59.984	3700.342	350	-223.015732	16	587	10	0	-103	7887.42	1	0	1	-0.002	0.002
10/12/09 02:51:10	59.981	3700.77	350	-223.015732	16	587.5	10	0	-103	7887.75	1	0	1	-0.003	0.003
10/12/09 02:51:12	59.98	3700.789	350	-223.015732	16	588	10	0	-103	7888.08	1	0	1	-0.001	0.001
10/12/09 02:51:14	59.977	3701.625	350	-223.015732	16	588.5	10	0	-103	7888.41	1	0	1	-0.003	0.003
10/12/09 02:51:16	59.975	3703.166	350	-223.015732	16	589	10	0	-103	7888.74	1	0	1	-0.002	0.002
10/12/09 02:51:18	59.976	3704.187	350	-223.015732	16	589.5	10	0	-103	7889.07	1	0	1	0.001	0.001
10/12/09 02:51:20	59.972	3704.785	350	-223.015732	16	590	10	0	-103	7889.4	1	0	1	-0.004	0.004
10/12/09 02:51:22	59.974	3705.811	350	-223.015732	16	590.5	10	0	-103	7889.73	1	0	1	0.002	0.002
10/12/09 02:51:24	59.977	3706.958	350	-223.015732	16	591	10	0	-103	7890.06	1	0	1	0.003	0.003
10/12/09 02:51:26	59.975	3706.688	350	-223.015732	16	591.5	10	0	-103	7890.39	1	0	1	-0.002	0.002

10/12/09 02:51:28	59.973	3706.543	350	-223.015732	16	592	10	0	-103	7890.72	1	0	1	-0.002	0.002
10/12/09 02:51:30	59.971	3706.257	350	-223.015732	16	592.5	10	0	-103	7891.05	1	0	1	-0.002	0.002
10/12/09 02:51:32	59.971	3707.027	350	-223.015732	16	593	10	0	-103	7891.38	1	0	1	0.000	0.000
10/12/09 02:51:34	59.976	3710.118	350	-223.015732	16	593.5	10	0	-103	7891.71	1	0	1	0.005	0.005
10/12/09 02:51:36	59.979	3710.531	350	-223.015732	16	594	10	0	-103	7892.04	1	0	1	0.003	0.003
10/12/09 02:51:38	59.98	3708.701	350	-223.015732	16	594.5	10	0	-103	7892.37	1	0	1	0.001	0.001
10/12/09 02:51:40	59.979	3708.018	350	-223.015732	16	595	10	0	-103	7892.7	1	0	1	-0.001	0.001
10/12/09 02:51:42	59.982	3706.942	350	-223.015732	16	595.5	10	0	-103	7893.03	1	0	1	0.003	0.003
10/12/09 02:51:44	59.982	3706.343	350	-223.015732	16	596	10	0	-103	7893.36	1	0	1	0.000	0.000
10/12/09 02:51:46	59.983	3706.125	350	-223.015732	16	596.5	10	0	-103	7893.69	1	0	1	0.001	0.001
10/12/09 02:51:48	59.981	3706.311	350	-223.015732	16	597	10	0	-103	7894.02	1	0	1	-0.002	0.002
10/12/09 02:51:50	59.979	3706.119	350	-223.015732	16	597.5	10	0	-103	7894.35	1	0	1	-0.002	0.002
10/12/09 02:51:52	59.978	3706.19	350	-223.015732	16	598	10	0	-103	7894.68	1	0	1	-0.001	0.001
10/12/09 02:51:54	59.976	3707.721	350	-223.015732	16	598.5	10	0	-103	7895.01	1	0	1	-0.002	0.002
10/12/09 02:51:56	59.978	3709.409	350	-223.015732	16	599	10	0	-103	7895.34	1	0	1	0.002	0.002
10/12/09 02:51:58	59.977	3708.971	350	-223.015732	16	599.5	10	0	-103	7895.67	1	0	1	-0.001	0.001
10/12/09 02:52:00	59.976	3708.531	350	-223.015732	16	600	10	0	-103	7896	1	0	1	-0.001	0.001
10/12/09 02:52:02	59.978	3708.071	350	-223.015732	16	600.5	10	0	-103	7896.33	1	0	1	0.002	0.002
10/12/09 02:52:04	59.975	3707.24	350	-223.015732	16	601	10	0	-103	7896.66	1	0	1	-0.003	0.003
10/12/09 02:52:06	59.971	3709.213	350	-223.015732	16	601.5	10	0	-103	7896.99	1	0	1	-0.004	0.004
10/12/09 02:52:08	59.97	3709.961	350	-223.015732	16	602	10	0	-103	7897.32	1	0	1	-0.001	0.001
10/12/09 02:52:10	59.97	3711.75	350	-223.015732	16	602.5	10	0	-103	7897.65	1	0	1	0.000	0.000
10/12/09 02:52:12	59.971	3711.98	350	-223.015732	16	603	10	0	-103	7897.98	1	0	1	0.001	0.001
10/12/09 02:52:14	59.99	3710.695	350	-223.015732	16	603.5	10	0	-103	7898.31	1	0	1	0.019	0.019
10/12/09 02:52:16	59.998	3707.867	350	-223.015732	16	604	10	0	-103	7898.64	1	0	1	0.008	0.008
10/12/09 02:52:18	59.999	3704.912	350	-223.015732	16	604.5	10	0	-103	7898.97	1	0	1	0.001	0.001
10/12/09 02:52:20	59.999	3705.639	350	-223.015732	16	605	10	0	-103	7899.3	1	0	1	0.000	0.000
10/12/09 02:52:22	59.998	3703.787	350	-223.015732	16	605.5	10	0	-103	7899.63	1	0	1	-0.001	0.001
10/12/09 02:52:24	59.999	3703.191	350	-223.015732	16	606	10	0	-103	7899.96	1	0	1	0.001	0.001
10/12/09 02:52:26	60.003	3702.071	350	-223.015732	16	606.5	10	0	-103	7900.29	1	1	1	0.004	0.004
10/12/09 02:52:28	60.005	3699.51	350	-223.015732	16	607	10	0	-103	7900.62	1	1	1	0.002	0.002
10/12/09 02:52:30	60.005	3698.658	350	-223.015732	16	607.5	10	0	-103	7900.95	1	1	1	0.000	0.000
10/12/09 02:52:32	60.01	3698.137	350	-223.015732	16	608	10	0	-103	7901.28	1	1	1	0.005	0.005
10/12/09 02:52:34	60.013	3697.882	350	-223.015732	16	608.5	10	0	-103	7901.61	1	1	1	0.003	0.003
10/12/09 02:52:36	60.02	3698.668	350	-223.015732	16	609	10	0	-103	7901.94	1	1	1	0.007	0.007
10/12/09 02:52:38	60.022	3698.604	350	-223.015732	16	609.5	10	0	-103	7902.27	1	1	1	0.002	0.002
10/12/09 02:52:40	60.024	3697.868	350	-223.015732	16	610	10	0	-103	7902.6	1	1	1	0.002	0.002
10/12/09 02:52:42	60.025	3694.672	350	-223.015732	16	610.5	10	0	-103	7902.93	1	1	1	0.001	0.001
10/12/09 02:52:44	60.025	3693.912	350	-223.015732	16	611	10	0	-103	7903.26	1	1	1	0.000	0.000
10/12/09 02:52:46	60.024	3693.418	350	-223.015732	16	611.5	10	0	-103	7903.59	1	1	1	-0.001	0.001
10/12/09 02:52:48	60.023	3688.301	350	-223.015732	16	612	10	0	-103	7903.92	1	1	1	-0.001	0.001
10/12/09 02:52:50	60.029	3688.021	350	-223.015732	16	612.5	10	0	-103	7904.25	1	1	1	0.006	0.006
10/12/09 02:52:52	60.029	3689.143	350	-223.015732	16	613	10	0	-103	7904.58	1	1	1	0.000	0.000
10/12/09 02:52:54	60.029	3688.237	350	-223.015732	16	613.5	10	0	-103	7904.91	1	1	1	0.000	0.000
10/12/09 02:52:56	60.028	3687.878	350	-223.015732	16	614	10	0	-103	7905.24	1	1	1	-0.001	0.001
10/12/09 02:52:58	60.028	3687.026	350	-223.015732	16	614.5	10	0	-103	7905.57	1	1	1	0.000	0.000
10/12/09 02:53:00	60.031	3686.683	350	-223.015732	16	615	10	0	-103	7905.9	1	1	1	0.003	0.003
10/12/09 02:53:02	60.032	3685.276	350	-223.015732	16	615.5	10	0	-103	7906.23	1	1	1	0.001	0.001
10/12/09 02:53:04	60.033	3685.576	350	-223.015732	16	616	10	0	-103	7906.56	1	1	1	0.001	0.001

10/12/09 02:53:06	60.031	3685.985	350	-223.015732	16	616.5	10	0	-103	7906.89	1	1	1	-0.002	0.002
10/12/09 02:53:08	60.03	3686.418	350	-223.015732	16	617	10	0	-103	7907.22	1	1	1	-0.001	0.001
10/12/09 02:53:10	60.022	3687.159	350	-223.015732	16	617.5	10	0	-103	7907.55	1	1	1	-0.008	0.008
10/12/09 02:53:12	60.021	3687.873	350	-223.015732	16	618	10	0	-103	7907.88	1	1	1	-0.001	0.001
10/12/09 02:53:14	60.019	3688.997	350	-223.015732	16	618.5	10	0	-103	7908.21	1	1	1	-0.002	0.002
10/12/09 02:53:16	60.017	3690.426	350	-223.015732	16	619	10	0	-103	7908.54	1	1	1	-0.002	0.002
10/12/09 02:53:18	60.017	3690.776	350	-223.015732	16	619.5	10	0	-103	7908.87	1	1	1	0.000	0.000
10/12/09 02:53:20	60.017	3692.715	350	-223.015732	16	620	10	0	-103	7909.2	1	1	1	0.000	0.000
10/12/09 02:53:22	60.016	3692.578	350	-223.015732	16	620.5	10	0	-103	7909.53	1	1	1	-0.001	0.001
10/12/09 02:53:24	60.015	3692.462	350	-223.015732	16	621	10	0	-103	7909.86	1	1	1	-0.001	0.001
10/12/09 02:53:26	60.015	3693.173	350	-223.015732	16	621.5	10	0	-103	7910.19	1	1	1	0.000	0.000
10/12/09 02:53:28	60.012	3693.249	350	-223.015732	16	622	10	0	-103	7910.52	1	1	1	-0.003	0.003
10/12/09 02:53:30	60.009	3693.743	350	-223.015732	16	622.5	10	0	-103	7910.85	1	1	1	-0.003	0.003
10/12/09 02:53:32	60.008	3695.124	350	-223.015732	16	623	10	0	-103	7911.18	1	1	1	-0.001	0.001
10/12/09 02:53:34	60.008	3694.681	350	-223.015732	16	623.5	10	0	-103	7911.51	1	1	1	0.000	0.000
10/12/09 02:53:36	60.005	3694.741	350	-223.015732	16	624	10	0	-103	7911.84	1	1	1	-0.003	0.003
10/12/09 02:53:38	60.005	3694.199	350	-223.015732	16	624.5	10	0	-103	7912.17	1	1	1	0.000	0.000
10/12/09 02:53:40	60.003	3693.75	350	-223.015732	16	625	10	0	-103	7912.5	1	1	1	-0.002	0.002
10/12/09 02:53:42	59.999	3693.624	350	-223.015732	16	625.5	10	0	-103	7912.83	1	0	1	-0.004	0.004
10/12/09 02:53:44	59.997	3692.806	350	-223.015732	16	626	10	0	-103	7913.16	1	0	1	-0.002	0.002
10/12/09 02:53:46	59.999	3691.15	350	-223.015732	16	626.5	10	0	-103	7913.49	1	0	1	0.002	0.002
10/12/09 02:53:48	60	3691.407	350	-223.015732	16	627	10	0	-103	7913.82	1	0	1	0.001	0.001
10/12/09 02:53:50	59.998	3691.077	350	-223.015732	16	627.5	10	0	-103	7914.15	1	0	1	-0.002	0.002
10/12/09 02:53:52	59.995	3690.588	350	-223.015732	16	628	10	0	-103	7914.48	1	0	1	-0.003	0.003
10/12/09 02:53:54	59.994	3689.797	350	-223.015732	16	628.5	10	0	-103	7914.81	1	0	1	-0.001	0.001
10/12/09 02:53:56	59.992	3688.483	350	-223.015732	16	629	10	0	-103	7915.14	1	0	1	-0.002	0.002
10/12/09 02:53:58	59.993	3689.445	350	-223.015732	16	629.5	10	0	-103	7915.47	1	0	1	0.001	0.001
10/12/09 02:54:00	59.988	3689.553	350	-223.015732	16	630	10	0	-103	7915.8	1	0	1	-0.005	0.005
10/12/09 02:54:02	59.985	3689.525	350	-223.015732	16	630.5	10	0	-103	7916.13	1	0	1	-0.003	0.003
10/12/09 02:54:04	59.986	3689.736	350	-223.015732	16	631	10	0	-103	7916.46	1	0	1	0.001	0.001
10/12/09 02:54:06	59.988	3688.853	350	-223.015732	16	631.5	10	0	-103	7916.79	1	0	1	0.002	0.002
10/12/09 02:54:08	59.988	3688.24	350	-223.015732	16	632	10	0	-103	7917.12	1	0	1	0.000	0.000
10/12/09 02:54:10	59.985	3687.494	350	-223.015732	16	632.5	10	0	-103	7917.45	1	0	1	-0.003	0.003
10/12/09 02:54:12	59.983	3687.475	350	-223.015732	16	633	10	0	-103	7917.78	1	0	1	-0.002	0.002
10/12/09 02:54:14	59.983	3686.707	350	-223.015732	16	633.5	10	0	-103	7918.11	1	0	1	0.000	0.000
10/12/09 02:54:16	59.985	3685.66	350	-223.015732	16	634	10	0	-103	7918.44	1	0	1	0.002	0.002
10/12/09 02:54:18	59.986	3684.51	350	-223.015732	16	634.5	10	0	-103	7918.77	1	0	1	0.001	0.001
10/12/09 02:54:20	59.987	3684.333	350	-223.015732	16	635	10	0	-103	7919.1	1	0	1	0.001	0.001
10/12/09 02:54:22	59.99	3683.911	350	-223.015732	16	635.5	10	0	-103	7919.43	1	0	1	0.003	0.003
10/12/09 02:54:24	59.986	3683.735	350	-223.015732	16	636	10	0	-103	7919.76	1	0	1	-0.004	0.004
10/12/09 02:54:26	59.985	3684.208	350	-223.015732	16	636.5	10	0	-103	7920.09	1	0	1	-0.001	0.001
10/12/09 02:54:28	59.984	3683.811	350	-223.015732	16	637	10	0	-103	7920.42	1	0	1	-0.001	0.001
10/12/09 02:54:30	59.983	3683.473	350	-223.015732	16	637.5	10	0	-103	7920.75	1	0	1	-0.001	0.001
10/12/09 02:54:32	59.982	3684.258	350	-223.015732	16	638	10	0	-103	7921.08	1	0	1	-0.001	0.001
10/12/09 02:54:34	59.982	3684.884	350	-223.015732	16	638.5	10	0	-103	7921.41	1	0	1	0.000	0.000
10/12/09 02:54:36	59.98	3685.092	350	-223.015732	16	639	10	0	-103	7921.74	1	0	1	-0.002	0.002
10/12/09 02:54:38	59.978	3685.654	350	-223.015732	16	639.5	10	0	-103	7922.07	1	0	1	-0.002	0.002
10/12/09 02:54:40	59.977	3685.087	350	-223.015732	16	640	10	0	-103	7922.4	1	0	1	-0.001	0.001
10/12/09 02:54:42	59.975	3685.491	350	-223.015732	16	640.5	10	0	-103	7922.73	1	0	1	-0.002	0.002

10/12/09 02:54:44	59.973	3685.196	350	-223.015732	16	641	10	0	-103	7923.06	1	0	1	-0.002	0.002
10/12/09 02:54:46	59.975	3687.412	350	-223.015732	16	641.5	10	0	-103	7923.39	1	0	1	0.002	0.002
10/12/09 02:54:48	59.976	3688.417	350	-223.015732	16	642	10	0	-103	7923.72	1	0	1	0.001	0.001
10/12/09 02:54:50	59.976	3688.599	350	-223.015732	16	642.5	10	0	-103	7924.05	1	0	1	0.000	0.000
10/12/09 02:54:52	59.979	3687.848	350	-223.015732	16	643	10	0	-103	7924.38	1	0	1	0.003	0.003
10/12/09 02:54:54	59.982	3686.678	350	-223.015732	16	643.5	10	0	-103	7924.71	1	0	1	0.003	0.003
10/12/09 02:54:56	59.979	3685.782	350	-223.015732	16	644	10	0	-103	7925.04	1	0	1	-0.003	0.003
10/12/09 02:54:58	59.979	3684.89	350	-223.015732	16	644.5	10	0	-103	7925.37	1	0	1	0.000	0.000
10/12/09 02:55:00	59.977	3685.143	350	-223.015732	16	645	10	0	-103	7925.7	1	0	1	-0.002	0.002
10/12/09 02:55:02	59.977	3684.549	350	-223.015732	16	645.5	10	0	-103	7926.03	1	0	1	0.000	0.000
10/12/09 02:55:04	59.978	3684.093	350	-223.015732	16	646	10	0	-103	7926.36	1	0	1	0.001	0.001
10/12/09 02:55:06	59.978	3684.555	350	-223.015732	16	646.5	10	0	-103	7926.69	1	0	1	0.000	0.000
10/12/09 02:55:08	59.978	3682.814	350	-223.015732	16	647	10	0	-103	7927.02	1	0	1	0.000	0.000
10/12/09 02:55:10	59.979	3682.318	350	-223.015732	16	647.5	10	0	-103	7927.35	1	0	1	0.001	0.001
10/12/09 02:55:12	59.983	3682.366	350	-223.015732	16	648	10	0	-103	7927.68	1	0	1	0.004	0.004
10/12/09 02:55:14	59.981	3682.647	350	-223.015732	16	648.5	10	0	-103	7928.01	1	0	1	-0.002	0.002
10/12/09 02:55:16	59.98	3682.855	350	-223.015732	16	649	10	0	-103	7928.34	1	0	1	-0.001	0.001
10/12/09 02:55:18	59.978	3683.557	350	-223.015732	16	649.5	10	0	-103	7928.67	1	0	1	-0.002	0.002
10/12/09 02:55:20	59.979	3684.052	350	-223.015732	16	650	10	0	-103	7929	1	0	1	0.001	0.001
10/12/09 02:55:22	59.978	3684.318	350	-223.015732	16	650.5	10	0	-103	7929.33	1	0	1	-0.001	0.001
10/12/09 02:55:24	59.979	3686.049	350	-223.015732	16	651	10	0	-103	7929.66	1	0	1	0.001	0.001
10/12/09 02:55:26	59.983	3686.629	350	-223.015732	16	651.5	10	0	-103	7929.99	1	0	1	0.004	0.004
10/12/09 02:55:28	59.987	3685.286	350	-223.015732	16	652	10	0	-103	7930.32	1	0	1	0.004	0.004
10/12/09 02:55:30	59.99	3683.415	350	-223.015732	16	652.5	10	0	-103	7930.65	1	0	1	0.003	0.003
10/12/09 02:55:32	59.992	3682.416	350	-223.015732	16	653	10	0	-103	7930.98	1	0	1	0.002	0.002
10/12/09 02:55:34	59.993	3681.403	350	-223.015732	16	653.5	10	0	-103	7931.31	1	0	1	0.001	0.001
10/12/09 02:55:36	59.99	3679.012	350	-223.015732	16	654	10	0	-103	7931.64	1	0	1	-0.003	0.003
10/12/09 02:55:38	59.988	3679.436	350	-223.015732	16	654.5	10	0	-103	7931.97	1	0	1	-0.002	0.002
10/12/09 02:55:40	59.988	3671.761	350	-223.015732	16	655	10	0	-103	7932.3	1	0	1	0.000	0.000
10/12/09 02:55:42	59.99	3670.717	350	-223.015732	16	655.5	10	0	-103	7932.63	1	0	1	0.002	0.002
10/12/09 02:55:44	59.993	3670.159	350	-223.015732	16	656	10	0	-103	7932.96	1	0	1	0.003	0.003
10/12/09 02:55:46	59.994	3679	350	-223.015732	16	656.5	10	0	-103	7933.29	1	0	1	0.001	0.001
10/12/09 02:55:48	59.993	3680.176	350	-223.015732	16	657	10	0	-103	7933.62	1	0	1	-0.001	0.001
10/12/09 02:55:50	59.994	3681.799	350	-223.015732	16	657.5	10	0	-103	7933.95	1	0	1	0.001	0.001
10/12/09 02:55:52	59.994	3682.7	350	-223.015732	16	658	10	0	-103	7934.28	1	0	1	0.000	0.000
10/12/09 02:55:54	59.993	3684.116	350	-223.015732	16	658.5	10	0	-103	7934.61	1	0	1	-0.001	0.001
10/12/09 02:55:56	59.989	3685.03	350	-223.015732	16	659	10	0	-103	7934.94	1	0	1	-0.004	0.004
10/12/09 02:55:58	59.984	3684.878	350	-223.015732	16	659.5	10	0	-103	7935.27	1	0	1	-0.005	0.005
10/12/09 02:56:00	59.986	3684.165	350	-223.015732	16	660	10	0	-103	7935.6	1	0	1	0.002	0.002
10/12/09 02:56:02	59.985	3684.478	350	-223.015732	16	660.5	10	0	-103	7935.93	1	0	1	-0.001	0.001
10/12/09 02:56:04	59.988	3685.584	350	-223.015732	16	661	10	0	-103	7936.26	1	0	1	0.003	0.003
10/12/09 02:56:06	59.987	3685.148	350	-223.015732	16	661.5	10	0	-103	7936.59	1	0	1	-0.001	0.001
10/12/09 02:56:08	59.986	3684.587	350	-223.015732	16	662	10	0	-103	7936.92	1	0	1	-0.001	0.001
10/12/09 02:56:10	59.987	3684.976	350	-223.015732	16	662.5	10	0	-103	7937.25	1	0	1	0.001	0.001
10/12/09 02:56:12	59.985	3683.674	350	-223.015732	16	663	10	0	-103	7937.58	1	0	1	-0.002	0.002
10/12/09 02:56:14	59.982	3684.872	350	-223.015732	16	663.5	10	0	-103	7937.91	1	0	1	-0.003	0.003
10/12/09 02:56:16	59.981	3684.245	350	-223.015732	16	664	10	0	-103	7938.24	1	0	1	-0.001	0.001
10/12/09 02:56:18	59.982	3684.711	350	-223.015732	16	664.5	10	0	-103	7938.57	1	0	1	0.001	0.001
10/12/09 02:56:20	59.987	3685.589	350	-223.015732	16	665	10	0	-103	7938.9	1	0	1	0.005	0.005

10/12/09 02:56:22	59.992	3683.736	350	-223.015732	16	665.5	10	0	-103	7939.23	1	0	1	0.005	0.005
10/12/09 02:56:24	59.997	3682.579	350	-223.015732	16	666	10	0	-103	7939.56	1	0	1	0.005	0.005
10/12/09 02:56:26	60	3682.234	350	-223.015732	16	666.5	10	0	-103	7939.89	1	0	1	0.003	0.003
10/12/09 02:56:28	60.003	3682.138	350	-223.015732	16	667	10	0	-103	7940.22	1	1	1	0.003	0.003
10/12/09 02:56:30	60.003	3682.224	350	-223.015732	16	667.5	10	0	-103	7940.55	1	1	1	0.000	0.000
10/12/09 02:56:32	60.003	3681.689	350	-223.015732	16	668	10	0	-103	7940.88	1	1	1	0.000	0.000
10/12/09 02:56:34	60.002	3681.458	350	-223.015732	16	668.5	10	0	-103	7941.21	1	1	1	-0.001	0.001
10/12/09 02:56:36	60.003	3681.65	350	-223.015732	16	669	10	0	-103	7941.54	1	1	1	0.001	0.001
10/12/09 02:56:38	60.002	3681.013	350	-223.015732	16	669.5	10	0	-103	7941.87	1	1	1	-0.001	0.001
10/12/09 02:56:40	60.003	3680.167	350	-223.015732	16	670	10	0	-103	7942.2	1	1	1	0.001	0.001
10/12/09 02:56:42	60.004	3679.943	350	-223.015732	16	670.5	10	0	-103	7942.53	1	1	1	0.001	0.001
10/12/09 02:56:44	60.005	3679.429	350	-223.015732	16	671	10	0	-103	7942.86	1	1	1	0.001	0.001
10/12/09 02:56:46	60.006	3679.669	350	-223.015732	16	671.5	10	0	-103	7943.19	1	1	1	0.001	0.001
10/12/09 02:56:48	60.009	3678.981	350	-223.015732	16	672	10	0	-103	7943.52	1	1	1	0.003	0.003
10/12/09 02:56:50	60.012	3678.267	350	-223.015732	16	672.5	10	0	-103	7943.85	1	1	1	0.003	0.003
10/12/09 02:56:52	60.017	3676.796	350	-223.015732	16	673	10	0	-103	7944.18	1	1	1	0.005	0.005
10/12/09 02:56:54	60.021	3676.81	350	-223.015732	16	673.5	10	0	-103	7944.51	1	1	1	0.004	0.004
10/12/09 02:56:56	60.022	3674.798	350	-223.015732	16	674	10	0	-103	7944.84	1	1	1	0.001	0.001
10/12/09 02:56:58	60.021	3673.906	350	-223.015732	16	674.5	10	0	-103	7945.17	1	1	1	-0.001	0.001
10/12/09 02:57:00	60.02	3671.145	350	-223.015732	16	675	10	0	-103	7945.5	1	1	1	-0.001	0.001
10/12/09 02:57:02	60.018	3670.51	350	-223.015732	16	675.5	10	0	-103	7945.83	1	1	1	-0.002	0.002
10/12/09 02:57:04	60.021	3673.648	350	-223.015732	16	676	10	0	-103	7946.16	1	1	1	0.003	0.003
10/12/09 02:57:06	60.02	3673.684	350	-223.015732	16	676.5	10	0	-103	7946.49	1	1	1	-0.001	0.001
10/12/09 02:57:08	60.02	3675.865	350	-223.015732	16	677	10	0	-103	7946.82	1	1	1	0.000	0.000
10/12/09 02:57:10	60.018	3676.676	350	-223.015732	16	677.5	10	0	-103	7947.15	1	1	1	-0.002	0.002
10/12/09 02:57:12	60.018	3676.404	350	-223.015732	16	678	10	0	-103	7947.48	1	1	1	0.000	0.000
10/12/09 02:57:14	60.019	3676.437	350	-223.015732	16	678.5	10	0	-103	7947.81	1	1	1	0.001	0.001
10/12/09 02:57:16	60.019	3677.185	350	-223.015732	16	679	10	0	-103	7948.14	1	1	1	0.000	0.000
10/12/09 02:57:18	60.018	3677.659	350	-223.015732	16	679.5	10	0	-103	7948.47	1	1	1	-0.001	0.001
10/12/09 02:57:20	60.017	3678.828	350	-223.015732	16	680	10	0	-103	7948.8	1	1	1	-0.001	0.001
10/12/09 02:57:22	60.016	3679.289	350	-223.015732	16	680.5	10	0	-103	7949.13	1	1	1	-0.001	0.001
10/12/09 02:57:24	60.016	3678.915	350	-223.015732	16	681	10	0	-103	7949.46	1	1	1	0.000	0.000
10/12/09 02:57:26	60.016	3679.276	350	-223.015732	16	681.5	10	0	-103	7949.79	1	1	1	0.000	0.000
10/12/09 02:57:28	60.015	3678.599	350	-223.015732	16	682	10	0	-103	7950.12	1	1	1	-0.001	0.001
10/12/09 02:57:30	60.014	3678.367	350	-223.015732	16	682.5	10	0	-103	7950.45	1	1	1	-0.001	0.001
10/12/09 02:57:32	60.014	3678.25	350	-223.015732	16	683	10	0	-103	7950.78	1	1	1	0.000	0.000
10/12/09 02:57:34	60.013	3678.589	350	-223.015732	16	683.5	10	0	-103	7951.11	1	1	1	-0.001	0.001
10/12/09 02:57:36	60.013	3677.251	350	-223.015732	16	684	10	0	-103	7951.44	1	1	1	0.000	0.000
10/12/09 02:57:38	60.015	3675.698	350	-223.015732	16	684.5	10	0	-103	7951.77	1	1	1	0.002	0.002
10/12/09 02:57:40	60.017	3674.669	350	-223.015732	16	685	10	0	-103	7952.1	1	1	1	0.002	0.002
10/12/09 02:57:42	60.016	3674.87	350	-223.015732	16	685.5	10	0	-103	7952.43	1	1	1	-0.001	0.001
10/12/09 02:57:44	60.019	3674.402	350	-223.015732	16	686	10	0	-103	7952.76	1	1	1	0.003	0.003
10/12/09 02:57:46	60.021	3674.546	350	-223.015732	16	686.5	10	0	-103	7953.09	1	1	1	0.002	0.002
10/12/09 02:57:48	60.021	3672.969	350	-223.015732	16	687	10	0	-103	7953.42	1	1	1	0.000	0.000
10/12/09 02:57:50	60.02	3671.914	350	-223.015732	16	687.5	10	0	-103	7953.75	1	1	1	-0.001	0.001
10/12/09 02:57:52	60.022	3671.982	350	-223.015732	16	688	10	0	-103	7954.08	1	1	1	0.002	0.002
10/12/09 02:57:54	60.024	3670.946	350	-223.015732	16	688.5	10	0	-103	7954.41	1	1	1	0.002	0.002
10/12/09 02:57:56	60.026	3670.821	350	-223.015732	16	689	10	0	-103	7954.74	1	1	1	0.002	0.002
10/12/09 02:57:58	60.025	3671.06	350	-223.015732	16	689.5	10	0	-103	7955.07	1	1	1	-0.001	0.001

10/12/09 02:58:00	60.026	3671.539	350	-223.015732	16	690	10	0	-103	7955.4	1	1	1	0.001	0.001
10/12/09 02:58:02	60.022	3673.794	350	-223.015732	16	690.5	10	0	-103	7955.73	1	1	1	-0.004	0.004
10/12/09 02:58:04	60.021	3674.01	350	-223.015732	16	691	10	0	-103	7956.06	1	1	1	-0.001	0.001
10/12/09 02:58:06	60.022	3675.102	350	-223.015732	16	691.5	10	0	-103	7956.39	1	1	1	0.001	0.001
10/12/09 02:58:08	60.024	3675.284	350	-223.015732	16	692	10	0	-103	7956.72	1	1	1	0.002	0.002
10/12/09 02:58:10	60.027	3676.051	350	-223.015732	16	692.5	10	0	-103	7957.05	1	1	1	0.003	0.003
10/12/09 02:58:12	60.029	3675.704	350	-223.015732	16	693	10	0	-103	7957.38	1	1	1	0.002	0.002
10/12/09 02:58:14	60.028	3672.583	350	-223.015732	16	693.5	10	0	-103	7957.71	1	1	1	-0.001	0.001
10/12/09 02:58:16	60.028	3671.343	350	-223.015732	16	694	10	0	-103	7958.04	1	1	1	0.000	0.000
10/12/09 02:58:18	60.032	3670.232	350	-223.015732	16	694.5	10	0	-103	7958.37	1	1	1	0.004	0.004
10/12/09 02:58:20	60.035	3668.654	350	-223.015732	16	695	10	0	-103	7958.7	1	1	1	0.003	0.003
10/12/09 02:58:22	60.03	3668.767	350	-223.015732	16	695.5	10	0	-103	7959.03	1	1	1	-0.005	0.005
10/12/09 02:58:24	60.028	3666.312	350	-223.015732	16	696	10	0	-103	7959.36	1	1	1	-0.002	0.002
10/12/09 02:58:26	60.021	3667.322	350	-223.015732	16	696.5	10	0	-103	7959.69	1	1	1	-0.007	0.007
10/12/09 02:58:28	60.021	3657.164	350	-223.015732	16	697	10	0	-103	7960.02	1	1	1	0.000	0.000
10/12/09 02:58:30	60.024	3657.714	350	-223.015732	16	697.5	10	0	-103	7960.35	1	1	1	0.003	0.003
10/12/09 02:58:32	60.025	3668.637	350	-223.015732	16	698	10	0	-103	7960.68	1	1	1	0.001	0.001
10/12/09 02:58:34	60.024	3669.309	350	-223.015732	16	698.5	10	0	-103	7961.01	1	1	1	-0.001	0.001
10/12/09 02:58:36	60.022	3670.112	350	-223.015732	16	699	10	0	-103	7961.34	1	1	1	-0.002	0.002
10/12/09 02:58:38	60.023	3670.735	350	-223.015732	16	699.5	10	0	-103	7961.67	1	1	1	0.001	0.001
10/12/09 02:58:40	60.021	3671.332	350	-223.015732	16	700	10	0	-103	7962	1	1	1	-0.002	0.002
10/12/09 02:58:42	60.02	3672.095	350	-223.015732	16	700.5	10	0	-103	7962.33	1	1	1	-0.001	0.001
10/12/09 02:58:44	60.02	3672.683	350	-223.015732	16	701	10	0	-103	7962.66	1	1	1	0.000	0.000
10/12/09 02:58:46	60.02	3673.833	350	-223.015732	16	701.5	10	0	-103	7962.99	1	1	1	0.000	0.000
10/12/09 02:58:48	60.02	3674.645	350	-223.015732	16	702	10	0	-103	7963.32	1	1	1	0.000	0.000
10/12/09 02:58:50	60.017	3675.641	350	-223.015732	16	702.5	10	0	-103	7963.65	1	1	1	-0.003	0.003
10/12/09 02:58:52	60.014	3675.971	350	-223.015732	16	703	10	0	-103	7963.98	1	1	1	-0.003	0.003
10/12/09 02:58:54	60.012	3677.009	350	-223.015732	16	703.5	10	0	-103	7964.31	1	1	1	-0.002	0.002
10/12/09 02:58:56	60.01	3678.314	350	-223.015732	16	704	10	0	-103	7964.64	1	1	1	-0.002	0.002
10/12/09 02:58:58	60.011	3679.393	350	-223.015732	16	704.5	10	0	-103	7964.97	1	1	1	0.001	0.001
10/12/09 02:59:00	60.01	3680.02	350	-223.015732	16	705	10	0	-103	7965.3	1	1	1	-0.001	0.001
10/12/09 02:59:02	60.01	3679.792	350	-223.015732	16	705.5	10	0	-103	7965.63	1	1	1	0.000	0.000
10/12/09 02:59:04	60.01	3679.597	350	-223.015732	16	706	10	0	-103	7965.96	1	1	1	0.000	0.000
10/12/09 02:59:06	60.012	3680.315	350	-223.015732	16	706.5	10	0	-103	7966.29	1	1	1	0.002	0.002
10/12/09 02:59:08	60.012	3680.11	350	-223.015732	16	707	10	0	-103	7966.62	1	1	1	0.000	0.000
10/12/09 02:59:10	60.013	3679.062	350	-223.015732	16	707.5	10	0	-103	7966.95	1	1	1	0.001	0.001
10/12/09 02:59:12	60.014	3679.127	350	-223.015732	16	708	10	0	-103	7967.28	1	1	1	0.001	0.001
10/12/09 02:59:14	60.013	3679.587	350	-223.015732	16	708.5	10	0	-103	7967.61	1	1	1	-0.001	0.001
10/12/09 02:59:16	60.012	3679.637	350	-223.015732	16	709	10	0	-103	7967.94	1	1	1	-0.001	0.001
10/12/09 02:59:18	60.011	3679.02	350	-223.015732	16	709.5	10	0	-103	7968.27	1	1	1	-0.001	0.001
10/12/09 02:59:20	60.01	3678.418	350	-223.015732	16	710	10	0	-103	7968.6	1	1	1	-0.001	0.001
10/12/09 02:59:22	60.008	3679.383	350	-223.015732	16	710.5	10	0	-103	7968.93	1	1	1	-0.002	0.002
10/12/09 02:59:24	60.01	3679.681	350	-223.015732	16	711	10	0	-103	7969.26	1	1	1	0.002	0.002
10/12/09 02:59:26	60.011	3679.932	350	-223.015732	16	711.5	10	0	-103	7969.59	1	1	1	0.001	0.001
10/12/09 02:59:28	60.013	3679.138	350	-223.015732	16	712	10	0	-103	7969.92	1	1	1	0.002	0.002
10/12/09 02:59:30	60.016	3678.469	350	-223.015732	16	712.5	10	0	-103	7970.25	1	1	1	0.003	0.003
10/12/09 02:59:32	60.018	3678.499	350	-223.015732	16	713	10	0	-103	7970.58	1	1	1	0.002	0.002
10/12/09 02:59:34	60.019	3678.456	350	-223.015732	16	713.5	10	0	-103	7970.91	1	1	1	0.001	0.001
10/12/09 02:59:36	60.019	3677.615	350	-223.015732	16	714	10	0	-103	7971.24	1	1	1	0.000	0.000

10/12/09 02:59:38	60.019	3677.446	350	-223.015732	16	714.5	10	0	-103	7971.57	1	1	1	0.000	0.000
10/12/09 02:59:40	60.02	3677.431	350	-223.015732	16	715	10	0	-103	7971.9	1	1	1	0.001	0.001
10/12/09 02:59:42	60.02	3677.451	350	-223.015732	16	715.5	10	0	-103	7972.23	1	1	1	0.000	0.000
10/12/09 02:59:44	60.018	3677.315	350	-223.015732	16	716	10	0	-103	7972.56	1	1	1	-0.002	0.002
10/12/09 02:59:46	60.018	3678.151	350	-223.015732	16	716.5	10	0	-103	7972.89	1	1	1	0.000	0.000
10/12/09 02:59:48	60.016	3678.362	350	-223.015732	16	717	10	0	-103	7973.22	1	1	1	-0.002	0.002
10/12/09 02:59:50	60.016	3678.874	350	-223.015732	16	717.5	10	0	-103	7973.55	1	1	1	0.000	0.000
10/12/09 02:59:52	60.019	3680.771	350	-223.015732	16	718	10	0	-103	7973.88	1	1	1	0.003	0.003
10/12/09 02:59:54	60.023	3681.058	350	-223.015732	16	718.5	10	0	-103	7974.21	1	1	1	0.004	0.004
10/12/09 02:59:56	60.022	3680.353	350	-223.015732	16	719	10	0	-103	7974.54	1	1	1	-0.001	0.001
10/12/09 02:59:58	60.018	3679.167	350	-223.015732	16	719.5	10	0	-103	7974.87	1	1	1	-0.004	0.004
10/12/09 03:00:00	60.015	3679.553	350	-223.015732	16	720	10	0	-103	7975.2	1	1	1	-0.003	0.003
10/12/09 03:00:02	60.016	3680.672	350	-223.015732	16	720.5	10	0	-103	7975.53	1	1	1	0.001	0.001
10/12/09 03:00:04	60.017	3682.73	350	-223.015732	16	721	10	0	-103	7975.86	1	1	1	0.001	0.001
10/12/09 03:00:06	60.015	3682.714	350	-223.015732	16	721.5	10	0	-103	7976.19	1	1	1	-0.002	0.002
10/12/09 03:00:08	60.01	3681.915	350	-223.015732	16	722	10	0	-103	7976.52	1	1	1	-0.005	0.005
10/12/09 03:00:10	60.004	3682.01	350	-223.015732	16	722.5	10	0	-103	7976.85	1	1	1	-0.006	0.006
10/12/09 03:00:12	59.999	3682.483	350	-223.015732	16	723	10	0	-103	7977.18	1	0	1	-0.005	0.005
10/12/09 03:00:14	59.995	3683.813	350	-223.015732	16	723.5	10	0	-103	7977.51	1	0	1	-0.004	0.004
10/12/09 03:00:16	59.99	3685.306	350	-223.015732	16	724	10	0	-103	7977.84	1	0	1	-0.005	0.005
10/12/09 03:00:18	59.982	3684.846	350	-223.015732	16	724.5	10	0	-103	7978.17	1	0	1	-0.008	0.008
10/12/09 03:00:20	59.974	3684.643	350	-223.015732	16	725	10	0	-103	7978.5	1	0	1	-0.008	0.008
10/12/09 03:00:22	59.97	3687.527	350	-223.015732	16	725.5	10	0	-103	7978.83	1	0	1	-0.004	0.004
10/12/09 03:00:24	59.97	3689.404	350	-223.015732	16	726	10	0	-103	7979.16	1	0	1	0.000	0.000
10/12/09 03:00:26	59.968	3692.287	350	-223.015732	16	726.5	10	0	-103	7979.49	1	0	1	-0.002	0.002
10/12/09 03:00:28	59.968	3692.966	350	-223.015732	16	727	10	0	-103	7979.82	1	0	1	0.000	0.000
10/12/09 03:00:30	59.968	3693.793	350	-223.015732	16	727.5	10	0	-103	7980.15	1	0	1	0.000	0.000
10/12/09 03:00:32	59.972	3694.397	350	-223.015732	16	728	10	0	-103	7980.48	1	0	1	0.004	0.004
10/12/09 03:00:34	59.967	3694.974	350	-223.015732	16	728.5	10	0	-103	7980.81	1	0	1	-0.005	0.005
10/12/09 03:00:36	59.966	3697.407	350	-223.015732	16	729	10	0	-103	7981.14	1	0	1	-0.001	0.001
10/12/09 03:00:38	59.964	3698.502	350	-223.015732	16	729.5	10	0	-103	7981.47	1	0	1	-0.002	0.002
10/12/09 03:00:40	59.965	3698.617	350	-223.015732	16	730	10	0	-103	7981.8	1	0	1	0.001	0.001
10/12/09 03:00:42	59.966	3698.992	350	-223.015732	16	730.5	10	0	-103	7982.13	1	0	1	0.001	0.001
10/12/09 03:00:44	59.963	3699.85	350	-223.015732	16	731	10	0	-103	7982.46	1	0	1	-0.003	0.003
10/12/09 03:00:46	59.963	3702.645	350	-223.015732	16	731.5	10	0	-103	7982.79	1	0	1	0.000	0.000
10/12/09 03:00:48	59.965	3701.989	350	-223.015732	16	732	10	0	-103	7983.12	1	0	1	0.002	0.002
10/12/09 03:00:50	59.968	3702.218	350	-223.015732	16	732.5	10	0	-103	7983.45	1	0	1	0.003	0.003
10/12/09 03:00:52	59.97	3704.023	350	-223.015732	16	733	10	0	-103	7983.78	1	0	1	0.002	0.002
10/12/09 03:00:54	59.97	3703.365	350	-223.015732	16	733.5	10	0	-103	7984.11	1	0	1	0.000	0.000
10/12/09 03:00:56	59.97	3702.988	350	-223.015732	16	734	10	0	-103	7984.44	1	0	1	0.000	0.000
10/12/09 03:00:58	59.973	3703.814	350	-223.015732	16	734.5	10	0	-103	7984.77	1	0	1	0.003	0.003
10/12/09 03:01:00	59.972	3704.899	350	-223.015732	16	735	10	0	-103	7985.1	1	0	1	-0.001	0.001
10/12/09 03:01:02	59.976	3705.625	350	-223.015732	16	735.5	10	0	-103	7985.43	1	0	1	0.004	0.004
10/12/09 03:01:04	59.975	3704.293	350	-223.015732	16	736	10	0	-103	7985.76	1	0	1	-0.001	0.001
10/12/09 03:01:06	59.975	3702.094	350	-223.015732	16	736.5	10	0	-103	7986.09	1	0	1	0.000	0.000
10/12/09 03:01:08	59.977	3701.944	350	-223.015732	16	737	10	0	-103	7986.42	1	0	1	0.002	0.002
10/12/09 03:01:10	59.976	3703.142	350	-223.015732	16	737.5	10	0	-103	7986.75	1	0	1	-0.001	0.001
10/12/09 03:01:12	59.976	3704.669	350	-223.015732	16	738	10	0	-103	7987.08	1	0	1	0.000	0.000
10/12/09 03:01:14	59.974	3705.376	350	-223.015732	16	738.5	10	0	-103	7987.41	1	0	1	-0.002	0.002

10/12/09 03:01:16	59.975	3705.662	350	-223.015732	16	739	10	0	-103	7987.74	1	0	1	0.001	0.001
10/12/09 03:01:18	59.974	3705.855	350	-223.015732	16	739.5	10	0	-103	7988.07	1	0	1	-0.001	0.001
10/12/09 03:01:20	59.974	3706.776	350	-223.015732	16	740	10	0	-103	7988.4	1	0	1	0.000	0.000
10/12/09 03:01:22	59.976	3707.514	350	-223.015732	16	740.5	10	0	-103	7988.73	1	0	1	0.002	0.002
10/12/09 03:01:24	59.977	3706.928	350	-223.015732	16	741	10	0	-103	7989.06	1	0	1	0.001	0.001
10/12/09 03:01:26	59.979	3706.446	350	-223.015732	16	741.5	10	0	-103	7989.39	1	0	1	0.002	0.002
10/12/09 03:01:28	59.981	3706.335	350	-223.015732	16	742	10	0	-103	7989.72	1	0	1	0.002	0.002
10/12/09 03:01:30	59.983	3706.771	350	-223.015732	16	742.5	10	0	-103	7990.05	1	0	1	0.002	0.002
10/12/09 03:01:32	59.985	3705.943	350	-223.015732	16	743	10	0	-103	7990.38	1	0	1	0.002	0.002
10/12/09 03:01:34	59.983	3704.127	350	-223.015732	16	743.5	10	0	-103	7990.71	1	0	1	-0.002	0.002
10/12/09 03:01:36	59.98	3704.777	350	-223.015732	16	744	10	0	-103	7991.04	1	0	1	-0.003	0.003
10/12/09 03:01:38	59.979	3705.974	350	-223.015732	16	744.5	10	0	-103	7991.37	1	0	1	-0.001	0.001
10/12/09 03:01:40	59.983	3705.968	350	-223.015732	16	745	10	0	-103	7991.7	1	0	1	0.004	0.004
10/12/09 03:01:42	59.987	3705.356	350	-223.015732	16	745.5	10	0	-103	7992.03	1	0	1	0.004	0.004
10/12/09 03:01:44	59.986	3704.683	350	-223.015732	16	746	10	0	-103	7992.36	1	0	1	-0.001	0.001
10/12/09 03:01:46	59.984	3703.913	350	-223.015732	16	746.5	10	0	-103	7992.69	1	0	1	-0.002	0.002
10/12/09 03:01:48	59.98	3704.361	350	-223.015732	16	747	10	0	-103	7993.02	1	0	1	-0.004	0.004
10/12/09 03:01:50	59.982	3704.988	350	-223.015732	16	747.5	10	0	-103	7993.35	1	0	1	0.002	0.002
10/12/09 03:01:52	59.984	3705.05	350	-223.015732	16	748	10	0	-103	7993.68	1	0	1	0.002	0.002
10/12/09 03:01:54	59.985	3704.893	350	-223.015732	16	748.5	10	0	-103	7994.01	1	0	1	0.001	0.001
10/12/09 03:01:56	59.987	3703.741	350	-223.015732	16	749	10	0	-103	7994.34	1	0	1	0.002	0.002
10/12/09 03:01:58	59.989	3701.831	350	-223.015732	16	749.5	10	0	-103	7994.67	1	0	1	0.002	0.002
10/12/09 03:02:00	59.992	3701.795	350	-223.015732	16	750	10	0	-103	7995	1	0	1	0.003	0.003
10/12/09 03:02:02	59.996	3700.07	350	-223.015732	16	750.5	10	0	-103	7995.33	1	0	1	0.004	0.004
10/12/09 03:02:04	59.999	3701.308	350	-223.015732	16	751	10	0	-103	7995.66	1	0	1	0.003	0.003
10/12/09 03:02:06	59.997	3700.429	350	-223.015732	16	751.5	10	0	-103	7995.99	1	0	1	-0.002	0.002
10/12/09 03:02:08	59.997	3700.913	350	-223.015732	16	752	10	0	-103	7996.32	1	0	1	0.000	0.000
10/12/09 03:02:10	59.997	3700.541	350	-223.015732	16	752.5	10	0	-103	7996.65	1	0	1	0.000	0.000
10/12/09 03:02:12	59.997	3699.927	350	-223.015732	16	753	10	0	-103	7996.98	1	0	1	0.000	0.000
10/12/09 03:02:14	59.996	3700.858	350	-223.015732	16	753.5	10	0	-103	7997.31	1	0	1	-0.001	0.001
10/12/09 03:02:16	59.997	3700.549	350	-223.015732	16	754	10	0	-103	7997.64	1	0	1	0.001	0.001
10/12/09 03:02:18	59.996	3700.614	350	-223.015732	16	754.5	10	0	-103	7997.97	1	0	1	-0.001	0.001
10/12/09 03:02:20	59.998	3700.224	350	-223.015732	16	755	10	0	-103	7998.3	1	0	1	0.002	0.002
10/12/09 03:02:22	60.003	3699.5	350	-223.015732	16	755.5	10	0	-103	7998.63	1	1	1	0.005	0.005
10/12/09 03:02:24	60.009	3698.032	350	-223.015732	16	756	10	0	-103	7998.96	1	1	1	0.006	0.006
10/12/09 03:02:26	60.01	3697.96	350	-223.015732	16	756.5	10	0	-103	7999.29	1	1	1	0.001	0.001
10/12/09 03:02:28	60.008	3699.409	350	-223.015732	16	757	10	0	-103	7999.62	1	1	1	-0.002	0.002
10/12/09 03:02:30	60.005	3699.241	350	-223.015732	16	757.5	10	0	-103	7999.95	1	1	1	-0.003	0.003
10/12/09 03:02:32	60.004	3700.738	350	-223.015732	16	758	10	0	-103	8000.28	1	1	1	-0.001	0.001
10/12/09 03:02:34	60.006	3701.11	350	-223.015732	16	758.5	10	0	-103	8000.61	1	1	1	0.002	0.002
10/12/09 03:02:36	60.003	3701.238	350	-223.015732	16	759	10	0	-103	8000.94	1	1	1	-0.003	0.003
10/12/09 03:02:38	60.001	3699.998	350	-223.015732	16	759.5	10	0	-103	8001.27	1	1	1	-0.002	0.002
10/12/09 03:02:40	60.002	3700.22	350	-223.015732	16	760	10	0	-103	8001.6	1	1	1	0.001	0.001
10/12/09 03:02:42	60.004	3701.823	350	-223.015732	16	760.5	10	0	-103	8001.93	1	1	1	0.002	0.002
10/12/09 03:02:44	60.007	3702.554	350	-223.015732	16	761	10	0	-103	8002.26	1	1	1	0.003	0.003
10/12/09 03:02:46	60.007	3702.276	350	-223.015732	16	761.5	10	0	-103	8002.59	1	1	1	0.000	0.000
10/12/09 03:02:48	60.008	3701.026	350	-223.015732	16	762	10	0	-103	8002.92	1	1	1	0.001	0.001
10/12/09 03:02:50	60.008	3701.923	350	-223.015732	16	762.5	10	0	-103	8003.25	1	1	1	0.000	0.000
10/12/09 03:02:52	60.006	3702.943	350	-223.015732	16	763	10	0	-103	8003.58	1	1	1	-0.002	0.002

10/12/09 03:02:54	60.006	3704.093	350	-223.015732	16	763.5	10	0	-103	8003.91	1	1	1	0.000	0.000
10/12/09 03:02:56	60.006	3703.96	350	-223.015732	16	764	10	0	-103	8004.24	1	1	1	0.000	0.000
10/12/09 03:02:58	60.005	3703.819	350	-223.015732	16	764.5	10	0	-103	8004.57	1	1	1	-0.001	0.001
10/12/09 03:03:00	60	3704.455	350	-223.015732	16	765	10	0	-103	8004.9	1	0	1	-0.005	0.005
10/12/09 03:03:02	59.999	3704.346	350	-223.015732	16	765.5	10	0	-103	8005.23	1	0	1	-0.001	0.001
10/12/09 03:03:04	60	3705.329	350	-223.015732	16	766	10	0	-103	8005.56	1	0	1	0.001	0.001
10/12/09 03:03:06	60	3704.93	350	-223.015732	16	766.5	10	0	-103	8005.89	1	0	1	0.000	0.000
10/12/09 03:03:08	60.004	3704.405	350	-223.015732	16	767	10	0	-103	8006.22	1	1	1	0.004	0.004
10/12/09 03:03:10	60.008	3703.675	350	-223.015732	16	767.5	10	0	-103	8006.55	1	1	1	0.004	0.004
10/12/09 03:03:12	60.013	3702.748	350	-223.015732	16	768	10	0	-103	8006.88	1	1	1	0.005	0.005
10/12/09 03:03:14	60.015	3702.669	350	-223.015732	16	768.5	10	0	-103	8007.21	1	1	1	0.002	0.002
10/12/09 03:03:16	60.015	3703.017	350	-223.015732	16	769	10	0	-103	8007.54	1	1	1	0.000	0.000
10/12/09 03:03:18	60.012	3703.416	350	-223.015732	16	769.5	10	0	-103	8007.87	1	1	1	-0.003	0.003
10/12/09 03:03:20	60.009	3703.297	350	-223.015732	16	770	10	0	-103	8008.2	1	1	1	-0.003	0.003
10/12/09 03:03:22	60.005	3705.189	350	-223.015732	16	770.5	10	0	-103	8008.53	1	1	1	-0.004	0.004
10/12/09 03:03:24	60.008	3705.279	350	-223.015732	16	771	10	0	-103	8008.86	1	1	1	0.003	0.003
10/12/09 03:03:26	60.011	3704.646	350	-223.015732	16	771.5	10	0	-103	8009.19	1	1	1	0.003	0.003
10/12/09 03:03:28	60.011	3704.051	350	-223.015732	16	772	10	0	-103	8009.52	1	1	1	0.000	0.000
10/12/09 03:03:30	60.013	3703.438	350	-223.015732	16	772.5	10	0	-103	8009.85	1	1	1	0.002	0.002
10/12/09 03:03:32	60.016	3704.255	350	-223.015732	16	773	10	0	-103	8010.18	1	1	1	0.003	0.003
10/12/09 03:03:34	60.018	3703.708	350	-223.015732	16	773.5	10	0	-103	8010.51	1	1	1	0.002	0.002
10/12/09 03:03:36	60.018	3703.83	350	-223.015732	16	774	10	0	-103	8010.84	1	1	1	0.000	0.000
10/12/09 03:03:38	60.019	3704.524	350	-223.015732	16	774.5	10	0	-103	8011.17	1	1	1	0.001	0.001
10/12/09 03:03:40	60.018	3704.139	350	-223.015732	16	775	10	0	-103	8011.5	1	1	1	-0.001	0.001
10/12/09 03:03:42	60.013	3704.27	350	-223.015732	16	775.5	10	0	-103	8011.83	1	1	1	-0.005	0.005
10/12/09 03:03:44	60.011	3705.429	350	-223.015732	16	776	10	0	-103	8012.16	1	1	1	-0.002	0.002
10/12/09 03:03:46	60.009	3705.942	350	-223.015732	16	776.5	10	0	-103	8012.49	1	1	1	-0.002	0.002
10/12/09 03:03:48	60.009	3705.54	350	-223.015732	16	777	10	0	-103	8012.82	1	1	1	0.000	0.000
10/12/09 03:03:50	60.008	3705.634	350	-223.015732	16	777.5	10	0	-103	8013.15	1	1	1	-0.001	0.001
10/12/09 03:03:52	60.009	3705.749	350	-223.015732	16	778	10	0	-103	8013.48	1	1	1	0.001	0.001
10/12/09 03:03:54	60.011	3707.267	350	-223.015732	16	778.5	10	0	-103	8013.81	1	1	1	0.002	0.002
10/12/09 03:03:56	60.015	3706.945	350	-223.015732	16	779	10	0	-103	8014.14	1	1	1	0.004	0.004
10/12/09 03:03:58	60.02	3706.63	350	-223.015732	16	779.5	10	0	-103	8014.47	1	1	1	0.005	0.005
10/12/09 03:04:00	60.021	3705.655	350	-223.015732	16	780	10	0	-103	8014.8	1	1	1	0.001	0.001
10/12/09 03:04:02	60.018	3703.895	350	-223.015732	16	780.5	10	0	-103	8015.13	1	1	1	-0.003	0.003
10/12/09 03:04:04	60.017	3704.224	350	-223.015732	16	781	10	0	-103	8015.46	1	1	1	-0.001	0.001
10/12/09 03:04:06	60.019	3703.887	350	-223.015732	16	781.5	10	0	-103	8015.79	1	1	1	0.002	0.002
10/12/09 03:04:08	60.019	3704.648	350	-223.015732	16	782	10	0	-103	8016.12	1	1	1	0.000	0.000
10/12/09 03:04:10	60.021	3704.795	350	-223.015732	16	782.5	10	0	-103	8016.45	1	1	1	0.002	0.002
10/12/09 03:04:12	60.022	3704.167	350	-223.015732	16	783	10	0	-103	8016.78	1	1	1	0.001	0.001
10/12/09 03:04:14	60.025	3702.764	350	-223.015732	16	783.5	10	0	-103	8017.11	1	1	1	0.003	0.003
10/12/09 03:04:16	60.027	3702.008	350	-223.015732	16	784	10	0	-103	8017.44	1	1	1	0.002	0.002
10/12/09 03:04:18	60.03	3700.36	350	-223.015732	16	784.5	10	0	-103	8017.77	1	1	1	0.003	0.003
10/12/09 03:04:20	60.027	3701.063	350	-223.015732	16	785	10	0	-103	8018.1	1	1	1	-0.003	0.003
10/12/09 03:04:22	60.023	3700.34	350	-223.015732	16	785.5	10	0	-103	8018.43	1	1	1	-0.004	0.004
10/12/09 03:04:24	60.021	3699.369	350	-223.015732	16	786	10	0	-103	8018.76	1	1	1	-0.002	0.002
10/12/09 03:04:26	60.023	3701.568	350	-223.015732	16	786.5	10	0	-103	8019.09	1	1	1	0.002	0.002
10/12/09 03:04:28	60.023	3702.959	350	-223.015732	16	787	10	0	-103	8019.42	1	1	1	0.000	0.000
10/12/09 03:04:30	60.02	3704.25	350	-223.015732	16	787.5	10	0	-103	8019.75	1	1	1	-0.003	0.003

10/12/09 03:04:32	60.024	3703.621	350	-223.015732	16	788	10	0	-103	8020.08	1	1	1	0.004	0.004
10/12/09 03:04:34	60.024	3703.374	350	-223.015732	16	788.5	10	0	-103	8020.41	1	1	1	0.000	0.000
10/12/09 03:04:36	60.022	3703.036	350	-223.015732	16	789	10	0	-103	8020.74	1	1	1	-0.002	0.002
10/12/09 03:04:38	60.022	3703.931	350	-223.015732	16	789.5	10	0	-103	8021.07	1	1	1	0.000	0.000
10/12/09 03:04:40	60.024	3704.947	350	-223.015732	16	790	10	0	-103	8021.4	1	1	1	0.002	0.002
10/12/09 03:04:42	60.025	3704.208	350	-223.015732	16	790.5	10	0	-103	8021.73	1	1	1	0.001	0.001
10/12/09 03:04:44	60.023	3703.541	350	-223.015732	16	791	10	0	-103	8022.06	1	1	1	-0.002	0.002
10/12/09 03:04:46	60.024	3703.16	350	-223.015732	16	791.5	10	0	-103	8022.39	1	1	1	0.001	0.001
10/12/09 03:04:48	60.02	3703.397	350	-223.015732	16	792	10	0	-103	8022.72	1	1	1	-0.004	0.004
10/12/09 03:04:50	60.018	3704.376	350	-223.015732	16	792.5	10	0	-103	8023.05	1	1	1	-0.002	0.002
10/12/09 03:04:52	60.013	3705.441	350	-223.015732	16	793	10	0	-103	8023.38	1	1	1	-0.005	0.005
10/12/09 03:04:54	60.008	3706.995	350	-223.015732	16	793.5	10	0	-103	8023.71	1	1	1	-0.005	0.005
10/12/09 03:04:56	60.012	3710.072	350	-223.015732	16	794	10	0	-103	8024.04	1	1	1	0.004	0.004
10/12/09 03:04:58	60.017	3707.971	350	-223.015732	16	794.5	10	0	-103	8024.37	1	1	1	0.005	0.005
10/12/09 03:05:00	60.019	3707.767	350	-223.015732	16	795	10	0	-103	8024.7	1	1	1	0.002	0.002
10/12/09 03:05:02	60.019	3707.609	350	-223.015732	16	795.5	10	0	-103	8025.03	1	1	1	0.000	0.000
10/12/09 03:05:04	60.015	3708.831	350	-223.015732	16	796	10	0	-103	8025.36	1	1	1	-0.004	0.004
10/12/09 03:05:06	60.016	3709.465	350	-223.015732	16	796.5	10	0	-103	8025.69	1	1	1	0.001	0.001
10/12/09 03:05:08	60.015	3709.813	350	-223.015732	16	797	10	0	-103	8026.02	1	1	1	-0.001	0.001
10/12/09 03:05:10	60.016	3709.817	350	-223.015732	16	797.5	10	0	-103	8026.35	1	1	1	0.001	0.001
10/12/09 03:05:12	60.014	3709.99	350	-223.015732	16	798	10	0	-103	8026.68	1	1	1	-0.002	0.002
10/12/09 03:05:14	60.016	3709.094	350	-223.015732	16	798.5	10	0	-103	8027.01	1	1	1	0.002	0.002
10/12/09 03:05:16	60.018	3709.642	350	-223.015732	16	799	10	0	-103	8027.34	1	1	1	0.002	0.002
10/12/09 03:05:18	60.019	3709.812	350	-223.015732	16	799.5	10	0	-103	8027.67	1	1	1	0.001	0.001
10/12/09 03:05:20	60.016	3709.933	350	-223.015732	16	800	10	0	-103	8028	1	1	1	-0.003	0.003
10/12/09 03:05:22	60.014	3710.677	350	-223.015732	16	800.5	10	0	-103	8028.33	1	1	1	-0.002	0.002
10/12/09 03:05:24	60.014	3710.591	350	-223.015732	16	801	10	0	-103	8028.66	1	1	1	0.000	0.000
10/12/09 03:05:26	60.018	3709.354	350	-223.015732	16	801.5	10	0	-103	8028.99	1	1	1	0.004	0.004
10/12/09 03:05:28	60.022	3707.696	350	-223.015732	16	802	10	0	-103	8029.32	1	1	1	0.004	0.004
10/12/09 03:05:30	60.023	3707.38	350	-223.015732	16	802.5	10	0	-103	8029.65	1	1	1	0.001	0.001
10/12/09 03:05:32	60.024	3707.12	350	-223.015732	16	803	10	0	-103	8029.98	1	1	1	0.001	0.001
10/12/09 03:05:34	60.026	3706.99	350	-223.015732	16	803.5	10	0	-103	8030.31	1	1	1	0.002	0.002
10/12/09 03:05:36	60.026	3705.848	350	-223.015732	16	804	10	0	-103	8030.64	1	1	1	0.000	0.000
10/12/09 03:05:38	60.024	3704.185	350	-223.015732	16	804.5	10	0	-103	8030.97	1	1	1	-0.002	0.002
10/12/09 03:05:40	60.022	3704.406	350	-223.015732	16	805	10	0	-103	8031.3	1	1	1	-0.002	0.002
10/12/09 03:05:42	60.02	3704.963	350	-223.015732	16	805.5	10	0	-103	8031.63	1	1	1	-0.002	0.002
10/12/09 03:05:44	60.019	3706.567	350	-223.015732	16	806	10	0	-103	8031.96	1	1	1	-0.001	0.001
10/12/09 03:05:46	60.022	3705.516	350	-223.015732	16	806.5	10	0	-103	8032.29	1	1	1	0.003	0.003
10/12/09 03:05:48	60.025	3704.869	350	-223.015732	16	807	10	0	-103	8032.62	1	1	1	0.003	0.003
10/12/09 03:05:50	60.028	3704.428	350	-223.015732	16	807.5	10	0	-103	8032.95	1	1	1	0.003	0.003
10/12/09 03:05:52	60.03	3704.773	350	-223.015732	16	808	10	0	-103	8033.28	1	1	1	0.002	0.002
10/12/09 03:05:54	60.031	3703.532	350	-223.015732	16	808.5	10	0	-103	8033.61	1	1	1	0.001	0.001
10/12/09 03:05:56	60.029	3702.686	350	-223.015732	16	809	10	0	-103	8033.94	1	1	1	-0.002	0.002
10/12/09 03:05:58	60.026	3702.093	350	-223.015732	16	809.5	10	0	-103	8034.27	1	1	1	-0.003	0.003
10/12/09 03:06:00	60.026	3703.169	350	-223.015732	16	810	10	0	-103	8034.6	1	1	1	0.000	0.000
10/12/09 03:06:02	60.029	3703.676	350	-223.015732	16	810.5	10	0	-103	8034.93	1	1	1	0.003	0.003
10/12/09 03:06:04	60.03	3701.52	350	-223.015732	16	811	10	0	-103	8035.26	1	1	1	0.001	0.001
10/12/09 03:06:06	60.033	3700.106	350	-223.015732	16	811.5	10	0	-103	8035.59	1	1	1	0.003	0.003
10/12/09 03:06:08	60.03	3698.222	350	-223.015732	16	812	10	0	-103	8035.92	1	1	1	-0.003	0.003

10/12/09 03:06:10	60.022	3698.009	350	-223.015732	16	812.5	10	0	-103	8036.25	1	1	1	-0.008	0.008
10/12/09 03:06:12	60.016	3700.28	350	-223.015732	16	813	10	0	-103	8036.58	1	1	1	-0.006	0.006
10/12/09 03:06:14	60.019	3703.192	350	-223.015732	16	813.5	10	0	-103	8036.91	1	1	1	0.003	0.003
10/12/09 03:06:16	60.03	3703.815	350	-223.015732	16	814	10	0	-103	8037.24	1	1	1	0.011	0.011
10/12/09 03:06:18	60.028	3701.863	350	-223.015732	16	814.5	10	0	-103	8037.57	1	1	1	-0.002	0.002
10/12/09 03:06:20	60.021	3699.956	350	-223.015732	16	815	10	0	-103	8037.9	1	1	1	-0.007	0.007
10/12/09 03:06:22	60.015	3700.816	350	-223.015732	16	815.5	10	0	-103	8038.23	1	1	1	-0.006	0.006
10/12/09 03:06:24	60.015	3703.802	350	-223.015732	16	816	10	0	-103	8038.56	1	1	1	0.000	0.000
10/12/09 03:06:26	60.012	3706.943	350	-223.015732	16	816.5	10	0	-103	8038.89	1	1	1	-0.003	0.003
10/12/09 03:06:28	60.011	3708.527	350	-223.015732	16	817	10	0	-103	8039.22	1	1	1	-0.001	0.001
10/12/09 03:06:30	60.014	3707.49	350	-223.015732	16	817.5	10	0	-103	8039.55	1	1	1	0.003	0.003
10/12/09 03:06:32	60.013	3707.647	350	-223.015732	16	818	10	0	-103	8039.88	1	1	1	-0.001	0.001
10/12/09 03:06:34	60.014	3706.991	350	-223.015732	16	818.5	10	0	-103	8040.21	1	1	1	0.001	0.001
10/12/09 03:06:36	60.016	3707.495	350	-223.015732	16	819	10	0	-103	8040.54	1	1	1	0.002	0.002
10/12/09 03:06:38	60.016	3705.584	350	-223.015732	16	819.5	10	0	-103	8040.87	1	1	1	0.000	0.000
10/12/09 03:06:40	60.015	3705.398	350	-223.015732	16	820	10	0	-103	8041.2	1	1	1	-0.001	0.001
10/12/09 03:06:42	60.013	3707.12	350	-223.015732	16	820.5	10	0	-103	8041.53	1	1	1	-0.002	0.002
10/12/09 03:06:44	60.007	3709.144	350	-223.015732	16	821	10	0	-103	8041.86	1	1	1	-0.006	0.006
10/12/09 03:06:46	59.997	3708.99	350	-223.015732	16	821.5	10	0	-103	8042.19	1	0	1	-0.010	0.010
10/12/09 03:06:48	59.994	3708.291	350	-223.015732	16	822	10	0	-103	8042.52	1	0	1	-0.003	0.003
10/12/09 03:06:50	59.993	3706.193	350	-223.015732	16	822.5	10	0	-103	8042.85	1	0	1	-0.001	0.001
10/12/09 03:06:52	59.99	3707.304	350	-223.015732	16	823	10	0	-103	8043.18	1	0	1	-0.003	0.003
10/12/09 03:06:54	59.993	3707.903	350	-223.015732	16	823.5	10	0	-103	8043.51	1	0	1	0.003	0.003
10/12/09 03:06:56	59.994	3706.76	350	-223.015732	16	824	10	0	-103	8043.84	1	0	1	0.001	0.001
10/12/09 03:06:58	59.993	3706.921	350	-223.015732	16	824.5	10	0	-103	8044.17	1	0	1	-0.001	0.001
10/12/09 03:07:00	59.994	3706.683	350	-223.015732	16	825	10	0	-103	8044.5	1	0	1	0.001	0.001
10/12/09 03:07:02	59.993	3706.888	350	-223.015732	16	825.5	10	0	-103	8044.83	1	0	1	-0.001	0.001
10/12/09 03:07:04	59.996	3704.934	350	-223.015732	16	826	10	0	-103	8045.16	1	0	1	0.003	0.003
10/12/09 03:07:06	59.988	3705.678	350	-223.015732	16	826.5	10	0	-103	8045.49	1	0	1	-0.008	0.008
10/12/09 03:07:08	59.985	3706.481	350	-223.015732	16	827	10	0	-103	8045.82	1	0	1	-0.003	0.003
10/12/09 03:07:10	59.983	3707.071	350	-223.015732	16	827.5	10	0	-103	8046.15	1	0	1	-0.002	0.002
10/12/09 03:07:12	59.982	3706.696	350	-223.015732	16	828	10	0	-103	8046.48	1	0	1	-0.001	0.001
10/12/09 03:07:14	59.98	3707.479	350	-223.015732	16	828.5	10	0	-103	8046.81	1	0	1	-0.002	0.002
10/12/09 03:07:16	59.977	3708.246	350	-223.015732	16	829	10	0	-103	8047.14	1	0	1	-0.003	0.003
10/12/09 03:07:18	59.981	3709.436	350	-223.015732	16	829.5	10	0	-103	8047.47	1	0	1	0.004	0.004
10/12/09 03:07:20	59.982	3710.419	350	-223.015732	16	830	10	0	-103	8047.8	1	0	1	0.001	0.001
10/12/09 03:07:22	59.978	3710.134	350	-223.015732	16	830.5	10	0	-103	8048.13	1	0	1	-0.004	0.004
10/12/09 03:07:24	59.98	3708.708	350	-223.015732	16	831	10	0	-103	8048.46	1	0	1	0.002	0.002
10/12/09 03:07:26	59.98	3710.024	350	-223.015732	16	831.5	10	0	-103	8048.79	1	0	1	0.000	0.000
10/12/09 03:07:28	59.977	3709.192	350	-223.015732	16	832	10	0	-103	8049.12	1	0	1	-0.003	0.003
10/12/09 03:07:30	59.98	3708.335	350	-223.015732	16	832.5	10	0	-103	8049.45	1	0	1	0.003	0.003
10/12/09 03:07:32	59.983	3709.399	350	-223.015732	16	833	10	0	-103	8049.78	1	0	1	0.003	0.003
10/12/09 03:07:34	59.984	3707.911	350	-223.015732	16	833.5	10	0	-103	8050.11	1	0	1	0.001	0.001
10/12/09 03:07:36	59.981	3709.004	350	-223.015732	16	834	10	0	-103	8050.44	1	0	1	-0.003	0.003
10/12/09 03:07:38	59.981	3707.638	350	-223.015732	16	834.5	10	0	-103	8050.77	1	0	1	0.000	0.000
10/12/09 03:07:40	59.98	3709.689	350	-223.015732	16	835	10	0	-103	8051.1	1	0	1	-0.001	0.001
10/12/09 03:07:42	59.981	3708.945	350	-223.015732	16	835.5	10	0	-103	8051.43	1	0	1	0.001	0.001
10/12/09 03:07:44	59.981	3706.541	350	-223.015732	16	836	10	0	-103	8051.76	1	0	1	0.000	0.000
10/12/09 03:07:46	59.981	3711.256	350	-223.015732	16	836.5	10	0	-103	8052.09	1	0	1	0.000	0.000

10/12/09 03:07:48	59.98	3711.362	350	-223.015732	16	837	10	0	-103	8052.42	1	0	1	-0.001	0.001
10/12/09 03:07:50	59.978	3712.303	350	-223.015732	16	837.5	10	0	-103	8052.75	1	0	1	-0.002	0.002
10/12/09 03:07:52	59.978	3712.012	350	-223.015732	16	838	10	0	-103	8053.08	1	0	1	0.000	0.000
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10/12/09 03:07:56	59.978	3712.093	350	-223.015732	16	839	10	0	-103	8053.74	1	0	1	-0.001	0.001
10/12/09 03:07:58	59.976	3713.992	350	-223.015732	16				-103	8054.07	1	0	1	-0.002	0.002
10/12/09 03:08:00	59.976	3714.612	350	-223.015732	16				-103	8054.4	1	0	1	0.000	0.000
10/12/09 03:08:02	59.975	3715.083	350	-223.015732	16				-103	8054.73	1	0	1	-0.001	0.001
10/12/09 03:08:04	59.976	3715.323	350	-223.015732	16				-103	8055.06	1	0	1	0.001	0.001
10/12/09 03:08:06	59.975	3714.794	350	-223.015732	16				-103	8055.39	1	0	1	-0.001	0.001
10/12/09 03:08:08	59.979	3714.717	350	-223.015732	16				-103	8055.72	1	0	1	0.004	0.004
10/12/09 03:08:10	59.978	3715.161	350	-223.015732	16				-103	8056.05	1	0	1	-0.001	0.001
10/12/09 03:08:12	59.975	3715.001	350	-223.015732	16				-103	8056.38	1	0	1	-0.003	0.003
10/12/09 03:08:14	59.976	3713.996	350	-223.015732	16				-103	8056.71	1	0	1	0.001	0.001
10/12/09 03:08:16	59.981	3714.063	350	-223.015732	16				-103	8057.04	1	0	1	0.005	0.005
10/12/09 03:08:18	59.977	3714.335	350	-223.015732	16				-103	8057.37	1	0	1	-0.004	0.004
10/12/09 03:08:20	59.975	3715.631	350	-223.015732	16				-103	8057.7	1	0	1	-0.002	0.002
10/12/09 03:08:22	59.976	3715.688	350	-223.015732	16				-103	8058.03	1	0	1	0.001	0.001
10/12/09 03:08:24	59.979	3715.567	350	-223.015732	16				-103	8058.36	1	0	1	0.003	0.003
10/12/09 03:08:26	59.98	3715.725	350	-223.015732	16				-103	8058.69	1	0	1	0.001	0.001
10/12/09 03:08:28	59.979	3714.848	350	-223.015732	16				-103	8059.02	1	0	1	-0.001	0.001
10/12/09 03:08:30	59.978	3713.142	350	-223.015732	16				-103	8059.35	1	0	1	-0.001	0.001
10/12/09 03:08:32	59.979	3713.358	350	-223.015732	16				-103	8059.68	1	0	1	0.001	0.001
10/12/09 03:08:34	59.982	3712.275	350	-223.015732	16				-103	8060.01	1	0	1	0.003	0.003
10/12/09 03:08:36	59.983	3712.619	350	-223.015732	16				-103	8060.34	1	0	1	0.001	0.001
10/12/09 03:08:38	59.987	3712.153	350	-223.015732	16				-103	8060.67	1	0	1	0.004	0.004
10/12/09 03:08:40	59.988	3710.05	350	-223.015732	16				-103	8061	1	0	1	0.001	0.001
10/12/09 03:08:42	59.984	3709.082	350	-223.015732	16				-103	8061.33	1	0	1	-0.004	0.004
10/12/09 03:08:44	59.98	3710.472	350	-223.015732	16				-103	8061.66	1	0	1	-0.004	0.004
10/12/09 03:08:46	59.979	3710.624	350	-223.015732	16				-103	8061.99	1	0	1	-0.001	0.001
10/12/09 03:08:48	59.98	3710.946	350	-223.015732	16				-103	8062.32	1	0	1	0.001	0.001
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10/12/09 03:08:54	59.975	3709.462	350	-223.015732	16				-103	8063.31	1	0	1	-0.003	0.003
10/12/09 03:08:56	59.979	3710.803	350	-223.015732	16				-103	8063.64	1	0	1	0.004	0.004
10/12/09 03:08:58	59.982	3709.286	350	-223.015732	16				-103	8063.97	1	0	1	0.003	0.003
10/12/09 03:09:00	59.983	3710.573	350	-223.015732	16				-103	8064.3	1	0	1	0.001	0.001
10/12/09 03:09:02	59.983	3709.525	350	-223.015732	16				-103	8064.63	1	0	1	0.000	0.000
10/12/09 03:09:04	59.985	3708.371	350	-223.015732	16				-103	8064.96	1	0	1	0.002	0.002
10/12/09 03:09:06	59.99	3708.527	350	-223.015732	16				-103	8065.29	1	0	1	0.005	0.005
10/12/09 03:09:08	59.987	3706.512	350	-223.015732	16				-103	8065.62	1	0	1	-0.003	0.003
10/12/09 03:09:10	59.984	3707.49	350	-223.015732	16				-103	8065.95	1	0	1	-0.003	0.003
10/12/09 03:09:12	59.976	3708.962	350	-223.015732	16				-103	8066.28	1	0	1	-0.008	0.008
10/12/09 03:09:14	59.979	3709.894	350	-223.015732	16				-103	8066.61	1	0	1	0.003	0.003
10/12/09 03:09:16	59.985	3712.303	350	-223.015732	16				-103	8066.94	1	0	1	0.006	0.006
10/12/09 03:09:18	59.983	3711.35	350	-223.015732	16				-103	8067.27	1	0	1	-0.002	0.002
10/12/09 03:09:20	59.979	3711.627	350	-223.015732	16				-103	8067.6	1	0	1	-0.004	0.004
10/12/09 03:09:22	59.981	3712.076	350	-223.015732	16				-103	8067.93	1	0	1	0.002	0.002
10/12/09 03:09:24	59.978	3712.393	350	-223.015732	16				-103	8068.26	1	0	1	-0.003	0.003

10/12/09 03:09:26	59.975	3712.999	350	-223.015732	16	-103	8068.59	1	0	1	-0.003	0.003
10/12/09 03:09:28	59.978	3713.51	350	-223.015732	16	-103	8068.92	1	0	1	0.003	0.003
10/12/09 03:09:30	59.989	3716.626	350	-223.015732	16	-103	8069.25	1	0	1	0.011	0.011
10/12/09 03:09:32	59.999	3715.443	350	-223.015732	16	-103	8069.58	1	0	1	0.010	0.010
10/12/09 03:09:34	59.994	3712.092	350	-223.015732	16	-103	8069.91	1	0	1	-0.005	0.005
10/12/09 03:09:36	59.989	3713.906	350	-223.015732	16	-103	8070.24	1	0	1	-0.005	0.005
10/12/09 03:09:38	59.986	3714.894	350	-223.015732	16	-103	8070.57	1	0	1	-0.003	0.003
10/12/09 03:09:40	59.984	3714.953	350	-223.015732	16	-103	8070.9	1	0	1	-0.002	0.002
10/12/09 03:09:42	59.983	3716.122	350	-223.015732	16	-103	8071.23	1	0	1	-0.001	0.001
10/12/09 03:09:44	59.982	3716.308	350	-223.015732	16	-103	8071.56	1	0	1	-0.001	0.001
10/12/09 03:09:46	59.98	3715.438	350	-223.015732	16	-103	8071.89	1	0	1	-0.002	0.002
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10/12/09 03:09:52	59.995	3715.068	350	-223.015732	16	-103	8072.88	1	0	1	0.000	0.000
10/12/09 03:09:54	59.99	3715.927	350	-223.015732	16	-103	8073.21	1	0	1	-0.005	0.005
10/12/09 03:09:56	59.989	3715.791	350	-223.015732	16	-103	8073.54	1	0	1	-0.001	0.001
10/12/09 03:09:58	59.991	3716.285	350	-223.015732	16	-103	8073.87	1	0	1	0.002	0.002
10/12/09 03:10:00	59.996	3715.324	350	-223.015732	16	-103	8074.2	1	0	1	0.005	0.005
10/12/09 03:10:02	60	3714.46	350	-223.015732	16	-103	8074.53	1	0	1	0.004	0.004
10/12/09 03:10:04	60.002	3711.708	350	-223.015732	16	-103	8074.86	1	1	1	0.002	0.002
10/12/09 03:10:06	60.004	3712.698	350	-223.015732	16	-103	8075.19	1	1	1	0.002	0.002
10/12/09 03:10:08	60.004	3712.851	350	-223.015732	16	-103	8075.52	1	1	1	0.000	0.000
10/12/09 03:10:10	60.002	3713.362	350	-223.015732	16	-103	8075.85	1	1	1	-0.002	0.002
10/12/09 03:10:12	59.999	3716.641	350	-223.015732	16	-103	8076.18	1	0	1	-0.003	0.003
10/12/09 03:10:14	59.998	3718.292	350	-223.015732	16	-103	8076.51	1	0	1	-0.001	0.001
10/12/09 03:10:16	59.995	3719.079	350	-223.015732	16	-103	8076.84	1	0	1	-0.003	0.003
10/12/09 03:10:18	59.996	3718.233	350	-223.015732	16	-103	8077.17	1	0	1	0.001	0.001
10/12/09 03:10:20	60.001	3717.815	350	-223.015732	16	-103	8077.5	1	1	1	0.005	0.005
10/12/09 03:10:22	60.002	3717.889	350	-223.015732	16	-103	8077.83	1	1	1	0.001	0.001
10/12/09 03:10:24	60.001	3718.56	350	-223.015732	16	-103	8078.16	1	1	1	-0.001	0.001
10/12/09 03:10:26	60.003	3718.195	350	-223.015732	16	-103	8078.49	1	1	1	0.002	0.002
10/12/09 03:10:28	60.005	3719.021	350	-223.015732	16	-103	8078.82	1	1	1	0.002	0.002
10/12/09 03:10:30	60.004	3718.821	350	-223.015732	16	-103	8079.15	1	1	1	-0.001	0.001
10/12/09 03:10:32	60.004	3719.897	350	-223.015732	16	-103	8079.48	1	1	1	0.000	0.000
10/12/09 03:10:34	60.004	3719.299	350	-223.015732	16	-103	8079.81	1	1	1	0.000	0.000
10/12/09 03:10:36	60.006	3719.643	350	-223.015732	16	-103	8080.14	1	1	1	0.002	0.002
10/12/09 03:10:38	60.003	3719.527	350	-223.015732	16	-103	8080.47	1	1	1	-0.003	0.003
10/12/09 03:10:40	60.005	3719.731	350	-223.015732	16	-103	8080.8	1	1	1	0.002	0.002
10/12/09 03:10:42	60.006	3720.279	350	-223.015732	16	-103	8081.13	1	1	1	0.001	0.001
10/12/09 03:10:44	60.009	3718.58	350	-223.015732	16	-103	8081.46	1	1	1	0.003	0.003
10/12/09 03:10:46	60.009	3718.976	350	-223.015732	16	-103	8081.79	1	1	1	0.000	0.000
10/12/09 03:10:48	60.01	3718.982	350	-223.015732	16	-103	8082.12	1	1	1	0.001	0.001
10/12/09 03:10:50	60.009	3720.034	350	-223.015732	16	-103	8082.45	1	1	1	-0.001	0.001
10/12/09 03:10:52	60.013	3720.609	350	-223.015732	16	-103	8082.78	1	1	1	0.004	0.004
10/12/09 03:10:54	60.015	3720.811	350	-223.015732	16	-103	8083.11	1	1	1	0.002	0.002
10/12/09 03:10:56	60.014	3721.239	350	-223.015732	16	-103	8083.44	1	1	1	-0.001	0.001
10/12/09 03:10:58	60.009	3720.38	350	-223.015732	16	-103	8083.77	1	1	1	-0.005	0.005
10/12/09 03:11:00	60.009	3719.447	350	-223.015732	16	-103	8084.1	1	1	1	0.000	0.000
10/12/09 03:11:02	60.008	3720.807	350	-223.015732	16	-103	8084.43	1	1	1	-0.001	0.001

10/12/09 03:11:04	60.011	3721.272	350	-223.015732	16	-103	8084.76	1	1	1	0.003	0.003
10/12/09 03:11:06	60.01	3720.592	350	-223.015732	16	-103	8085.09	1	1	1	-0.001	0.001
10/12/09 03:11:08	60.009	3721.245	350	-223.015732	16	-103	8085.42	1	1	1	-0.001	0.001
10/12/09 03:11:10	60.013	3721.594	350	-223.015732	16	-103	8085.75	1	1	1	0.004	0.004
10/12/09 03:11:12	60.013	3722.176	350	-223.015732	16	-103	8086.08	1	1	1	0.000	0.000
10/12/09 03:11:14	60.014	3721.999	350	-223.015732	16	-103	8086.41	1	1	1	0.001	0.001
10/12/09 03:11:16	60.014	3721.646	350	-223.015732	16	-103	8086.74	1	1	1	0.000	0.000
10/12/09 03:11:18	60.012	3721.678	350	-223.015732	16	-103	8087.07	1	1	1	-0.002	0.002
10/12/09 03:11:20	60.01	3720.86	350	-223.015732	16	-103	8087.4	1	1	1	-0.002	0.002
10/12/09 03:11:22	60.011	3721.645	350	-223.015732	16	-103	8087.73	1	1	1	0.001	0.001
10/12/09 03:11:24	60.007	3723.816	350	-223.015732	16	-103	8088.06	1	1	1	-0.004	0.004
10/12/09 03:11:26	60.003	3725.07	350	-223.015732	16	-103	8088.39	1	1	1	-0.004	0.004
10/12/09 03:11:28	60.001	3724.656	350	-223.015732	16	-103	8088.72	1	1	1	-0.002	0.002
10/12/09 03:11:30	60	3724.869	350	-223.015732	16	-103	8089.05	1	0	1	-0.001	0.001
10/12/09 03:11:32	59.998	3724.661	350	-223.015732	16	-103	8089.38	1	0	1	-0.002	0.002
10/12/09 03:11:34	59.998	3723.696	350	-223.015732	16	-103	8089.71	1	0	1	0.000	0.000
10/12/09 03:11:36	59.999	3723.58	350	-223.015732	16	-103	8090.04	1	0	1	0.001	0.001
10/12/09 03:11:38	60.002	3723.405	350	-223.015732	16	-103	8090.37	1	1	1	0.003	0.003
10/12/09 03:11:40	60.003	3721.879	350	-223.015732	16	-103	8090.7	1	1	1	0.001	0.001
10/12/09 03:11:42	60.003	3722.401	350	-223.015732	16	-103	8091.03	1	1	1	0.000	0.000
10/12/09 03:11:44	59.999	3722.906	350	-223.015732	16	-103	8091.36	1	0	1	-0.004	0.004
10/12/09 03:11:46	59.998	3724.142	350	-223.015732	16	-103	8091.69	1	0	1	-0.001	0.001
10/12/09 03:11:48	60.001	3723.65	350	-223.015732	16	-103	8092.02	1	1	1	0.003	0.003
10/12/09 03:11:50	59.995	3723.201	350	-223.015732	16	-103	8092.35	1	0	1	-0.006	0.006
10/12/09 03:11:52	59.989	3723.639	350	-223.015732	16	-103	8092.68	1	0	1	-0.006	0.006
10/12/09 03:11:54	59.987	3723.881	350	-223.015732	16	-103	8093.01	1	0	1	-0.002	0.002
10/12/09 03:11:56	59.988	3724.654	350	-223.015732	16	-103	8093.34	1	0	1	0.001	0.001
10/12/09 03:11:58	59.988	3725.361	350	-223.015732	16	-103	8093.67	1	0	1	0.000	0.000
10/12/09 03:12:00	59.99	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.002	0.002
10/12/09 03:12:02	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.009	0.009
10/12/09 03:12:04	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:12:06	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:12:08	60.0005	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:12:10	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:12:12	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:14	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:16	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:18	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:20	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:22	59.994	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:24	59.993	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:26	59.992	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:28	59.991	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:30	59.99	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:32	59.991	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:34	59.992	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:36	59.993	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:38	59.994	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:40	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001

10/12/09 03:12:42	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:44	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:46	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:48	59.9965	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:50	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:52	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:54	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:56	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:58	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:13:00	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.002	0.002
10/12/09 03:13:02	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:04	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:06	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:08	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.003	0.003
10/12/09 03:13:10	60.007	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.003	0.003
10/12/09 03:13:12	60.009	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:14	60.011	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:16	60.0085	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.003	0.003
10/12/09 03:13:18	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:13:20	60.007	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:13:22	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:13:24	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:26	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:28	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:30	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:32	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:13:34	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:13:36	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:38	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:40	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:42	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:44	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:46	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:48	60.007	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:13:50	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:13:52	60.005	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:13:54	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:13:56	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:58	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:14:00	60.0025	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:14:02	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:14:04	59.9995	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:06	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:08	59.9965	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:10	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:12	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:14	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:16	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:14:18	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001

10/12/09 03:14:20	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:22	59.993	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:24	59.9925	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:26	59.992	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:28	59.9905	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:30	59.989	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:32	59.99	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:14:34	59.991	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:14:36	59.989	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:38	59.987	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:40	59.9875	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:42	59.988	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:44	59.988	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:46	59.988	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:48	59.987	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:50	59.986	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:52	59.9855	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:54	59.985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:56	59.9845	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:58	59.984	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:15:00	59.984	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:15:02	59.984	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:15:04	59.985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:06	59.986	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:08	59.987	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:10	59.988	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:12	59.992	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.004	0.004
10/12/09 03:15:14	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.004	0.004
10/12/09 03:15:16	59.9975	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:18	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.002	0.002
10/12/09 03:15:20	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:22	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:24	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:26	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:28	60.0055	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.003	0.003
10/12/09 03:15:30	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:32	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:34	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:36	60.0105	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:15:38	60.009	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:15:40	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:42	60.011	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:44	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:46	60.013	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:48	60.013	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:50	60.013	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:52	60.0145	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:54	60.016	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:56	60.0155	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000

10/12/09 03:15:58	60.015	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:59	60.014	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:01	60.013	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:03	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:05	60.011	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:07	60.0105	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:09	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:11	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:16:13	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:16:15	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:17	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:19	60.0045	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:21	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:16:23	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:25	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:27	60.0035	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:16:29	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:31	60.0025	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:33	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:16:35	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:16:37	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:16:39	59.9965	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:16:41	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:43	59.9965	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:45	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:16:47	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:49	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:51	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:16:53	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:16:55	59.9985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:57	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:59	59.9985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:17:01	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:17:03	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:17:05	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:17:07	59.9985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:17:09	60	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:17:11	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:17:13	60.002	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:17:15	60.0015	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:17:17	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:17:19	60.0035	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.003	0.003
10/12/09 03:17:21	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:17:23	60.0055	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:17:25	60.005	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000

Balancing Authority Name: MyBA

MyBA_091012_0227_FRS_Form2.9.xlsm

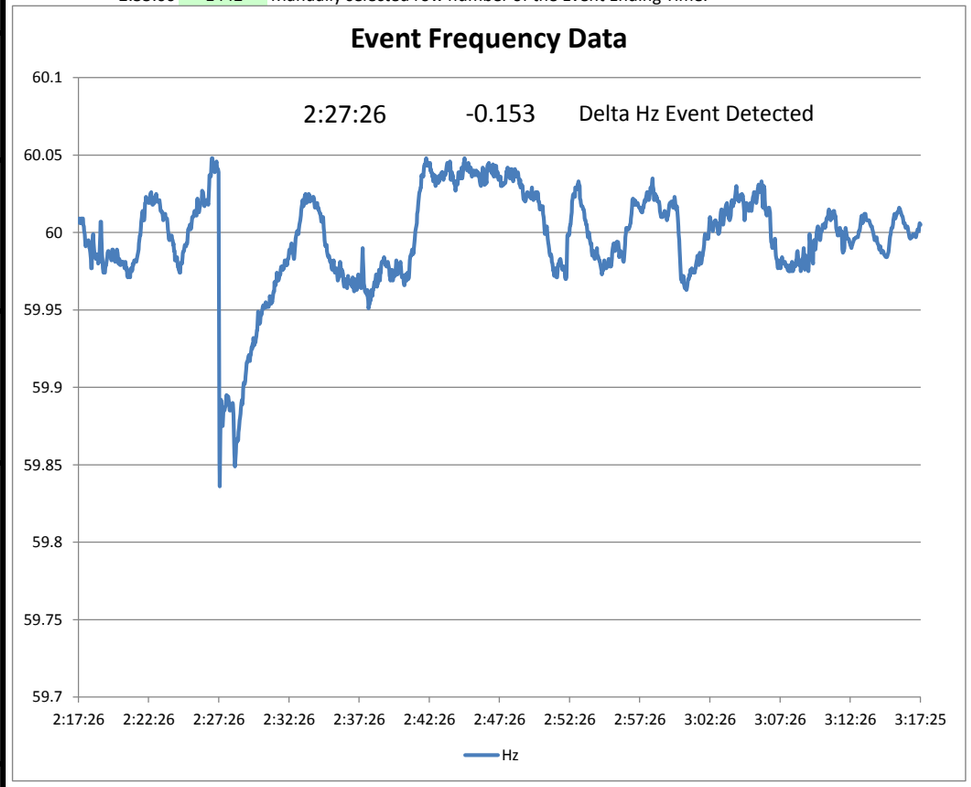
Interconnection Prevailing UFLS First Step Relay trip point 59.500 Hz

Interconnection High Relay trip point 60.500 Hz

Note: See "Instruction" tab for more detailed instructions.

	Auto	**Event Detection**
2:27:26	1245	Manually selected row number of the Event Starting Time.
2:33:00	1442	Manually selected row number of the Event Ending Time.

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



09/10/12 Date yymmdd

2:27 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_091012_0227_FRS_Form2.9.xlsm

Auto
Manual

Date:	Monday, October 12, 2009		Balancing Authority	MyBA		A Point	2:27:24
Time of T(0)	2:27:26		Grid Nominal Frequency	60.000 Hz		FPointA	60.03900146
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:00					A Value	60.04212523
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.042 Hz		Droop Setting	5.00%	3.00000 Hz	C Value	59.83599854
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.889 Hz		Deadband Setting	0.000 Hz		Delta FC	
Pre to Post Perturbation Delta Frequency Actual	-0.153 Hz		Hz Span	3.00000 Hz			
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.73 MW						
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	3788.35 MW						
Pre to Post Perturbation Interchange Delta MW Actual	157.63 MW						
Initial Performance Ramp Magnitude Adjustment	-15.40 MW						
EPFR Pre-Perturbation Average	-43.39 MW						
EPFR Post-Perturbation Average	114.21 MW						
EPFR Delta	157.60 MW		TC (frequency response filter constant)	0.350	Time Constant for delayed delivery of PFR during Sustained Measure		

			Low Hz	Delta Hz Event
			3764.66	Actual Interchange MW Average during frequency recovery period
			3804.23	Target Interchange MW Average during frequency recovery period
EPFR = Expected Primary Frequency Response	EPFR(Final)	142.20 MW	3719.84	Interchange Average Ramp MW during frequency recovery period
MW Response in right direction for frequency delta		Yes	3640.68	Actual MW @ T(-4)
			103.04	Starting and Ending Difference in Interchange MW during frequency recovery period (indicates r
			0:05:34	Event Duration (h:mm:ss)
			No	Target MW Average minus MW @ T(-4) less than zero
			163.55	Interchange Target Relative Average Change - MW (Low Frequency Event)
			123.97	Interchange Actual Relative Average Change - MW (Low Frequency Event)
			No	Interchange Actual Average minus MW @ T(-4) less than zero
			Yes	Interchange Average MW minus MW @ T(-4) greater than zero
			Yes	Interchange Target MW Average minus MW @ T(-4) greater than zero
			60.52	Interchange Target Relative Average Change - MW (High Frequency Event)
			20.94	Interchange Actual Relative Average Change - MW (High Frequency Event)
			Up	Ramp Direction during frequency recovery period

Initial Response P.U. Performance			1.109 P.U.							0.758 P.U. Sustianed Response P.U. Performance						
	T	Frequency Hz	Interchange MW	Value B 20 to 52 sec Average Frequency	Average MW		Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response		Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW
T-72 sec	2:26:14	60.027	3671.189				3090	-27.810	-9.734							
T-70 sec	2:26:16	60.026	3668.611				3090	-26.781	-15.700							
T-68 sec	2:26:18	60.026	3665.232				3090	-26.781	-19.578							
T-66 sec	2:26:20	60.022	3664.495				3090	-22.659	-20.657							
T-64 sec	2:26:22	60.019	3666.062				3090	-19.571	-20.277							
T-62 sec	2:26:24	60.017	3666.821				3090	-17.508	-19.308							

T-60 sec	2:26:26	60.019	3666.787			3090	-19.571	-19.400		-0.102	3666.787						
T-58 sec	2:26:28	60.02	3670.454			3090	-20.600	-19.820		-0.102	3666.265						
T-56 sec	2:26:30	60.019	3670.267			3090	-19.571	-19.733		-0.102	3666.251						
T-54 sec	2:26:32	60.021	3671.668			3090	-21.630	-20.397		-0.102	3665.485						
T-52 sec	2:26:34	60.021	3672.493			3090	-21.630	-20.828		-0.102	3664.952						
T-50 sec	2:26:36	60.021	3672.685			3090	-21.630	-21.109		-0.102	3664.570						
T-48 sec	2:26:38	60.019	3672.857			3090	-19.571	-20.571		-0.102	3665.006						
T-46 sec	2:26:40	60.018	3672.164			3090	-18.542	-19.861		-0.102	3665.615						
T-44 sec	2:26:42	60.022	3671.413			3090	-22.659	-20.840		-0.102	3664.533						
T-42 sec	2:26:44	60.031	3669.983			3090	-31.928	-24.721		-0.102	3660.551						
T-40 sec	2:26:46	60.037	3666.467			3090	-38.109	-29.407		-0.102	3655.763						
T-38 sec	2:26:48	60.037	3663.758			3090	-38.109	-32.452		-0.102	3652.616						
T-36 sec	2:26:50	60.036	3661.599			3090	-37.079	-34.072		-0.102	3650.895						
T-34 sec	2:26:52	60.037	3660.672			3090	-38.109	-35.485		-0.102	3649.380						
T-32 sec	2:26:54	60.046	3651.492			3090	-47.381	-39.649		-0.102	3645.114						
T-30 sec	2:26:56	60.048	3649.190			3090	-49.440	-43.076		-0.102	3641.585						
T-28 sec	2:26:58	60.048	3650.025			3090	-49.440	-45.303		-0.102	3639.256						
T-26 sec	2:27:00	60.043	3648.246			3090	-44.289	-44.948		-0.102	3639.509						
T-24 sec	2:27:02	60.041	3649.512			3090	-42.230	-43.997		-0.102	3640.359						
T-22 sec	2:27:04	60.041	3654.294			3090	-42.230	-43.379		-0.102	3640.875						
T-20 sec	2:27:06	60.041	3655.007			3090	-42.230	-42.977		-0.102	3641.176						
T-18 sec	2:27:08	60.039	3651.874			3090	-40.172	-41.995		-0.102	3642.056						
T-16 sec	2:27:10	60.041	3651.059	60.042	3645.73	3090	-42.230	-42.077		-0.102	3641.872						
T-14 sec	2:27:12	60.043	3649.187	60.042	3645.73	3090	-44.289	-42.852		-0.102	3640.996						
T-12 sec	2:27:14	60.045	3648.236	60.042	3645.73	3090	-46.348	-44.075		-0.102	3639.670						
T-10 sec	2:27:16	60.046	3645.387	60.042	3645.73	3090	-47.381	-45.232		-0.102	3638.411						
T-08 sec	2:27:18	60.041	3644.628	60.042	3645.73	3090	-42.230	-44.182		-0.102	3639.360						
T-06 sec	2:27:20	60.041	3645.446	60.042	3645.73	3090	-42.230	-43.499		-0.102	3639.942						
T-04 sec	2:27:22	60.041	3640.682	60.042	3645.73	3090	-42.230	-43.055		-0.102	3640.284						
T-02 sec	2:27:24	60.039	3641.191	60.042	3645.73	3090	-40.172	-42.046		-0.102	3641.191						
T+0 sec	2:27:26	59.978	3659.465			3090	22.659	-19.399		0.000	3663.838						
T+02 sec	2:27:28	59.852	3696.362			3090	152.439	40.744		0.617	3724.598	3677.914	3694.218	3668.635	3668.635		
T+04 sec	2:27:30	59.836	3734.904			3090	168.922	85.606		0.617	3770.077	3696.910	3719.504	3669.252	3668.944		
T+06 sec	2:27:32	59.869	3734.673			3090	134.931	102.870		0.617	3787.958	3706.351	3736.618	3669.869	3669.252		
T+08 sec	2:27:34	59.869	3734.673			3090	134.931	114.091		0.617	3799.796	3712.015	3749.253	3670.486	3669.561		
T+10 sec	2:27:36	59.892	3737.157			3090	111.242	113.094		0.617	3799.415	3716.206	3757.614	3671.103	3669.869		
T+12 sec	2:27:38	59.891	3761.250			3090	112.271	112.806		0.617	3799.745	3722.640	3763.632	3671.720	3670.178		
T+14 sec	2:27:40	59.88	3766.113			3090	123.599	116.583		0.617	3804.139	3728.074	3768.696	3672.337	3670.486		
T+16 sec	2:27:42	59.876	3766.194			3090	127.721	120.481		0.617	3808.654	3732.310	3773.136	3672.954	3670.795		
T+18 sec	2:27:44	59.875	3768.877			3090	128.750	123.375		0.617	3812.165	3735.967	3777.038	3673.571	3671.103		
T+20 sec	2:27:46	59.883	3769.925	59.889	3788.35	3090	120.511	122.373	3803.32	0.617	3811.779	3739.054	3780.197	3674.188	3671.412		
T+22 sec	2:27:48	59.887	3780.621	59.889	3788.35	3090	116.389	120.278	3803.32	0.617	3810.302	3742.518	3782.705	3674.805	3671.720		
T+24 sec	2:27:50	59.886	3781.592	59.889	3788.35	3090	117.418	119.277	3803.32	0.617	3809.918	3745.523	3784.799	3675.422	3672.029		
T+26 sec	2:27:52	59.885	3782.500	59.889	3788.35	3090	118.452	118.988	3803.32	0.617	3810.246	3748.165	3786.616	3676.039	3672.337		
T+28 sec	2:27:54	59.887	3784.962	59.889	3788.35	3090	116.389	118.079	3803.32	0.617	3809.953	3750.618	3788.172	3676.656	3672.646		
T+30 sec	2:27:56	59.888	3784.730	59.889	3788.35	3090	115.359	117.127	3803.32	0.617	3809.618	3752.750	3789.513	3677.273	3672.954		
T+32 sec	2:27:58	59.89	3784.419	59.889	3788.35	3090	113.301	115.788	3803.32	0.617	3808.896	3754.613	3790.653	3677.890	3673.263		
T+34 sec	2:28:00	59.895	3788.072	59.889	3788.35	3090	108.150	113.114	3803.32	0.617	3806.840	3756.471	3791.552	3678.507	3673.571		
T+36 sec	2:28:02	59.894	3788.328	59.889	3788.35	3090	109.179	111.737	3803.32	0.617	3806.079	3758.148	3792.317	3679.124	3673.879		

T+38 sec	2:28:04	59.893	3788.868	59.889	3788.35	3090	110.208	111.202	3803.32	0.617	3806.161	3759.684	3793.009	3679.741	3674.188
T+40 sec	2:28:06	59.894	3788.472	59.889	3788.35	3090	109.179	110.494	3803.32	0.617	3806.070	3761.055	3793.631	3680.358	3674.496
T+42 sec	2:28:08	59.894	3792.276	59.889	3788.35	3090	109.179	110.034	3803.32	0.617	3806.227	3762.474	3794.203	3680.975	3674.805
T+44 sec	2:28:10	59.891	3793.074	59.889	3788.35	3090	112.271	110.817	3803.32	0.617	3807.627	3763.805	3794.787	3681.592	3675.113
T+46 sec	2:28:12	59.89	3794.374	59.889	3788.35	3090	113.301	111.686	3803.32	0.617	3809.113	3765.078	3795.384	3682.209	3675.422
T+48 sec	2:28:14	59.885	3799.428	59.889	3788.35	3090	118.452	114.054	3803.32	0.617	3812.098	3766.452	3796.053	3682.826	3675.730
T+50 sec	2:28:16	59.885	3800.427	59.889	3788.35	3090	118.452	115.593	3803.32	0.617	3814.254	3767.759	3796.753	3683.443	3676.039
T+52 sec	2:28:18	59.888	3799.959	59.889	3788.35	3090	115.359	115.511	3803.32	0.617	3814.790	3768.952	3797.421	3684.060	3676.347
T+54 sec	2:28:20	59.887	3803.625			3090	116.389	115.819		0.617	3815.714	3770.190	3798.074	3684.677	3676.656
T+56 sec	2:28:22	59.888	3802.925			3090	115.359	115.658		0.617	3816.170	3771.319	3798.698	3685.293	3676.964
T+58 sec	2:28:24	59.888	3802.951			3090	115.359	115.553		0.617	3816.682	3772.373	3799.297	3685.910	3677.273
T+60 sec	2:28:26	59.89	3804.388			3090	113.301	114.765		0.617	3816.511	3773.406	3799.853	3686.527	3677.581
T+62 sec	2:28:28	59.889	3805.496			3090	114.330	114.613		0.617	3816.976	3774.409	3800.388	3687.144	3677.890
T+64 sec	2:28:30	59.882	3805.617			3090	121.540	117.037		0.617	3820.017	3775.354	3800.983	3687.761	3678.198
T+66 sec	2:28:32	59.873	3809.237			3090	130.809	121.857		0.617	3825.454	3776.351	3801.702	3688.378	3678.507
T+68 sec	2:28:34	59.857	3811.503			3090	147.292	130.759		0.617	3834.973	3777.355	3802.653	3688.995	3678.815
T+70 sec	2:28:36	59.849	3814.862			3090	155.531	139.429		0.617	3844.260	3778.397	3803.809	3689.612	3679.124
T+72 sec	2:28:38	59.852	3815.889			3090	152.439	143.983		0.617	3849.431	3779.410	3805.042	3690.229	3679.432
T+74 sec	2:28:40	59.858	3825.643			3090	146.258	144.779		0.617	3850.844	3780.627	3806.247	3690.846	3679.741
T+76 sec	2:28:42	59.863	3826.053			3090	141.111	143.495		0.617	3850.177	3781.792	3807.373	3691.463	3680.049
T+78 sec	2:28:44	59.866	3826.002			3090	138.019	141.579		0.617	3848.877	3782.897	3808.411	3692.080	3680.358
T+80 sec	2:28:46	59.865	3827.524			3090	139.048	140.693		0.617	3848.609	3783.986	3809.392	3692.697	3680.666
T+82 sec	2:28:48	59.867	3826.753			3090	136.989	139.397		0.617	3847.929	3785.004	3810.309	3693.314	3680.975
T+84 sec	2:28:50	59.866	3826.783			3090	138.019	138.914		0.617	3848.064	3785.975	3811.187	3693.931	3681.283
T+86 sec	2:28:52	59.871	3826.454			3090	132.872	136.799		0.617	3846.566	3786.895	3811.991	3694.548	3681.592
T+88 sec	2:28:54	59.874	3825.713			3090	129.779	134.342		0.617	3844.726	3787.758	3812.719	3695.165	3681.900
T+90 sec	2:28:56	59.879	3823.826			3090	124.628	130.943		0.617	3841.943	3788.542	3813.354	3695.782	3682.209
T+92 sec	2:28:58	59.88	3822.505			3090	123.599	128.372		0.617	3839.990	3789.265	3813.921	3696.399	3682.517
T+94 sec	2:29:00	59.883	3819.081			3090	120.511	125.621		0.617	3837.855	3789.886	3814.419	3697.016	3682.826
T+96 sec	2:29:02	59.886	3818.055			3090	117.418	122.750		0.617	3835.601	3790.461	3814.852	3697.633	3683.134
T+98 sec	2:29:04	59.89	3816.815			3090	113.301	119.443		0.617	3832.911	3790.988	3815.213	3698.250	3683.443
T+100 sec	2:29:06	59.892	3815.010			3090	111.242	116.572		0.617	3830.658	3791.459	3815.516	3698.867	3683.751
T+102 sec	2:29:08	59.889	3813.783			3090	114.330	115.788		0.617	3830.490	3791.888	3815.804	3699.484	3684.060
T+104 sec	2:29:10	59.893	3811.838			3090	110.208	113.835		0.617	3829.154	3792.265	3816.055	3700.101	3684.368
T+106 sec	2:29:12	59.899	3809.652			3090	104.032	110.404		0.617	3826.340	3792.587	3816.246	3700.718	3684.677
T+108 sec	2:29:14	59.903	3806.972			3090	99.910	106.731		0.617	3823.284	3792.848	3816.374	3701.335	3684.985
T+110 sec	2:29:16	59.902	3805.593			3090	100.940	104.704		0.617	3821.874	3793.076	3816.472	3701.952	3685.293
T+112 sec	2:29:18	59.902	3804.188			3090	100.940	103.386		0.617	3821.174	3793.271	3816.555	3702.569	3685.602
T+114 sec	2:29:20	59.904	3796.078			3090	98.881	101.809		0.617	3820.214	3793.319	3816.618	3703.186	3685.910
T+116 sec	2:29:22	59.907	3793.975			3090	95.788	99.702		0.617	3818.723	3793.330	3816.653	3703.803	3686.219
T+118 sec	2:29:24	59.911	3792.169			3090	91.671	96.891		0.617	3816.529	3793.311	3816.651	3704.420	3686.527
T+120 sec	2:29:26	59.916	3791.502			3090	86.520	93.261		0.617	3813.516	3793.281	3816.600	3705.037	3686.836
T+122 sec	2:29:28	59.916	3789.534			3090	86.520	90.902		0.617	3811.774	3793.221	3816.522	3705.654	3687.144
T+124 sec	2:29:30	59.917	3788.132			3090	85.490	89.008		0.617	3810.497	3793.140	3816.426	3706.271	3687.453
T+126 sec	2:29:32	59.918	3784.563			3090	84.461	87.416		0.617	3809.522	3793.006	3816.319	3706.888	3687.761
T+128 sec	2:29:34	59.92	3783.028			3090	82.402	85.661		0.617	3808.384	3792.853	3816.197	3707.504	3688.070
T+130 sec	2:29:36	59.921	3781.701			3090	81.369	84.159		0.617	3807.499	3792.684	3816.065	3708.121	3688.378
T+132 sec	2:29:38	59.92	3776.358			3090	82.402	83.544		0.617	3807.501	3792.440	3815.937	3708.738	3688.687
T+134 sec	2:29:40	59.917	3775.635			3090	85.490	84.225		0.617	3808.799	3792.193	3815.832	3709.355	3688.995

T+136 sec	2:29:42	59.92	3774.604	3090	82.402	83.587	0.617	3808.778	3791.938	3815.730	3709.972	3689.304
T+138 sec	2:29:44	59.921	3773.334	3090	81.369	82.811	0.617	3808.618	3791.672	3815.628	3710.589	3689.612
T+140 sec	2:29:46	59.923	3773.958	3090	79.310	81.585	0.617	3808.010	3791.423	3815.521	3711.206	3689.921
T+142 sec	2:29:48	59.926	3772.722	3090	76.221	79.708	0.617	3806.750	3791.163	3815.399	3711.823	3690.229
T+144 sec	2:29:50	59.925	3771.670	3090	77.251	78.848	0.617	3806.507	3790.896	3815.277	3712.440	3690.538
T+146 sec	2:29:52	59.928	3769.630	3090	74.159	77.207	0.617	3805.482	3790.608	3815.145	3713.057	3690.846
T+148 sec	2:29:54	59.927	3768.707	3090	75.192	76.501	0.617	3805.394	3790.316	3815.015	3713.674	3691.155
T+150 sec	2:29:56	59.932	3767.643	3090	70.041	74.240	0.617	3803.750	3790.018	3814.867	3714.291	3691.463
T+152 sec	2:29:58	59.927	3767.021	3090	75.192	74.573	0.617	3804.700	3789.719	3814.735	3714.908	3691.772
T+154 sec	2:30:00	59.928	3767.408	3090	74.159	74.428	0.617	3805.172	3789.433	3814.612	3715.525	3692.080
T+156 sec	2:30:02	59.931	3766.788	3090	71.070	73.253	0.617	3804.614	3789.147	3814.485	3716.142	3692.389
T+158 sec	2:30:04	59.929	3766.259	3090	73.129	73.210	0.617	3805.187	3788.861	3814.369	3716.759	3692.697
T+160 sec	2:30:06	59.931	3765.672	3090	71.070	72.461	0.617	3805.055	3788.574	3814.254	3717.376	3693.006
T+162 sec	2:30:08	59.933	3766.123	3090	69.011	71.254	0.617	3804.465	3788.301	3814.135	3717.993	3693.314
T+164 sec	2:30:10	59.937	3764.243	3090	64.890	69.026	0.617	3802.855	3788.011	3813.999	3718.610	3693.623
T+166 sec	2:30:12	59.937	3765.105	3090	64.890	67.578	0.617	3802.024	3787.738	3813.856	3719.227	3693.931
T+168 sec	2:30:14	59.945	3762.935	3090	56.650	63.754	0.617	3798.816	3787.446	3813.679	3719.844	3694.240
T+170 sec	2:30:16	59.949	3758.387	3090	52.529	59.825	0.617	3795.504	3787.108	3813.468	3720.461	3694.548
T+172 sec	2:30:18	59.947	3753.922	3090	54.591	57.993	0.617	3794.290	3786.727	3813.248	3721.078	3694.857
T+174 sec	2:30:20	59.942	3749.867	3090	59.739	58.604	0.617	3795.518	3786.308	3813.046	3721.695	3695.165
T+176 sec	2:30:22	59.941	3746.889	3090	60.768	59.361	0.617	3796.892	3785.865	3812.865	3722.312	3695.474
T+178 sec	2:30:24	59.942	3747.875	3090	59.739	59.493	0.617	3797.641	3785.443	3812.695	3722.929	3695.782
T+180 sec	2:30:26	59.945	3749.593	3090	56.650	58.498	0.617	3797.263	3785.049	3812.526	3723.546	3696.090
	2:30:28	59.948	3748.661	3090	53.558	56.769	0.617	3796.151	3784.654	3812.348	3724.163	3696.399
	2:30:30	59.947	3746.706	3090	54.591	56.007	0.617	3796.005	3784.245	3812.172	3724.780	3696.707
	2:30:32	59.949	3749.077	3090	52.529	54.790	0.617	3795.405	3783.871	3811.994	3725.397	3697.016
	2:30:34	59.951	3742.741	3090	50.470	53.278	0.617	3794.510	3783.438	3811.810	3726.014	3697.324
	2:30:36	59.952	3740.259	3090	49.440	51.935	0.617	3793.784	3782.989	3811.622	3726.631	3697.633
	2:30:38	59.953	3736.139	3090	48.411	50.701	0.617	3793.167	3782.506	3811.432	3727.248	3697.941
	2:30:40	59.951	3731.382	3090	50.470	50.620	0.617	3793.703	3781.984	3811.251	3727.865	3698.250
	2:30:42	59.952	3727.838	3090	49.440	50.207	0.617	3793.907	3781.437	3811.076	3728.482	3698.558
	2:30:44	59.952	3725.952	3090	49.440	49.939	0.617	3794.256	3780.882	3810.907	3729.099	3698.867
	2:30:46	59.952	3722.649	3090	49.440	49.764	0.617	3794.698	3780.306	3810.747	3729.715	3699.175
	2:30:48	59.955	3720.578	3090	46.348	48.569	0.617	3794.120	3779.720	3810.584	3730.332	3699.484
	2:30:50	59.952	3717.996	3090	49.440	48.874	0.617	3795.042	3779.121	3810.433	3730.949	3699.792
	2:30:52	59.954	3718.142	3090	47.381	48.351	0.617	3795.136	3778.534	3810.286	3731.566	3700.101
	2:30:54	59.952	3715.753	3090	49.440	48.733	0.617	3796.135	3777.937	3810.151	3732.183	3700.409
	2:30:56	59.953	3713.694	3090	48.411	48.620	0.617	3796.639	3777.330	3810.024	3732.800	3700.718
	2:30:58	59.953	3713.484	3090	48.411	48.547	0.617	3797.183	3776.734	3809.904	3733.417	3701.026
	2:31:00	59.952	3710.848	3090	49.440	48.860	0.617	3798.112	3776.124	3809.795	3734.034	3701.335
	2:31:02	59.954	3710.810	3090	47.381	48.342	0.617	3798.212	3775.525	3809.688	3734.651	3701.643
	2:31:04	59.954	3712.092	3090	47.381	48.006	0.617	3798.493	3774.948	3809.586	3735.268	3701.952
	2:31:06	59.959	3714.623	3090	42.230	45.985	0.617	3797.088	3774.404	3809.474	3735.885	3702.260
	2:31:08	59.957	3715.130	3090	44.289	45.391	0.617	3797.112	3773.875	3809.364	3736.502	3702.569
	2:31:10	59.956	3716.168	3090	45.319	45.366	0.617	3797.704	3773.364	3809.260	3737.119	3702.877
	2:31:12	59.954	3716.461	3090	47.381	46.071	0.617	3799.026	3772.865	3809.171	3737.736	3703.186
	2:31:14	59.956	3716.980	3090	45.319	45.808	0.617	3799.380	3772.379	3809.085	3738.353	3703.494
	2:31:16	59.955	3717.759	3090	46.348	45.997	0.617	3800.186	3771.908	3809.009	3738.970	3703.803
	2:31:18	59.958	3722.361	3090	43.260	45.039	0.617	3799.845	3771.485	3808.930	3739.587	3704.111

2:31:20	59.961	3721.973	3090	40.172	43.335	0.617	3798.758	3771.065	3808.844	3740.204	3704.420
2:31:22	59.962	3722.658	3090	39.138	41.866	0.617	3797.906	3770.659	3808.752	3740.821	3704.728
2:31:24	59.962	3722.267	3090	39.138	40.911	0.617	3797.568	3770.255	3808.659	3741.438	3705.037
2:31:26	59.968	3722.278	3090	32.962	38.129	0.617	3795.403	3769.859	3808.549	3742.055	3705.345
2:31:28	59.966	3721.787	3090	35.020	37.041	0.617	3794.931	3769.465	3808.438	3742.672	3705.654
2:31:30	59.966	3723.091	3090	35.020	36.334	0.617	3794.841	3769.088	3808.327	3743.289	3705.962
2:31:32	59.968	3723.984	3090	32.962	35.153	0.617	3794.278	3768.724	3808.214	3743.906	3706.271
2:31:34	59.97	3723.435	3090	30.899	33.664	0.617	3793.406	3768.362	3808.096	3744.523	3706.579
2:31:36	59.974	3723.893	3090	26.781	31.255	0.617	3791.614	3768.009	3807.965	3745.140	3706.888
2:31:38	59.97	3725.403	3090	30.899	31.130	0.617	3792.106	3767.673	3807.840	3745.757	3707.196
2:31:40	59.969	3727.121	3090	31.928	31.410	0.617	3793.002	3767.357	3807.724	3746.374	3707.504
2:31:42	59.969	3728.053	3090	31.928	31.591	0.617	3793.800	3767.052	3807.616	3746.991	3707.813
2:31:44	59.97	3731.130	3090	30.899	31.349	0.617	3794.175	3766.776	3807.513	3747.608	3708.121
2:31:46	59.971	3732.530	3090	29.869	30.831	0.617	3794.274	3766.514	3807.412	3748.225	3708.430
2:31:48	59.973	3733.327	3090	27.810	29.774	0.617	3793.834	3766.263	3807.309	3748.842	3708.738
2:31:50	59.973	3736.535	3090	27.810	29.087	0.617	3793.764	3766.039	3807.207	3749.459	3709.047
2:31:52	59.976	3736.907	3090	24.718	27.558	0.617	3792.852	3765.822	3807.100	3750.076	3709.355
2:31:54	59.978	3736.822	3090	22.659	25.843	0.617	3791.754	3765.607	3806.986	3750.693	3709.664
2:31:56	59.978	3738.699	3090	22.659	24.729	0.617	3791.257	3765.409	3806.870	3751.310	3709.972
2:31:58	59.976	3739.944	3090	24.718	24.725	0.617	3791.870	3765.223	3806.761	3751.927	3710.281
2:32:00	59.978	3740.877	3090	22.659	24.002	0.617	3791.764	3765.047	3806.652	3752.543	3710.589
2:32:02	59.976	3741.794	3090	24.718	24.253	0.617	3792.632	3764.880	3806.551	3753.160	3710.898
2:32:04	59.978	3745.234	3090	22.659	23.695	0.617	3792.691	3764.739	3806.452	3753.777	3711.206
2:32:06	59.977	3746.608	3090	23.689	23.693	0.617	3793.306	3764.611	3806.359	3754.394	3711.515
2:32:08	59.98	3748.300	3090	20.600	22.611	0.617	3792.840	3764.496	3806.264	3755.011	3711.823
2:32:10	59.982	3750.716	3090	18.542	21.186	0.617	3792.033	3764.399	3806.164	3755.628	3712.132
2:32:12	59.981	3751.558	3090	19.571	20.621	0.617	3792.085	3764.310	3806.067	3756.245	3712.440
2:32:14	59.98	3752.748	3090	20.600	20.614	0.617	3792.695	3764.230	3805.974	3756.862	3712.749
2:32:16	59.979	3755.599	3090	21.630	20.969	0.617	3793.667	3764.171	3805.890	3757.479	3713.057
2:32:18	59.98	3756.407	3090	20.600	20.840	0.617	3794.155	3764.119	3805.810	3758.096	3713.366
2:32:20	59.979	3756.975	3090	21.630	21.117	0.617	3795.048	3764.070	3805.738	3758.713	3713.674
2:32:22	59.983	3760.405	3090	17.508	19.854	0.617	3794.402	3764.046	3805.662	3759.330	3713.983
2:32:24	59.983	3760.982	3090	17.508	19.033	0.617	3794.199	3764.025	3805.585	3759.947	3714.291
2:32:26	59.984	3761.407	3090	16.479	18.139	0.617	3793.922	3764.008	3805.508	3760.564	3714.600
2:32:28	59.988	3762.737	3090	12.361	16.117	0.617	3792.516	3764.000	3805.422	3761.181	3714.908
2:32:30	59.989	3763.212	3090	11.332	14.442	0.617	3791.459	3763.994	3805.331	3761.798	3715.217
2:32:32	59.987	3764.958	3090	13.391	14.074	0.617	3791.708	3764.001	3805.243	3762.415	3715.525
2:32:34	59.987	3766.085	3090	13.391	13.835	0.617	3792.085	3764.014	3805.158	3763.032	3715.834
2:32:36	59.991	3766.433	3090	9.269	12.237	0.617	3791.104	3764.030	3805.068	3763.649	3716.142
2:32:38	59.993	3767.251	3090	7.210	10.477	0.617	3789.962	3764.050	3804.971	3764.266	3716.451
2:32:40	59.992	3767.792	3090	8.239	9.694	0.617	3789.796	3764.074	3804.875	3764.883	3716.759
2:32:42	59.991	3768.634	3090	9.269	9.545	0.617	3790.264	3764.102	3804.784	3765.500	3717.068
2:32:44	59.989	3771.146	3090	11.332	10.170	0.617	3791.506	3764.146	3804.701	3766.117	3717.376
2:32:46	59.986	3772.445	3090	14.420	11.658	0.617	3793.610	3764.198	3804.632	3766.734	3717.685
2:32:48	59.983	3773.695	3090	17.508	13.705	0.617	3796.275	3764.257	3804.580	3767.351	3717.993
2:32:50	59.983	3774.668	3090	17.508	15.036	0.617	3798.223	3764.321	3804.541	3767.968	3718.302
2:32:52	59.988	3775.841	3090	12.361	14.100	0.617	3797.903	3764.391	3804.501	3768.585	3718.610
2:32:54	59.993	3775.363	3090	7.210	11.689	0.617	3796.109	3764.457	3804.450	3769.202	3718.918
2:32:56	59.996	3774.866	3090	4.122	9.040	0.617	3794.077	3764.520	3804.387	3769.819	3719.227

2:32:58	59.998	3775.492	3090	2.059	6.597	0.617	3792.251	3764.586	3804.315	3770.436	3719.535
2:33:00	59.999	3776.420	3090	1.029	4.648	0.617	3790.919	3764.656	3804.235	3771.053	3719.844
2:33:02	60.001	3778.554	3090	-1.029	2.661	0.000	3788.932	3764.738	3804.144	3771.053	3720.149
2:33:04	59.999	3779.692	3090	1.029	2.090	0.000	3788.361	3764.826	3804.051	3771.053	3720.450
2:33:06	59.999	3781.256	3090	1.029	1.719	0.000	3787.990	3764.922	3803.958	3771.053	3720.748
2:33:08	59.999	3780.595	3090	1.029	1.478	0.000	3787.749	3765.014	3803.863	3771.053	3721.042
2:33:10	60.002	3783.092	3090	-2.059	0.240	0.000	3786.511	3765.118	3803.763	3771.053	3721.333
2:33:12	60.005	3783.896	3090	-5.151	-1.647	0.000	3784.624	3765.226	3803.653	3771.053	3721.620
2:33:14	60.007	3784.421	3090	-7.210	-3.594	0.000	3782.677	3765.336	3803.533	3771.053	3721.904
2:33:16	60.008	3785.768	3090	-8.239	-5.220	0.000	3781.051	3765.452	3803.405	3771.053	3722.185
2:33:18	60.011	3785.463	3090	-11.332	-7.359	0.000	3778.912	3765.565	3803.267	3771.053	3722.463
2:33:20	60.014	3786.850	3090	-14.420	-9.830	0.000	3776.441	3765.684	3803.116	3771.053	3722.737
2:33:22	60.017	3786.304	3090	-17.508	-12.518	0.000	3773.754	3765.800	3802.952	3771.053	3723.009
2:33:24	60.019	3787.259	3090	-19.571	-14.986	0.000	3771.285	3765.919	3802.776	3771.053	3723.277
2:33:26	60.021	3787.516	3090	-21.630	-17.312	0.000	3768.960	3766.038	3802.590	3771.053	3723.542
2:33:28	60.017	3787.955	3090	-17.508	-17.380	0.000	3768.891	3766.159	3802.404	3771.053	3723.805
2:33:30	60.017	3788.030	3090	-17.508	-17.425	0.000	3768.846	3766.278	3802.221	3771.053	3724.064
2:33:32	60.019	3788.607	3090	-19.571	-18.176	0.000	3768.095	3766.399	3802.036	3771.053	3724.321
2:33:34	60.023	3789.216	3090	-23.689	-20.106	0.000	3766.166	3766.523	3801.842	3771.053	3724.575
2:33:36	60.024	3787.537	3090	-24.718	-21.720	0.000	3764.551	3766.636	3801.641	3771.053	3724.826
2:33:38	60.025	3785.842	3090	-25.752	-23.131	0.000	3763.140	3766.738	3801.435	3771.053	3725.075
2:33:40	60.021	3786.077	3090	-21.630	-22.606	0.000	3763.666	3766.841	3801.234	3771.053	3725.321
2:33:42	60.019	3787.930	3090	-19.571	-21.544	0.000	3764.728	3766.953	3801.041	3771.053	3725.564
2:33:44	60.024	3788.760	3090	-24.718	-22.655	0.000	3763.617	3767.068	3800.844	3771.053	3725.805
2:33:46	60.024	3786.875	3090	-24.718	-23.377	0.000	3762.894	3767.171	3800.646	3771.053	3726.043
2:33:48	60.021	3786.550	3090	-21.630	-22.765	0.000	3763.506	3767.272	3800.452	3771.053	3726.279
2:33:50	60.02	3787.358	3090	-20.600	-22.008	0.000	3764.264	3767.376	3800.265	3771.053	3726.512
2:33:52	60.025	3785.018	3090	-25.752	-23.318	0.000	3762.953	3767.467	3800.072	3771.053	3726.743
2:33:54	60.024	3785.614	3090	-24.718	-23.808	0.000	3762.463	3767.560	3799.879	3771.053	3726.971
2:33:56	60.02	3785.949	3090	-20.600	-22.685	0.000	3763.586	3767.654	3799.694	3771.053	3727.197
2:33:58	60.02	3785.804	3090	-20.600	-21.956	0.000	3764.316	3767.746	3799.515	3771.053	3727.421
2:34:00	60.022	3786.864	3090	-22.659	-22.202	0.000	3764.069	3767.843	3799.336	3771.053	3727.642
2:34:02	60.022	3786.877	3090	-22.659	-22.362	0.000	3763.909	3767.938	3799.158	3771.053	3727.861
2:34:04	60.022	3785.254	3090	-22.659	-22.466	0.000	3763.805	3768.025	3798.981	3771.053	3728.079
2:34:06	60.021	3785.726	3090	-21.630	-22.173	0.000	3764.098	3768.113	3798.807	3771.053	3728.293
2:34:08	60.021	3786.347	3090	-21.630	-21.983	0.000	3764.288	3768.203	3798.636	3771.053	3728.506
2:34:10	60.023	3785.821	3090	-23.689	-22.580	0.000	3763.691	3768.290	3798.464	3771.053	3728.717
2:34:12	60.023	3785.798	3090	-23.689	-22.968	0.000	3763.303	3768.376	3798.292	3771.053	3728.925
2:34:14	60.022	3786.284	3090	-22.659	-22.860	0.000	3763.411	3768.463	3798.122	3771.053	3729.132
2:34:16	60.019	3786.939	3090	-19.571	-21.709	0.000	3764.562	3768.553	3797.959	3771.053	3729.336
2:34:18	60.016	3787.627	3090	-16.479	-19.878	0.000	3766.393	3768.645	3797.806	3771.053	3729.539
2:34:20	60.018	3789.444	3090	-18.542	-19.411	0.000	3766.861	3768.745	3797.658	3771.053	3729.739
2:34:22	60.018	3789.673	3090	-18.542	-19.106	0.000	3767.165	3768.845	3797.512	3771.053	3729.938
2:34:24	60.018	3789.404	3090	-18.542	-18.909	0.000	3767.363	3768.943	3797.368	3771.053	3730.135
2:34:26	60.019	3788.479	3090	-19.571	-19.141	0.000	3767.131	3769.036	3797.225	3771.053	3730.330
2:34:28	60.019	3789.183	3090	-19.571	-19.291	0.000	3766.980	3769.131	3797.082	3771.053	3730.523
2:34:30	60.016	3789.369	3090	-16.479	-18.307	0.000	3767.964	3769.226	3796.945	3771.053	3730.714
2:34:32	60.015	3789.005	3090	-15.449	-17.307	0.000	3768.964	3769.318	3796.815	3771.053	3730.903
2:34:34	60.016	3788.665	3090	-16.479	-17.017	0.000	3769.254	3769.408	3796.686	3771.053	3731.091

2:34:36	60.014	3788.933	3090	-14.420	-16.108	0.000	3770.163	3769.499	3796.564	3771.053	3731.277
2:34:38	60.013	3790.667	3090	-13.391	-15.157	0.000	3771.114	3769.596	3796.446	3771.053	3731.461
2:34:40	60.012	3790.805	3090	-12.361	-14.178	0.000	3772.093	3769.693	3796.335	3771.053	3731.643
2:34:42	60.012	3790.411	3090	-12.361	-13.542	0.000	3772.729	3769.788	3796.227	3771.053	3731.824
2:34:44	60.01	3789.769	3090	-10.298	-12.407	0.000	3773.864	3769.879	3796.125	3771.053	3732.003
2:34:46	60.007	3791.540	3090	-7.210	-10.588	0.000	3775.683	3769.977	3796.033	3771.053	3732.181
2:34:48	60.007	3792.945	3090	-7.210	-9.406	0.000	3776.866	3770.080	3795.946	3771.053	3732.356
2:34:50	60.009	3791.027	3090	-9.269	-9.358	0.000	3776.913	3770.174	3795.861	3771.053	3732.531
2:34:52	60.009	3791.443	3090	-9.269	-9.327	0.000	3776.945	3770.269	3795.777	3771.053	3732.704
2:34:54	60.01	3791.426	3090	-10.298	-9.667	0.000	3776.605	3770.363	3795.691	3771.053	3732.875
2:34:56	60.003	3790.603	3090	-3.088	-7.364	0.000	3778.907	3770.453	3795.617	3771.053	3733.044
2:34:58	59.999	3790.457	3090	1.029	-4.426	0.000	3781.845	3770.541	3795.556	3771.053	3733.213
2:35:00	59.995	3790.216	3090	5.151	-1.074	0.000	3785.197	3770.627	3795.511	3771.053	3733.379
2:35:02	59.992	3789.585	3090	8.239	2.185	0.000	3788.457	3770.710	3795.480	3771.053	3733.545
2:35:04	59.991	3788.457	3090	9.269	4.665	0.000	3790.936	3770.787	3795.460	3771.053	3733.708
2:35:06	59.992	3788.105	3090	8.239	5.916	0.000	3792.187	3770.862	3795.446	3771.053	3733.871
2:35:08	59.992	3788.057	3090	8.239	6.729	0.000	3793.000	3770.936	3795.436	3771.053	3734.032
2:35:10	59.988	3788.189	3090	12.361	8.700	0.000	3794.972	3771.010	3795.434	3771.053	3734.191
2:35:12	59.986	3788.497	3090	14.420	10.702	0.000	3796.973	3771.085	3795.440	3771.053	3734.349
2:35:14	59.985	3788.540	3090	15.449	12.364	0.000	3798.635	3771.159	3795.454	3771.053	3734.506
2:35:16	59.984	3788.571	3090	16.479	13.804	0.000	3800.075	3771.233	3795.474	3771.053	3734.662
2:35:18	59.985	3788.101	3090	15.449	14.380	0.000	3800.651	3771.304	3795.495	3771.053	3734.816
2:35:20	59.984	3787.133	3090	16.479	15.114	0.000	3801.386	3771.371	3795.520	3771.053	3734.969
2:35:22	59.982	3786.453	3090	18.542	16.314	0.000	3802.585	3771.434	3795.550	3771.053	3735.120
2:35:24	59.981	3787.732	3090	19.571	17.454	0.000	3803.725	3771.502	3795.584	3771.053	3735.271
2:35:26	59.982	3788.813	3090	18.542	17.835	0.000	3804.106	3771.574	3795.619	3771.053	3735.420
2:35:28	59.979	3789.285	3090	21.630	19.163	0.000	3805.434	3771.647	3795.660	3771.053	3735.568
2:35:30	59.977	3788.256	3090	23.689	20.747	0.000	3807.018	3771.715	3795.706	3771.053	3735.714
2:35:32	59.976	3788.410	3090	24.718	22.137	0.000	3808.408	3771.784	3795.758	3771.053	3735.860
2:35:34	59.976	3790.467	3090	24.718	23.040	0.000	3809.312	3771.860	3795.814	3771.053	3736.004
2:35:36	59.979	3790.665	3090	21.630	22.547	0.000	3808.818	3771.936	3795.867	3771.053	3736.147
2:35:38	59.982	3790.420	3090	18.542	21.145	0.000	3807.416	3772.011	3795.913	3771.053	3736.289
2:35:40	59.978	3789.674	3090	22.659	21.675	0.000	3807.946	3772.082	3795.962	3771.053	3736.430
2:35:42	59.976	3789.267	3090	24.718	22.740	0.000	3809.011	3772.151	3796.014	3771.053	3736.569
2:35:44	59.974	3789.148	3090	26.781	24.154	0.000	3810.426	3772.219	3796.072	3771.053	3736.708
2:35:46	59.976	3790.430	3090	24.718	24.352	0.000	3810.623	3772.292	3796.130	3771.053	3736.845
2:35:48	59.977	3789.914	3090	23.689	24.120	0.000	3810.391	3772.362	3796.187	3771.053	3736.982
2:35:50	59.977	3786.243	3090	23.689	23.969	0.000	3810.240	3772.417	3796.242	3771.053	3737.117
2:35:52	59.975	3787.442	3090	25.752	24.593	0.000	3810.864	3772.476	3796.300	3771.053	3737.251
2:35:54	59.973	3788.963	3090	27.810	25.719	0.000	3811.990	3772.541	3796.361	3771.053	3737.384
2:35:56	59.969	3790.602	3090	31.928	27.892	0.000	3814.163	3772.611	3796.431	3771.053	3737.516
2:35:58	59.97	3791.877	3090	30.899	28.944	0.000	3815.216	3772.686	3796.504	3771.053	3737.647
2:36:00	59.971	3792.911	3090	29.869	29.268	0.000	3815.539	3772.764	3796.578	3771.053	3737.777
2:36:02	59.973	3792.311	3090	27.810	28.758	0.000	3815.029	3772.840	3796.649	3771.053	3737.906
2:36:04	59.978	3789.125	3090	22.659	26.623	0.000	3812.895	3772.903	3796.711	3771.053	3738.034
2:36:06	59.981	3788.080	3090	19.571	24.155	0.000	3810.426	3772.961	3796.764	3771.053	3738.161
2:36:08	59.978	3787.844	3090	22.659	23.632	0.000	3809.903	3773.018	3796.814	3771.053	3738.287
2:36:10	59.975	3787.135	3090	25.752	24.374	0.000	3810.645	3773.071	3796.867	3771.053	3738.412
2:36:12	59.972	3787.164	3090	28.840	25.937	0.000	3812.208	3773.125	3796.925	3771.053	3738.536

2:36:14	59.976	3786.996	3090	24.718	25.510	0.000	3811.782	3773.177	3796.981	3771.053	3738.659
2:36:16	59.975	3787.405	3090	25.752	25.595	0.000	3811.866	3773.230	3797.037	3771.053	3738.781
2:36:18	59.973	3786.487	3090	27.810	26.370	0.000	3812.641	3773.280	3797.095	3771.053	3738.903
2:36:20	59.969	3787.079	3090	31.928	28.316	0.000	3814.587	3773.332	3797.160	3771.053	3739.023
2:36:22	59.966	3789.214	3090	35.020	30.662	0.000	3816.933	3773.391	3797.234	3771.053	3739.143
2:36:24	59.965	3790.512	3090	36.050	32.548	0.000	3818.819	3773.454	3797.314	3771.053	3739.261
2:36:26	59.966	3791.221	3090	35.020	33.413	0.000	3819.685	3773.520	3797.396	3771.053	3739.379
2:36:28	59.969	3792.218	3090	31.928	32.893	0.000	3819.165	3773.588	3797.476	3771.053	3739.496
2:36:30	59.97	3790.959	3090	30.899	32.195	0.000	3818.467	3773.652	3797.553	3771.053	3739.612
2:36:32	59.968	3788.824	3090	32.962	32.464	0.000	3818.735	3773.707	3797.631	3771.053	3739.727
2:36:34	59.965	3789.026	3090	36.050	33.719	0.000	3819.990	3773.763	3797.712	3771.053	3739.841
2:36:36	59.964	3789.167	3090	37.079	34.895	0.000	3821.166	3773.819	3797.797	3771.053	3739.955
2:36:38	59.97	3787.394	3090	30.899	33.496	0.000	3819.767	3773.868	3797.876	3771.053	3740.068
2:36:40	59.972	3785.690	3090	28.840	31.867	0.000	3818.138	3773.910	3797.949	3771.053	3740.180
2:36:42	59.967	3784.831	3090	33.991	32.610	0.000	3818.881	3773.950	3798.024	3771.053	3740.291
2:36:44	59.967	3785.010	3090	33.991	33.093	0.000	3819.365	3773.989	3798.100	3771.053	3740.401
2:36:46	59.969	3784.320	3090	31.928	32.686	0.000	3818.957	3774.026	3798.175	3771.053	3740.510
2:36:48	59.968	3782.809	3090	32.962	32.782	0.000	3819.053	3774.057	3798.249	3771.053	3740.619
2:36:50	59.969	3782.110	3090	31.928	32.483	0.000	3818.754	3774.085	3798.321	3771.053	3740.727
2:36:52	59.967	3779.352	3090	33.991	33.011	0.000	3819.282	3774.104	3798.395	3771.053	3740.834
2:36:54	59.967	3779.056	3090	33.991	33.354	0.000	3819.625	3774.121	3798.469	3771.053	3740.940
2:36:56	59.966	3778.633	3090	35.020	33.937	0.000	3820.208	3774.137	3798.545	3771.053	3741.046
2:36:58	59.965	3779.212	3090	36.050	34.677	0.000	3820.948	3774.155	3798.623	3771.053	3741.151
2:37:00	59.971	3779.335	3090	29.869	32.994	0.000	3819.265	3774.173	3798.695	3771.053	3741.255
2:37:02	59.967	3776.429	3090	33.991	33.343	0.000	3819.614	3774.181	3798.768	3771.053	3741.359
2:37:04	59.965	3775.647	3090	36.050	34.290	0.000	3820.562	3774.186	3798.843	3771.053	3741.461
2:37:06	59.962	3776.597	3090	39.138	35.987	0.000	3822.258	3774.194	3798.923	3771.053	3741.563
2:37:08	59.964	3776.559	3090	37.079	36.369	0.000	3822.641	3774.202	3799.004	3771.053	3741.665
2:37:10	59.97	3776.023	3090	30.899	34.455	0.000	3820.726	3774.208	3799.079	3771.053	3741.765
2:37:12	59.967	3773.170	3090	33.991	34.292	0.000	3820.564	3774.205	3799.152	3771.053	3741.865
2:37:14	59.969	3771.730	3090	31.928	33.465	0.000	3819.736	3774.196	3799.221	3771.053	3741.965
2:37:16	59.968	3768.793	3090	32.962	33.289	0.000	3819.560	3774.178	3799.290	3771.053	3742.063
2:37:18	59.963	3768.503	3090	38.109	34.976	0.000	3821.247	3774.159	3799.364	3771.053	3742.161
2:37:20	59.965	3768.917	3090	36.050	35.352	0.000	3821.623	3774.141	3799.439	3771.053	3742.259
2:37:22	59.97	3767.366	3090	30.899	33.793	0.000	3820.064	3774.119	3799.508	3771.053	3742.355
2:37:24	59.973	3764.786	3090	27.810	31.699	0.000	3817.970	3774.088	3799.569	3771.053	3742.451
2:37:26	59.968	3760.295	3090	32.962	32.141	0.000	3818.412	3774.042	3799.632	3771.053	3742.546
2:37:28	59.965	3759.592	3090	36.050	33.509	0.000	3819.780	3773.994	3799.699	3771.053	3742.641
2:37:30	59.968	3761.894	3090	32.962	33.317	0.000	3819.589	3773.954	3799.764	3771.053	3742.735
2:37:32	59.969	3761.777	3090	31.928	32.831	0.000	3819.102	3773.914	3799.828	3771.053	3742.829
2:37:34	59.967	3760.583	3090	33.991	33.237	0.000	3819.508	3773.870	3799.892	3771.053	3742.922
2:37:36	59.964	3760.157	3090	37.079	34.582	0.000	3820.853	3773.825	3799.961	3771.053	3743.014
2:37:38	59.966	3759.781	3090	35.020	34.735	0.000	3821.007	3773.780	3800.029	3771.053	3743.105
2:37:40	59.979	3759.495	3090	21.630	30.148	0.000	3816.420	3773.733	3800.083	3771.053	3743.196
2:37:42	59.99	3757.773	3090	10.298	23.201	0.000	3809.472	3773.682	3800.113	3771.053	3743.287
2:37:44	59.983	3753.277	3090	17.508	21.208	0.000	3807.480	3773.616	3800.137	3771.053	3743.377
2:37:46	59.974	3753.087	3090	26.781	23.159	0.000	3809.430	3773.550	3800.167	3771.053	3743.466
2:37:48	59.967	3751.637	3090	33.991	26.950	0.000	3813.221	3773.480	3800.208	3771.053	3743.555
2:37:50	59.965	3753.751	3090	36.050	30.135	0.000	3816.406	3773.417	3800.260	3771.053	3743.643

2:37:52	59.962	3758.225	3090	39.138	33.286	0.000	3819.557	3773.368	3800.322	3771.053	3743.730
2:37:54	59.962	3759.250	3090	39.138	35.334	0.000	3821.606	3773.323	3800.389	3771.053	3743.817
2:37:56	59.961	3758.041	3090	40.172	37.027	0.000	3823.299	3773.275	3800.462	3771.053	3743.904
2:37:58	59.961	3760.965	3090	40.172	38.128	0.000	3824.399	3773.236	3800.537	3771.053	3743.990
2:38:00	59.96	3762.022	3090	41.201	39.203	0.000	3825.475	3773.201	3800.616	3771.053	3744.075
2:38:02	59.963	3763.822	3090	38.109	38.820	0.000	3825.091	3773.171	3800.692	3771.053	3744.160
2:38:04	59.959	3763.100	3090	42.230	40.014	0.000	3826.285	3773.140	3800.772	3771.053	3744.244
2:38:06	59.956	3763.858	3090	45.319	41.871	0.000	3828.142	3773.111	3800.858	3771.053	3744.328
2:38:08	59.951	3764.158	3090	50.470	44.880	0.000	3831.151	3773.083	3800.952	3771.053	3744.411
2:38:10	59.953	3766.127	3090	48.411	46.116	0.000	3832.387	3773.062	3801.049	3771.053	3744.494
2:38:12	59.954	3768.339	3090	47.381	46.559	0.000	3832.830	3773.047	3801.147	3771.053	3744.576
2:38:14	59.957	3767.972	3090	44.289	45.765	0.000	3832.036	3773.032	3801.242	3771.053	3744.658
2:38:16	59.956	3767.438	3090	45.319	45.608	0.000	3831.880	3773.014	3801.336	3771.053	3744.739
2:38:18	59.961	3765.606	3090	40.172	43.706	0.000	3829.977	3772.992	3801.424	3771.053	3744.820
2:38:20	59.963	3762.688	3090	38.109	41.747	0.000	3828.018	3772.960	3801.505	3771.053	3744.900
2:38:22	59.961	3761.570	3090	40.172	41.195	0.000	3827.467	3772.926	3801.584	3771.053	3744.980
2:38:24	59.959	3761.920	3090	42.230	41.558	0.000	3827.829	3772.892	3801.663	3771.053	3745.059
2:38:26	59.963	3759.627	3090	38.109	40.350	0.000	3826.622	3772.852	3801.739	3771.053	3745.138
2:38:28	59.963	3758.522	3090	38.109	39.566	0.000	3825.837	3772.809	3801.811	3771.053	3745.216
2:38:30	59.965	3752.429	3090	36.050	38.335	0.000	3824.606	3772.748	3801.880	3771.053	3745.294
2:38:32	59.968	3750.102	3090	32.962	36.454	0.000	3822.726	3772.680	3801.942	3771.053	3745.371
2:38:34	59.968	3753.830	3090	32.962	35.232	0.000	3821.503	3772.624	3802.001	3771.053	3745.448
2:38:36	59.968	3753.510	3090	32.962	34.437	0.000	3820.709	3772.567	3802.056	3771.053	3745.525
2:38:38	59.97	3753.523	3090	30.899	33.199	0.000	3819.470	3772.510	3802.108	3771.053	3745.601
2:38:40	59.973	3752.741	3090	27.810	31.313	0.000	3817.584	3772.452	3802.154	3771.053	3745.676
2:38:42	59.971	3753.178	3090	29.869	30.808	0.000	3817.079	3772.395	3802.198	3771.053	3745.751
2:38:44	59.965	3752.729	3090	36.050	32.642	0.000	3818.914	3772.337	3802.247	3771.053	3745.826
2:38:46	59.967	3753.291	3090	33.991	33.114	0.000	3819.386	3772.281	3802.297	3771.053	3745.900
2:38:48	59.967	3752.872	3090	33.991	33.421	0.000	3819.692	3772.225	3802.348	3771.053	3745.974
2:38:50	59.972	3752.359	3090	28.840	31.818	0.000	3818.089	3772.167	3802.394	3771.053	3746.047
2:38:52	59.976	3749.398	3090	24.718	29.333	0.000	3815.604	3772.101	3802.432	3771.053	3746.120
2:38:54	59.975	3747.476	3090	25.752	28.079	0.000	3814.351	3772.029	3802.467	3771.053	3746.193
2:38:56	59.969	3740.370	3090	31.928	29.426	0.000	3815.698	3771.938	3802.505	3771.053	3746.265
2:38:58	59.973	3741.285	3090	27.810	28.861	0.000	3815.132	3771.849	3802.541	3771.053	3746.336
2:39:00	59.974	3746.651	3090	26.781	28.133	0.000	3814.404	3771.777	3802.576	3771.053	3746.408
2:39:02	59.978	3745.738	3090	22.659	26.217	0.000	3812.488	3771.702	3802.604	3771.053	3746.478
2:39:04	59.981	3743.351	3090	19.571	23.891	0.000	3810.162	3771.621	3802.626	3771.053	3746.549
2:39:06	59.981	3741.618	3090	19.571	22.379	0.000	3808.650	3771.536	3802.643	3771.053	3746.619
2:39:08	59.981	3740.306	3090	19.571	21.396	0.000	3807.667	3771.447	3802.657	3771.053	3746.688
2:39:10	59.982	3738.484	3090	18.542	20.397	0.000	3806.668	3771.354	3802.668	3771.053	3746.758
2:39:12	59.982	3738.901	3090	18.542	19.748	0.000	3806.019	3771.262	3802.678	3771.053	3746.826
2:39:14	59.984	3737.404	3090	16.479	18.604	0.000	3804.875	3771.167	3802.684	3771.053	3746.895
2:39:16	59.982	3737.273	3090	18.542	18.582	0.000	3804.853	3771.071	3802.690	3771.053	3746.963
2:39:18	59.981	3736.308	3090	19.571	18.928	0.000	3805.199	3770.974	3802.697	3771.053	3747.031
2:39:20	59.979	3736.272	3090	21.630	19.874	0.000	3806.145	3770.877	3802.707	3771.053	3747.098
2:39:22	59.98	3735.448	3090	20.600	20.128	0.000	3806.399	3770.778	3802.717	3771.053	3747.165
2:39:24	59.978	3735.650	3090	22.659	21.014	0.000	3807.285	3770.681	3802.730	3771.053	3747.231
2:39:26	59.978	3737.541	3090	22.659	21.590	0.000	3807.861	3770.589	3802.744	3771.053	3747.297
2:39:28	59.98	3738.012	3090	20.600	21.244	0.000	3807.515	3770.499	3802.757	3771.053	3747.363

2:39:30	59.981	3736.748	3090	19.571	20.658	0.000	3806.929	3770.406	3802.769	3771.053	3747.429
2:39:32	59.98	3736.693	3090	20.600	20.638	0.000	3806.909	3770.313	3802.780	3771.053	3747.494
2:39:34	59.978	3736.067	3090	22.659	21.345	0.000	3807.617	3770.220	3802.793	3771.053	3747.559
2:39:36	59.976	3736.094	3090	24.718	22.526	0.000	3808.797	3770.126	3802.810	3771.053	3747.623
2:39:38	59.972	3736.575	3090	28.840	24.736	0.000	3811.007	3770.035	3802.832	3771.053	3747.687
2:39:40	59.971	3738.571	3090	29.869	26.533	0.000	3812.804	3769.949	3802.859	3771.053	3747.751
2:39:42	59.969	3738.875	3090	31.928	28.421	0.000	3814.692	3769.865	3802.891	3771.053	3747.814
2:39:44	59.974	3738.935	3090	26.781	27.847	0.000	3814.118	3769.782	3802.921	3771.053	3747.877
2:39:46	59.975	3738.647	3090	25.752	27.114	0.000	3813.385	3769.698	3802.950	3771.053	3747.940
2:39:48	59.976	3737.684	3090	24.718	26.275	0.000	3812.546	3769.612	3802.975	3771.053	3748.002
2:39:50	59.972	3737.382	3090	28.840	27.173	0.000	3813.444	3769.525	3803.004	3771.053	3748.064
2:39:52	59.969	3737.892	3090	31.928	28.837	0.000	3815.108	3769.441	3803.036	3771.053	3748.125
2:39:54	59.971	3740.017	3090	29.869	29.198	0.000	3815.470	3769.362	3803.069	3771.053	3748.187
2:39:56	59.974	3740.329	3090	26.781	28.352	0.000	3814.624	3769.285	3803.100	3771.053	3748.248
2:39:58	59.972	3742.053	3090	28.840	28.523	0.000	3814.794	3769.213	3803.131	3771.053	3748.308
2:40:00	59.972	3742.424	3090	28.840	28.634	0.000	3814.905	3769.142	3803.162	3771.053	3748.369
2:40:02	59.972	3742.524	3090	28.840	28.706	0.000	3814.977	3769.072	3803.193	3771.053	3748.429
2:40:04	59.977	3742.245	3090	23.689	26.950	0.000	3813.221	3769.001	3803.220	3771.053	3748.488
2:40:06	59.982	3741.723	3090	18.542	24.007	0.000	3810.278	3768.930	3803.238	3771.053	3748.548
2:40:08	59.978	3740.085	3090	22.659	23.535	0.000	3809.807	3768.854	3803.255	3771.053	3748.607
2:40:10	59.976	3740.629	3090	24.718	23.949	0.000	3810.221	3768.780	3803.273	3771.053	3748.666
2:40:12	59.973	3739.964	3090	27.810	25.301	0.000	3811.572	3768.705	3803.295	3771.053	3748.724
2:40:14	59.974	3740.775	3090	26.781	25.819	0.000	3812.090	3768.633	3803.318	3771.053	3748.782
2:40:16	59.977	3742.833	3090	23.689	25.073	0.000	3811.345	3768.566	3803.339	3771.053	3748.840
2:40:18	59.977	3741.268	3090	23.689	24.589	0.000	3810.860	3768.495	3803.358	3771.053	3748.898
2:40:20	59.978	3739.776	3090	22.659	23.913	0.000	3810.185	3768.421	3803.376	3771.053	3748.955
2:40:22	59.979	3738.966	3090	21.630	23.114	0.000	3809.385	3768.346	3803.391	3771.053	3749.012
2:40:24	59.981	3738.706	3090	19.571	21.874	0.000	3808.145	3768.270	3803.403	3771.053	3749.068
2:40:26	59.977	3738.879	3090	23.689	22.509	0.000	3808.780	3768.194	3803.417	3771.053	3749.125
2:40:28	59.974	3739.860	3090	26.781	24.004	0.000	3810.276	3768.122	3803.435	3771.053	3749.181
2:40:30	59.971	3738.102	3090	29.869	26.057	0.000	3812.328	3768.046	3803.457	3771.053	3749.237
2:40:32	59.971	3738.558	3090	29.869	27.391	0.000	3813.663	3767.971	3803.483	3771.053	3749.292
2:40:34	59.971	3743.507	3090	29.869	28.259	0.000	3814.530	3767.909	3803.511	3771.053	3749.347
2:40:36	59.972	3743.419	3090	28.840	28.462	0.000	3814.733	3767.847	3803.539	3771.053	3749.402
2:40:38	59.968	3745.251	3090	32.962	30.037	0.000	3816.308	3767.790	3803.572	3771.053	3749.457
2:40:40	59.966	3745.744	3090	35.020	31.781	0.000	3818.052	3767.735	3803.608	3771.053	3749.511
2:40:42	59.966	3747.340	3090	35.020	32.915	0.000	3819.186	3767.684	3803.647	3771.053	3749.566
2:40:44	59.971	3750.700	3090	29.869	31.849	0.000	3818.120	3767.641	3803.683	3771.053	3749.619
2:40:46	59.973	3749.750	3090	27.810	30.435	0.000	3816.707	3767.597	3803.716	3771.053	3749.673
2:40:48	59.972	3746.217	3090	28.840	29.877	0.000	3816.148	3767.543	3803.747	3771.053	3749.726
2:40:50	59.969	3744.683	3090	31.928	30.595	0.000	3816.866	3767.487	3803.779	3771.053	3749.779
2:40:52	59.972	3743.745	3090	28.840	29.981	0.000	3816.252	3767.428	3803.810	3771.053	3749.832
2:40:54	59.974	3743.149	3090	26.781	28.861	0.000	3815.132	3767.368	3803.838	3771.053	3749.885
2:40:56	59.973	3740.299	3090	27.810	28.493	0.000	3814.764	3767.301	3803.865	3771.053	3749.937
2:40:58	59.97	3739.453	3090	30.899	29.335	0.000	3815.606	3767.233	3803.894	3771.053	3749.989
2:41:00	59.971	3733.376	3090	29.869	29.522	0.000	3815.793	3767.150	3803.923	3771.053	3750.041
2:41:02	59.974	3731.830	3090	26.781	28.563	0.000	3814.834	3767.064	3803.950	3771.053	3750.092
2:41:04	59.982	3737.583	3090	18.542	25.055	0.000	3811.327	3766.992	3803.968	3771.053	3750.143
2:41:06	59.985	3736.229	3090	15.449	21.693	0.000	3807.964	3766.917	3803.977	3771.053	3750.194

2:41:08	59.985	3734.897	3090	15.449	19.508	0.000	3805.779	3766.839	3803.982	3771.053	3750.245
2:41:10	59.985	3733.434	3090	15.449	18.087	0.000	3804.359	3766.758	3803.983	3771.053	3750.296
2:41:12	59.987	3733.115	3090	13.391	16.443	0.000	3802.715	3766.677	3803.980	3771.053	3750.346
2:41:14	59.989	3730.510	3090	11.332	14.654	0.000	3800.926	3766.590	3803.972	3771.053	3750.396
2:41:16	59.989	3729.180	3090	11.332	13.491	0.000	3799.763	3766.500	3803.962	3771.053	3750.446
2:41:18	59.986	3725.459	3090	14.420	13.816	0.000	3800.088	3766.401	3803.953	3771.053	3750.495
2:41:20	59.987	3724.785	3090	13.391	13.667	0.000	3799.939	3766.302	3803.943	3771.053	3750.545
2:41:22	59.99	3720.108	3090	10.298	12.488	0.000	3798.759	3766.192	3803.931	3771.053	3750.594
2:41:24	59.994	3720.938	3090	6.181	10.280	0.000	3796.552	3766.084	3803.913	3771.053	3750.642
2:41:26	59.996	3725.661	3090	4.122	8.125	0.000	3794.396	3765.988	3803.891	3771.053	3750.691
2:41:28	60.001	3725.677	3090	-1.029	4.921	0.000	3791.192	3765.892	3803.861	3771.053	3750.739
2:41:30	60.003	3727.754	3090	-3.088	2.118	0.000	3788.389	3765.802	3803.824	3771.053	3750.788
2:41:32	60.004	3727.825	3090	-4.122	-0.066	0.000	3786.205	3765.713	3803.782	3771.053	3750.835
2:41:34	60.006	3727.683	3090	-6.181	-2.206	0.000	3784.065	3765.623	3803.736	3771.053	3750.883
2:41:36	60.012	3727.231	3090	-12.361	-5.760	0.000	3780.511	3765.533	3803.681	3771.053	3750.931
2:41:38	60.014	3725.012	3090	-14.420	-8.791	0.000	3777.480	3765.438	3803.620	3771.053	3750.978
2:41:40	60.019	3726.446	3090	-19.571	-12.564	0.000	3773.707	3765.347	3803.550	3771.053	3751.025
2:41:42	60.021	3726.016	3090	-21.630	-15.737	0.000	3770.534	3765.255	3803.473	3771.053	3751.072
2:41:44	60.025	3719.123	3090	-25.752	-19.242	0.000	3767.029	3765.148	3803.389	3771.053	3751.118
2:41:46	60.026	3716.375	3090	-26.781	-21.881	0.000	3764.390	3765.035	3803.298	3771.053	3751.165
2:41:48	60.027	3717.333	3090	-27.810	-23.956	0.000	3762.315	3764.924	3803.203	3771.053	3751.211
2:41:50	60.029	3717.560	3090	-29.869	-26.026	0.000	3760.245	3764.815	3803.104	3771.053	3751.257
2:41:52	60.029	3717.142	3090	-29.869	-27.371	0.000	3758.900	3764.705	3803.002	3771.053	3751.302
2:41:54	60.037	3715.166	3090	-38.109	-31.129	0.000	3755.142	3764.591	3802.892	3771.053	3751.348
2:41:56	60.036	3713.632	3090	-37.079	-33.212	0.000	3753.060	3764.474	3802.778	3771.053	3751.393
2:41:58	60.037	3710.283	3090	-38.109	-34.926	0.000	3751.346	3764.350	3802.660	3771.053	3751.438
2:42:00	60.037	3710.158	3090	-38.109	-36.040	0.000	3750.231	3764.227	3802.540	3771.053	3751.483
2:42:02	60.036	3699.356	3090	-37.079	-36.404	0.000	3749.868	3764.079	3802.420	3771.053	3751.528
2:42:04	60.041	3698.591	3090	-42.230	-38.443	0.000	3747.828	3763.930	3802.296	3771.053	3751.572
2:42:06	60.043	3704.591	3090	-44.289	-40.489	0.000	3745.782	3763.796	3802.168	3771.053	3751.617
2:42:08	60.044	3703.275	3090	-45.319	-42.179	0.000	3744.092	3763.659	3802.037	3771.053	3751.661
2:42:10	60.043	3702.482	3090	-44.289	-42.918	0.000	3743.353	3763.521	3801.904	3771.053	3751.705
2:42:12	60.046	3701.316	3090	-47.381	-44.480	0.000	3741.791	3763.380	3801.769	3771.053	3751.748
2:42:14	60.048	3700.826	3090	-49.440	-46.216	0.000	3740.055	3763.240	3801.630	3771.053	3751.792
2:42:16	60.046	3699.529	3090	-47.381	-46.624	0.000	3739.647	3763.097	3801.491	3771.053	3751.835
2:42:18	60.046	3699.726	3090	-47.381	-46.889	0.000	3739.382	3762.955	3801.352	3771.053	3751.878
2:42:20	60.043	3690.100	3090	-44.289	-45.979	0.000	3740.292	3762.793	3801.216	3771.053	3751.921
2:42:22	60.043	3690.477	3090	-44.289	-45.388	0.000	3740.884	3762.632	3801.082	3771.053	3751.964
2:42:24	60.044	3696.865	3090	-45.319	-45.364	0.000	3740.908	3762.485	3800.948	3771.053	3752.006
2:42:26	60.043	3696.877	3090	-44.289	-44.988	0.000	3741.284	3762.340	3800.816	3771.053	3752.049

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-"

2:27:24

Time of Frequency Recovery t
Value A Pre-Perturbation Averi
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Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

20 to 52 second Average P

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Initial P.U.

	T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW
T-72 sec	2:26:14	60.027	3671.19	350.00	157.63	0.00	10.00	15.00	-103.00	7640.91	-27.810
T-70 sec	2:26:16	60.026	3668.61	350.00	155.53	0.00	10.00	15.00	-103.00	7641.24	-26.781
T-68 sec	2:26:18	60.026	3665.23	350.00	155.53	0.00	10.00	15.00	-103.00	7641.57	-26.781
T-66 sec	2:26:20	60.022	3664.50	350.00	155.53	0.00	10.00	15.00	-103.00	7641.90	-22.659
T-64 sec	2:26:22	60.019	3666.06	350.00	155.53	0.00	10.00	15.00	-103.00	7642.23	-19.571
T-62 sec	2:26:24	60.017	3666.82	350.00	155.53	0.00	10.00	15.00	-103.00	7642.56	-17.508

	T	Frequency Hz	Net Actual Interchange MW
T-72 sec	2:26:14		
T-70 sec	2:26:16		
T-68 sec	2:26:18		
T-66 sec	2:26:20		
T-64 sec	2:26:22		
T-62 sec	2:26:24		

T-60 sec	2:26:26	60.019	3666.79	350.00	160.45	0.00	10.00	15.00	-103.00	7642.89	-19.571	T-60 sec	2:26:26		
T-58 sec	2:26:28	60.020	3670.45	350.00	160.45	0.00	10.00	15.00	-103.00	7643.22	-20.600	T-58 sec	2:26:28		
T-56 sec	2:26:30	60.019	3670.27	350.00	160.45	0.00	10.00	15.00	-103.00	7643.55	-19.571	T-56 sec	2:26:30		
T-54 sec	2:26:32	60.021	3671.67	350.00	160.45	0.00	10.00	15.00	-103.00	7643.88	-21.630	T-54 sec	2:26:32		
T-52 sec	2:26:34	60.021	3672.49	350.00	160.45	0.00	10.00	15.00	-103.00	7644.21	-21.630	T-52 sec	2:26:34		
T-50 sec	2:26:36	60.021	3672.69	350.00	163.96	0.00	10.00	15.00	-103.00	7644.54	-21.630	T-50 sec	2:26:36		
T-48 sec	2:26:38	60.019	3672.86	350.00	163.96	0.00	10.00	15.00	-103.00	7644.87	-19.571	T-48 sec	2:26:38		
T-46 sec	2:26:40	60.018	3672.16	350.00	163.96	0.00	10.00	15.00	-103.00	7645.20	-18.542	T-46 sec	2:26:40		
T-44 sec	2:26:42	60.022	3671.41	350.00	163.96	0.00	10.00	15.00	-103.00	7645.53	-22.659	T-44 sec	2:26:42		
T-42 sec	2:26:44	60.031	3669.98	350.00	163.96	0.00	10.00	15.00	-103.00	7645.86	-31.928	T-42 sec	2:26:44		
T-40 sec	2:26:46	60.037	3666.47	350.00	166.07	0.00	10.00	15.00	-103.00	7646.19	-38.109	T-40 sec	2:26:46		
T-38 sec	2:26:48	60.037	3663.76	350.00	166.07	0.00	10.00	15.00	-103.00	7646.52	-38.109	T-38 sec	2:26:48		
T-36 sec	2:26:50	60.036	3661.60	350.00	166.07	0.00	10.00	15.00	-103.00	7646.85	-37.079	T-36 sec	2:26:50		
T-34 sec	2:26:52	60.037	3660.67	350.00	166.07	0.00	10.00	15.00	-103.00	7647.18	-38.109	T-34 sec	2:26:52		
T-32 sec	2:26:54	60.046	3651.49	350.00	166.07	0.00	10.00	15.00	-103.00	7647.51	-47.381	T-32 sec	2:26:54		
T-30 sec	2:26:56	60.048	3649.19	350.00	163.77	0.00	10.00	15.00	-103.00	7647.84	-49.440	T-30 sec	2:26:56		
T-28 sec	2:26:58	60.048	3650.03	350.00	163.77	0.00	10.00	15.00	-103.00	7648.17	-49.440	T-28 sec	2:26:58		
T-26 sec	2:27:00	60.043	3648.25	350.00	163.77	0.00	10.00	15.00	-103.00	7648.50	-44.289	T-26 sec	2:27:00		
T-24 sec	2:27:02	60.041	3649.51	350.00	163.77	0.00	10.00	15.00	-103.00	7648.83	-42.230	T-24 sec	2:27:02		
T-22 sec	2:27:04	60.041	3654.29	350.00	163.77	0.00	10.00	15.00	-103.00	7649.16	-42.230	T-22 sec	2:27:04		
T-20 sec	2:27:06	60.041	3655.01	350.00	165.10	0.00	10.00	15.00	-103.00	7649.49	-42.230	T-20 sec	2:27:06		
T-18 sec	2:27:08	60.039	3651.87	350.00	165.10	0.00	10.00	15.00	-103.00	7649.82	-40.172	T-18 sec	2:27:08		
T-16 sec	2:27:10	60.041	3651.06	350.00	165.10	0.00	10.00	15.00	-103.00	7650.15	-42.230	T-16 sec	2:27:10	60.042	3645.73
T-14 sec	2:27:12	60.043	3649.19	350.00	165.10	0.00	10.00	15.00	-103.00	7650.48	-44.289	T-14 sec	2:27:12	60.042	3645.73
T-12 sec	2:27:14	60.045	3648.24	350.00	165.10	0.00	10.00	15.00	-103.00	7650.81	-46.348	T-12 sec	2:27:14	60.042	3645.73
T-10 sec	2:27:16	60.046	3645.39	350.00	165.48	0.00	10.00	15.00	-103.00	7651.14	-47.381	T-10 sec	2:27:16	60.042	3645.73
T-08 sec	2:27:18	60.041	3644.63	350.00	165.48	0.00	10.00	15.00	-103.00	7651.47	-42.230	T-08 sec	2:27:18	60.042	3645.73
T-06 sec	2:27:20	60.041	3645.45	350.00	165.48	0.00	10.00	15.00	-103.00	7651.80	-42.230	T-06 sec	2:27:20	60.042	3645.73
T-04 sec	2:27:22	60.041	3640.68	350.00	165.48	0.00	10.00	15.00	-103.00	7652.13	-42.230	T-04 sec	2:27:22	60.042	3645.73
T-02 sec	2:27:24	60.039	3641.19	350.00	165.48	0.00	10.00	15.00	-103.00	7652.46	-40.172	T-02 sec	2:27:24	60.042	3645.73
T+0 sec	2:27:26	59.978	3659.46	350.00	206.46	0.00	10.00	15.00	-103.00	7652.79	22.659	T+0 sec	2:27:26		
T+02 sec	2:27:28	59.852	3696.36	350.00	206.46	0.00	10.00	0.00	-103.00	7616.00	152.439	T+02 sec	2:27:28		
T+04 sec	2:27:30	59.836	3734.90	335.00	206.46	0.00	10.00	0.00	-103.00	7626.00	168.922	T+04 sec	2:27:30		
T+06 sec	2:27:32	59.869	3734.67	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	134.931	T+06 sec	2:27:32		
T+08 sec	2:27:34	59.869	3734.67	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	134.931	T+08 sec	2:27:34		
T+10 sec	2:27:36	59.892	3737.16	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	111.242	T+10 sec	2:27:36		
T+12 sec	2:27:38	59.891	3761.25	335.00	211.26	0.00	10.00	0.00	-103.00	7632.00	112.271	T+12 sec	2:27:38		
T+14 sec	2:27:40	59.880	3766.11	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	123.599	T+14 sec	2:27:40		
T+16 sec	2:27:42	59.876	3766.19	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	127.721	T+16 sec	2:27:42		
T+18 sec	2:27:44	59.875	3768.88	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	128.750	T+18 sec	2:27:44		
T+20 sec	2:27:46	59.883	3769.93	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	120.511	T+20 sec	2:27:46	59.889	3788.35
T+22 sec	2:27:48	59.887	3780.62	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	116.389	T+22 sec	2:27:48	59.889	3788.35
T+24 sec	2:27:50	59.886	3781.59	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	117.418	T+24 sec	2:27:50	59.889	3788.35
T+26 sec	2:27:52	59.885	3782.50	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	118.452	T+26 sec	2:27:52	59.889	3788.35
T+28 sec	2:27:54	59.887	3784.96	335.00	214.35	2.00	10.00	0.00	-103.00	7632.00	116.389	T+28 sec	2:27:54	59.889	3788.35
T+30 sec	2:27:56	59.888	3784.73	335.00	214.35	3.00	10.00	0.00	-103.00	7632.00	115.359	T+30 sec	2:27:56	59.889	3788.35
T+32 sec	2:27:58	59.890	3784.42	335.00	212.17	4.00	10.00	0.00	-103.00	7632.00	113.301	T+32 sec	2:27:58	59.889	3788.35
T+34 sec	2:28:00	59.895	3788.07	335.00	212.17	5.00	10.00	0.00	-103.00	7632.00	108.150	T+34 sec	2:28:00	59.889	3788.35
T+36 sec	2:28:02	59.894	3788.33	335.00	212.17	6.00	10.00	0.00	-103.00	7632.00	109.179	T+36 sec	2:28:02	59.889	3788.35

T+38 sec	2:28:04	59.893	3788.87	335.00	212.17	7.00	10.00	0.00	-103.00	7632.00	110.208	T+38 sec	2:28:04	59.889	3788.35
T+40 sec	2:28:06	59.894	3788.47	335.00	212.17	8.00	10.00	0.00	-103.00	7632.00	109.179	T+40 sec	2:28:06	59.889	3788.35
T+42 sec	2:28:08	59.894	3792.28	335.00	215.60	9.00	10.00	0.00	-103.00	7632.00	109.179	T+42 sec	2:28:08	59.889	3788.35
T+44 sec	2:28:10	59.891	3793.07	335.00	215.60	10.00	10.00	0.00	-103.00	7632.00	112.271	T+44 sec	2:28:10	59.889	3788.35
T+46 sec	2:28:12	59.890	3794.37	335.00	215.60	11.00	10.00	0.00	-103.00	7632.00	113.301	T+46 sec	2:28:12	59.889	3788.35
T+48 sec	2:28:14	59.885	3799.43	335.00	215.60	12.00	10.00	0.00	-103.00	7632.00	118.452	T+48 sec	2:28:14	59.889	3788.35
T+50 sec	2:28:16	59.885	3800.43	335.00	215.60	13.00	10.00	0.00	-103.00	7632.00	118.452	T+50 sec	2:28:16	59.889	3788.35
T+52 sec	2:28:18	59.888	3799.96	335.00	218.33	14.00	10.00	0.00	-103.00	7632.00	115.359	T+52 sec	2:28:18	59.889	3788.35
T+54 sec	2:28:20	59.887	3803.63	335.00	218.33	15.00	10.00	0.00	-103.00	7632.00	116.389	T+54 sec	2:28:20		
T+56 sec	2:28:22	59.888	3802.93	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	115.359	T+56 sec	2:28:22		
T+58 sec	2:28:24	59.888	3802.95	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	115.359	T+58 sec	2:28:24		
T+60 sec	2:28:26	59.890	3804.39	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	113.301	T+60 sec	2:28:26		
T+62 sec	2:28:28	59.889	3805.50	335.00	217.38	16.00	10.00	0.00	-103.00	7632.00	114.330	T+62 sec	2:28:28		
T+64 sec	2:28:30	59.882	3805.62	335.00	217.38	16.00	10.00	0.00	-103.00	7632.00	121.540	T+64 sec	2:28:30		
T+66 sec	2:28:32	59.873	3809.24	335.00	217.38	16.00	10.00	0.00	-103.00	7631.00	130.809	T+66 sec	2:28:32		
T+68 sec	2:28:34	59.857	3811.50	335.00	217.38	16.00	10.00	0.00	-103.00	7625.00	147.292	T+68 sec	2:28:34		
T+70 sec	2:28:36	59.849	3814.86	335.00	217.38	16.00	10.00	0.00	-103.00	7623.00	155.531	T+70 sec	2:28:36		
T+72 sec	2:28:38	59.852	3815.89	335.00	214.83	16.00	10.00	0.00	-103.00	7621.00	152.439	T+72 sec	2:28:38		
T+74 sec	2:28:40	59.858	3825.64	335.00	214.83	16.00	10.00	0.00	-103.00	7623.00	146.258	T+74 sec	2:28:40		
T+76 sec	2:28:42	59.863	3826.05	335.00	214.83	16.00	10.00	0.00	-103.00	7625.00	141.111	T+76 sec	2:28:42		
T+78 sec	2:28:44	59.866	3826.00	335.00	214.83	16.00	10.00	0.00	-103.00	7627.00	138.019	T+78 sec	2:28:44		
T+80 sec	2:28:46	59.865	3827.52	335.00	214.83	16.00	10.00	0.00	-103.00	7628.00	139.048	T+80 sec	2:28:46		
T+82 sec	2:28:48	59.867	3826.75	335.00	227.66	16.00	10.00	0.00	-103.00	7628.00	136.989	T+82 sec	2:28:48		
T+84 sec	2:28:50	59.866	3826.78	335.00	227.66	16.00	10.00	0.00	-103.00	7629.00	138.019	T+84 sec	2:28:50		
T+86 sec	2:28:52	59.871	3826.45	335.00	227.66	16.00	10.00	0.00	-103.00	7630.00	132.872	T+86 sec	2:28:52		
T+88 sec	2:28:54	59.874	3825.71	335.00	227.66	16.00	10.00	0.00	-103.00	7631.00	129.779	T+88 sec	2:28:54		
T+90 sec	2:28:56	59.879	3823.83	335.00	227.66	16.00	10.00	0.00	-103.00	7635.00	124.628	T+90 sec	2:28:56		
T+92 sec	2:28:58	59.880	3822.51	335.00	225.02	16.00	10.00	0.00	-103.00	7638.00	123.599	T+92 sec	2:28:58		
T+94 sec	2:29:00	59.883	3819.08	335.00	225.02	16.00	10.00	0.00	-103.00	7639.00	120.511	T+94 sec	2:29:00		
T+96 sec	2:29:02	59.886	3818.06	335.00	225.02	16.00	10.00	0.00	-103.00	7642.00	117.418	T+96 sec	2:29:02		
T+98 sec	2:29:04	59.890	3816.81	335.00	225.02	16.00	10.00	0.00	-103.00	7644.00	113.301	T+98 sec	2:29:04		
T+100 sec	2:29:06	59.892	3815.01	335.00	225.02	16.00	10.00	0.00	-103.00	7645.00	111.242	T+100 sec	2:29:06		
T+102 sec	2:29:08	59.889	3813.78	335.00	228.37	16.00	10.00	0.00	-103.00	7647.00	114.330	T+102 sec	2:29:08		
T+104 sec	2:29:10	59.893	3811.84	335.00	228.37	16.00	10.00	0.00	-103.00	7648.00	110.208	T+104 sec	2:29:10		
T+106 sec	2:29:12	59.899	3809.65	335.00	228.37	16.00	10.00	0.00	-103.00	7649.00	104.032	T+106 sec	2:29:12		
T+108 sec	2:29:14	59.903	3806.97	335.00	228.37	16.00	10.00	0.00	-103.00	7650.00	99.910	T+108 sec	2:29:14		
T+110 sec	2:29:16	59.902	3805.59	335.00	228.37	16.00	10.00	0.00	-103.00	7651.00	100.940	T+110 sec	2:29:16		
T+112 sec	2:29:18	59.902	3804.19	335.00	234.08	16.00	10.00	0.00	-103.00	7652.00	100.940	T+112 sec	2:29:18		
T+114 sec	2:29:20	59.904	3796.08	335.00	234.08	16.00	10.00	0.00	-103.00	7653.00	98.881	T+114 sec	2:29:20		
T+116 sec	2:29:22	59.907	3793.98	335.00	234.08	16.00	10.00	0.00	-103.00	7654.00	95.788	T+116 sec	2:29:22		
T+118 sec	2:29:24	59.911	3792.17	335.00	234.08	16.00	10.00	0.00	-103.00	7655.00	91.671	T+118 sec	2:29:24		
T+120 sec	2:29:26	59.916	3791.50	335.00	234.08	16.00	10.00	0.00	-103.00	7655.00	86.520	T+120 sec	2:29:26		
T+122 sec	2:29:28	59.916	3789.53	335.00	228.80	16.00	10.00	0.00	-103.00	7656.00	86.520	T+122 sec	2:29:28		
T+124 sec	2:29:30	59.917	3788.13	335.00	228.80	16.00	10.00	0.00	-103.00	7656.00	85.490	T+124 sec	2:29:30		
T+126 sec	2:29:32	59.918	3784.56	335.00	228.80	16.00	10.00	0.00	-103.00	7657.00	84.461	T+126 sec	2:29:32		
T+128 sec	2:29:34	59.920	3783.03	335.00	228.80	16.00	10.00	0.00	-103.00	7657.00	82.402	T+128 sec	2:29:34		
T+130 sec	2:29:36	59.921	3781.70	335.00	228.80	16.00	10.00	0.00	-103.00	7658.00	81.369	T+130 sec	2:29:36		
T+132 sec	2:29:38	59.920	3776.36	335.00	229.47	16.00	10.00	0.00	-103.00	7658.00	82.402	T+132 sec	2:29:38		
T+134 sec	2:29:40	59.917	3775.64	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	85.490	T+134 sec	2:29:40		

T+136 sec	2:29:42	59.920	3774.60	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	82.402	T+136 sec	2:29:42
T+138 sec	2:29:44	59.921	3773.33	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	81.369	T+138 sec	2:29:44
T+140 sec	2:29:46	59.923	3773.96	335.00	229.47	16.00	10.00	0.00	-103.00	7660.00	79.310	T+140 sec	2:29:46
T+142 sec	2:29:48	59.926	3772.72	335.00	228.98	16.00	10.00	0.00	-103.00	7660.00	76.221	T+142 sec	2:29:48
T+144 sec	2:29:50	59.925	3771.67	335.00	228.98	16.00	10.00	0.00	-103.00	7661.00	77.251	T+144 sec	2:29:50
T+146 sec	2:29:52	59.928	3769.63	335.00	228.98	16.00	10.00	0.00	-103.00	7661.00	74.159	T+146 sec	2:29:52
T+148 sec	2:29:54	59.927	3768.71	335.00	228.98	16.00	10.00	0.00	-103.00	7662.00	75.192	T+148 sec	2:29:54
T+150 sec	2:29:56	59.932	3767.64	335.00	228.98	16.00	10.00	0.00	-103.00	7662.00	70.041	T+150 sec	2:29:56
T+152 sec	2:29:58	59.927	3767.02	335.00	219.98	16.00	10.00	0.00	-103.00	7663.00	75.192	T+152 sec	2:29:58
T+154 sec	2:30:00	59.928	3767.41	335.00	219.98	16.00	10.00	0.00	-103.00	7663.00	74.159	T+154 sec	2:30:00
T+156 sec	2:30:02	59.931	3766.79	335.00	219.98	16.00	10.00	0.00	-103.00	7664.00	71.070	T+156 sec	2:30:02
T+158 sec	2:30:04	59.929	3766.26	335.00	219.98	16.00	10.00	0.00	-103.00	7664.00	73.129	T+158 sec	2:30:04
T+160 sec	2:30:06	59.931	3765.67	335.00	219.98	16.00	10.00	0.00	-103.00	7665.00	71.070	T+160 sec	2:30:06
T+162 sec	2:30:08	59.933	3766.12	335.00	229.09	16.00	10.00	0.00	-103.00	7666.00	69.011	T+162 sec	2:30:08
T+164 sec	2:30:10	59.937	3764.24	335.00	229.09	16.00	10.00	0.00	-103.00	7666.00	64.890	T+164 sec	2:30:10
T+166 sec	2:30:12	59.937	3765.10	335.00	229.09	16.00	10.00	0.00	-103.00	7667.00	64.890	T+166 sec	2:30:12
T+168 sec	2:30:14	59.945	3762.94	335.00	229.09	16.00	10.00	0.00	-103.00	7668.00	56.650	T+168 sec	2:30:14
T+170 sec	2:30:16	59.949	3758.39	335.00	229.09	16.00	10.00	0.00	-103.00	7668.00	52.529	T+170 sec	2:30:16
T+172 sec	2:30:18	59.947	3753.92	335.00	229.66	16.00	10.00	0.00	-103.00	7669.00	54.591	T+172 sec	2:30:18
T+174 sec	2:30:20	59.942	3749.87	335.00	229.66	16.00	10.00	0.00	-103.00	7669.00	59.739	T+174 sec	2:30:20
T+176 sec	2:30:22	59.941	3746.89	335.00	229.66	16.00	10.00	0.00	-103.00	7670.00	60.768	T+176 sec	2:30:22
T+178 sec	2:30:24	59.942	3747.88	335.00	229.66	16.00	10.00	0.00	-103.00	7670.00	59.739	T+178 sec	2:30:24
T+180 sec	2:30:26	59.945	3749.59	335.00	229.66	16.00	10.00	0.00	-103.00	7671.00	56.650	T+180 sec	2:30:26
	2:30:28	59.948	3748.66	335.00	229.23	16.00	10.00	0.00	-103.00	7671.00	53.558		
	2:30:30	59.947	3746.71	335.00	229.23	16.00	10.00	0.00	-103.00	7672.00	54.591		
	2:30:32	59.949	3749.08	335.00	229.23	16.00	10.00	0.00	-103.00	7673.00	52.529		
	2:30:34	59.951	3742.74	335.00	229.23	16.00	10.00	0.00	-103.00	7673.00	50.470		
	2:30:36	59.952	3740.26	350.00	229.23	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:38	59.953	3736.14	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	48.411		
	2:30:40	59.951	3731.38	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	50.470		
	2:30:42	59.952	3727.84	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:44	59.952	3725.95	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:46	59.952	3722.65	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:48	59.955	3720.58	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	46.348		
	2:30:50	59.952	3718.00	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:52	59.954	3718.14	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	47.381		
	2:30:54	59.952	3715.75	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:56	59.953	3713.69	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	48.411		
	2:30:58	59.953	3713.48	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	48.411		
	2:31:00	59.952	3710.85	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:31:02	59.954	3710.81	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	47.381		
	2:31:04	59.954	3712.09	350.00	213.54	16.00	10.00	0.00	-103.00	7674.00	47.381		
	2:31:06	59.959	3714.62	350.00	213.54	16.00	10.00	0.00	-103.00	7675.00	42.230		
	2:31:08	59.957	3715.13	350.00	225.65	16.00	10.00	0.00	-103.00	7676.00	44.289		
	2:31:10	59.956	3716.17	350.00	225.65	16.00	10.00	0.00	-103.00	7677.00	45.319		
	2:31:12	59.954	3716.46	350.00	225.65	16.00	10.00	0.00	-103.00	7678.00	47.381		
	2:31:14	59.956	3716.98	350.00	225.65	16.00	10.00	0.00	-103.00	7679.00	45.319		
	2:31:16	59.955	3717.76	350.00	225.65	16.00	10.00	0.00	-103.00	7680.00	46.348		
	2:31:18	59.958	3722.36	350.00	212.57	16.00	10.00	0.00	-103.00	7681.00	43.260		

2:31:20	59.961	3721.97	350.00	212.57	16.00	10.00	0.00	-103.00	7682.00	40.172
2:31:22	59.962	3722.66	350.00	212.57	16.00	10.00	0.00	-103.00	7684.00	39.138
2:31:24	59.962	3722.27	350.00	212.57	16.00	10.00	0.00	-103.00	7685.00	39.138
2:31:26	59.968	3722.28	350.00	212.57	16.00	10.00	0.00	-103.00	7687.00	32.962
2:31:28	59.966	3721.79	350.00	219.90	16.00	10.00	0.00	-103.00	7689.00	35.020
2:31:30	59.966	3723.09	350.00	219.90	16.00	10.00	0.00	-103.00	7690.00	35.020
2:31:32	59.968	3723.98	350.00	219.90	16.00	10.00	0.00	-103.00	7692.00	32.962
2:31:34	59.970	3723.43	350.00	219.90	16.00	10.00	0.00	-103.00	7692.00	30.899
2:31:36	59.974	3723.89	350.00	219.90	16.00	10.00	0.00	-103.00	7693.00	26.781
2:31:38	59.970	3725.40	350.00	231.18	16.00	10.00	0.00	-103.00	7693.00	30.899
2:31:40	59.969	3727.12	350.00	231.18	16.00	10.00	0.00	-103.00	7694.00	31.928
2:31:42	59.969	3728.05	350.00	231.18	16.00	10.00	0.00	-103.00	7694.00	31.928
2:31:44	59.970	3731.13	350.00	231.18	16.00	10.00	0.00	-103.00	7695.00	30.899
2:31:46	59.971	3732.53	350.00	231.18	16.00	10.00	0.00	-103.00	7695.00	29.869
2:31:48	59.973	3733.33	350.00	226.63	16.00	10.00	0.00	-103.00	7695.00	27.810
2:31:50	59.973	3736.54	350.00	226.63	16.00	10.00	0.00	-103.00	7696.00	27.810
2:31:52	59.976	3736.91	350.00	226.63	16.00	10.00	0.00	-103.00	7696.00	24.718
2:31:54	59.978	3736.82	350.00	226.63	16.00	10.00	0.00	-103.00	7697.00	22.659
2:31:56	59.978	3738.70	350.00	226.63	16.00	10.00	0.00	-103.00	7697.00	22.659
2:31:58	59.976	3739.94	350.00	227.26	16.00	10.00	0.00	-103.00	7697.00	24.718
2:32:00	59.978	3740.88	350.00	227.26	16.00	10.00	0.00	-103.00	7698.00	22.659
2:32:02	59.976	3741.79	350.00	227.26	16.00	10.00	0.00	-103.00	7698.00	24.718
2:32:04	59.978	3745.23	350.00	227.26	16.00	10.00	0.00	-103.00	7698.33	22.659
2:32:06	59.977	3746.61	350.00	227.26	16.00	10.00	0.00	-103.00	7698.66	23.689
2:32:08	59.980	3748.30	350.00	229.29	16.00	10.00	0.00	-103.00	7698.99	20.600
2:32:10	59.982	3750.72	350.00	229.29	16.00	10.00	0.00	-103.00	7699.32	18.542
2:32:12	59.981	3751.56	350.00	229.29	16.00	10.00	0.00	-103.00	7699.65	19.571
2:32:14	59.980	3752.75	350.00	229.29	16.00	10.00	0.00	-103.00	7699.98	20.600
2:32:16	59.979	3755.60	350.00	229.29	16.00	10.00	0.00	-103.00	7700.31	21.630
2:32:18	59.980	3756.41	350.00	221.46	16.00	10.00	0.00	-103.00	7700.64	20.600
2:32:20	59.979	3756.98	350.00	221.46	16.00	10.00	0.00	-103.00	7700.97	21.630
2:32:22	59.983	3760.41	350.00	221.46	16.00	10.00	0.00	-103.00	7701.30	17.508
2:32:24	59.983	3760.98	350.00	221.46	16.00	10.00	0.00	-103.00	7701.63	17.508
2:32:26	59.984	3761.41	350.00	221.46	16.00	10.00	0.00	-103.00	7701.96	16.479
2:32:28	59.988	3762.74	350.00	241.27	16.00	10.00	0.00	-103.00	7702.29	12.361
2:32:30	59.989	3763.21	350.00	241.27	16.00	10.00	0.00	-103.00	7702.62	11.332
2:32:32	59.987	3764.96	350.00	241.27	16.00	10.00	0.00	-103.00	7702.95	13.391
2:32:34	59.987	3766.09	350.00	241.27	16.00	10.00	0.00	-103.00	7703.28	13.391
2:32:36	59.991	3766.43	350.00	241.27	16.00	10.00	0.00	-103.00	7703.61	9.269
2:32:38	59.993	3767.25	350.00	243.07	16.00	10.00	0.00	-103.00	7703.94	7.210
2:32:40	59.992	3767.79	350.00	243.07	16.00	10.00	0.00	-103.00	7704.27	8.239
2:32:42	59.991	3768.63	350.00	243.07	16.00	10.00	0.00	-103.00	7704.60	9.269
2:32:44	59.989	3771.15	350.00	243.07	16.00	10.00	0.00	-103.00	7704.93	11.332
2:32:46	59.986	3772.44	350.00	243.07	16.00	10.00	0.00	-103.00	7705.26	14.420
2:32:48	59.983	3773.69	350.00	241.67	16.00	10.00	0.00	-103.00	7705.59	17.508
2:32:50	59.983	3774.67	350.00	241.67	16.00	10.00	0.00	-103.00	7705.92	17.508
2:32:52	59.988	3775.84	350.00	241.67	16.00	10.00	0.00	-103.00	7706.25	12.361
2:32:54	59.993	3775.36	350.00	241.67	16.00	10.00	0.00	-103.00	7706.58	7.210
2:32:56	59.996	3774.87	350.00	241.67	16.00	10.00	0.00	-103.00	7706.91	4.122

2:32:58	59.998	3775.49	350.00	228.15	16.00	10.00	0.00	-103.00	7707.24	2.059
2:33:00	59.999	3776.42	350.00	228.15	16.00	10.00	0.00	-103.00	7707.57	1.029
2:33:02	60.001	3778.55	350.00	228.15	16.00	10.00	0.00	-103.00	7707.90	-1.029
2:33:04	59.999	3779.69	350.00	228.15	16.00	10.00	0.00	-103.00	7708.23	1.029
2:33:06	59.999	3781.26	350.00	228.15	16.00	10.00	0.00	-103.00	7708.56	1.029
2:33:08	59.999	3780.59	350.00	235.13	16.00	10.00	0.00	-103.00	7708.89	1.029
2:33:10	60.002	3783.09	350.00	235.13	16.00	10.00	0.00	-103.00	7709.22	-2.059
2:33:12	60.005	3783.90	350.00	235.13	16.00	10.00	0.00	-103.00	7709.55	-5.151
2:33:14	60.007	3784.42	350.00	235.13	16.00	10.00	0.00	-103.00	7709.88	-7.210
2:33:16	60.008	3785.77	350.00	235.13	16.00	10.00	0.00	-103.00	7710.21	-8.239
2:33:18	60.011	3785.46	350.00	246.43	16.00	10.00	0.00	-103.00	7710.54	-11.332
2:33:20	60.014	3786.85	350.00	246.43	16.00	10.00	0.00	-103.00	7710.87	-14.420
2:33:22	60.017	3786.30	350.00	246.43	16.00	10.00	0.00	-103.00	7711.20	-17.508
2:33:24	60.019	3787.26	350.00	246.43	16.00	10.00	0.00	-103.00	7711.53	-19.571
2:33:26	60.021	3787.52	350.00	246.43	16.00	10.00	0.00	-103.00	7711.86	-21.630
2:33:28	60.017	3787.96	350.00	236.55	16.00	10.00	0.00	-103.00	7712.19	-17.508
2:33:30	60.017	3788.03	350.00	236.55	16.00	10.00	0.00	-103.00	7712.52	-17.508
2:33:32	60.019	3788.61	350.00	236.55	16.00	10.00	0.00	-103.00	7712.85	-19.571
2:33:34	60.023	3789.22	350.00	236.55	16.00	10.00	0.00	-103.00	7713.18	-23.689
2:33:36	60.024	3787.54	350.00	236.55	16.00	10.00	0.00	-103.00	7713.51	-24.718
2:33:38	60.025	3785.84	350.00	230.30	16.00	10.00	0.00	-103.00	7713.84	-25.752
2:33:40	60.021	3786.08	350.00	230.30	16.00	10.00	0.00	-103.00	7714.17	-21.630
2:33:42	60.019	3787.93	350.00	230.30	16.00	10.00	0.00	-103.00	7714.50	-19.571
2:33:44	60.024	3788.76	350.00	230.30	16.00	10.00	0.00	-103.00	7714.83	-24.718
2:33:46	60.024	3786.87	350.00	230.30	16.00	10.00	0.00	-103.00	7715.16	-24.718
2:33:48	60.021	3786.55	350.00	231.18	16.00	10.00	0.00	-103.00	7715.49	-21.630
2:33:50	60.020	3787.36	350.00	231.18	16.00	10.00	0.00	-103.00	7715.82	-20.600
2:33:52	60.025	3785.02	350.00	231.18	16.00	10.00	0.00	-103.00	7716.15	-25.752
2:33:54	60.024	3785.61	350.00	231.18	16.00	10.00	0.00	-103.00	7716.48	-24.718
2:33:56	60.020	3785.95	350.00	231.18	16.00	10.00	0.00	-103.00	7716.81	-20.600
2:33:58	60.020	3785.80	350.00	225.62	16.00	10.00	0.00	-103.00	7717.14	-20.600
2:34:00	60.022	3786.86	350.00	225.62	16.00	10.00	0.00	-103.00	7717.47	-22.659
2:34:02	60.022	3786.88	350.00	225.62	16.00	10.00	0.00	-103.00	7717.80	-22.659
2:34:04	60.022	3785.25	350.00	225.62	16.00	10.00	0.00	-103.00	7718.13	-22.659
2:34:06	60.021	3785.73	350.00	225.62	16.00	10.00	0.00	-103.00	7718.46	-21.630
2:34:08	60.021	3786.35	350.00	230.73	16.00	10.00	0.00	-103.00	7718.79	-21.630
2:34:10	60.023	3785.82	350.00	230.73	16.00	10.00	0.00	-103.00	7719.12	-23.689
2:34:12	60.023	3785.80	350.00	230.73	16.00	10.00	0.00	-103.00	7719.45	-23.689
2:34:14	60.022	3786.28	350.00	230.73	16.00	10.00	0.00	-103.00	7719.78	-22.659
2:34:16	60.019	3786.94	350.00	230.73	16.00	10.00	0.00	-103.00	7720.11	-19.571
2:34:18	60.016	3787.63	350.00	234.85	16.00	10.00	0.00	-103.00	7720.44	-16.479
2:34:20	60.018	3789.44	350.00	234.85	16.00	10.00	0.00	-103.00	7720.77	-18.542
2:34:22	60.018	3789.67	350.00	234.85	16.00	10.00	0.00	-103.00	7721.10	-18.542
2:34:24	60.018	3789.40	350.00	234.85	16.00	10.00	0.00	-103.00	7721.43	-18.542
2:34:26	60.019	3788.48	350.00	234.85	16.00	10.00	0.00	-103.00	7721.76	-19.571
2:34:28	60.019	3789.18	350.00	228.96	16.00	10.00	0.00	-103.00	7722.09	-19.571
2:34:30	60.016	3789.37	350.00	228.96	16.00	10.00	0.00	-103.00	7722.42	-16.479
2:34:32	60.015	3789.00	350.00	228.96	16.00	10.00	0.00	-103.00	7722.75	-15.449
2:34:34	60.016	3788.66	350.00	228.96	16.00	10.00	0.00	-103.00	7723.08	-16.479

2:34:36	60.014	3788.93	350.00	228.96	16.00	10.00	0.00	-103.00	7723.41	-14.420
2:34:38	60.013	3790.67	350.00	231.18	16.00	10.00	0.00	-103.00	7723.74	-13.391
2:34:40	60.012	3790.81	350.00	231.18	16.00	10.00	0.00	-103.00	7724.07	-12.361
2:34:42	60.012	3790.41	350.00	231.18	16.00	10.00	0.00	-103.00	7724.40	-12.361
2:34:44	60.010	3789.77	350.00	231.18	16.00	10.00	0.00	-103.00	7724.73	-10.298
2:34:46	60.007	3791.54	350.00	231.18	16.00	10.00	0.00	-103.00	7725.06	-7.210
2:34:48	60.007	3792.95	350.00	236.49	16.00	10.00	0.00	-103.00	7725.39	-7.210
2:34:50	60.009	3791.03	350.00	236.49	16.00	10.00	0.00	-103.00	7725.72	-9.269
2:34:52	60.009	3791.44	350.00	236.49	16.00	10.00	0.00	-103.00	7726.05	-9.269
2:34:54	60.010	3791.43	350.00	236.49	16.00	10.00	0.00	-103.00	7726.38	-10.298
2:34:56	60.003	3790.60	350.00	236.49	16.00	10.00	0.00	-103.00	7726.71	-3.088
2:34:58	59.999	3790.46	350.00	245.04	16.00	10.00	0.00	-103.00	7727.04	1.029
2:35:00	59.995	3790.22	350.00	245.04	16.00	10.00	0.00	-103.00	7727.37	5.151
2:35:02	59.992	3789.58	350.00	245.04	16.00	10.00	0.00	-103.00	7727.70	8.239
2:35:04	59.991	3788.46	350.00	245.04	16.00	10.00	0.00	-103.00	7728.03	9.269
2:35:06	59.992	3788.10	350.00	245.04	16.00	10.00	0.00	-103.00	7728.36	8.239
2:35:08	59.992	3788.06	350.00	223.61	16.00	10.00	0.00	-103.00	7728.69	8.239
2:35:10	59.988	3788.19	350.00	223.61	16.00	10.00	0.00	-103.00	7729.02	12.361
2:35:12	59.986	3788.50	350.00	223.61	16.00	10.00	0.00	-103.00	7729.35	14.420
2:35:14	59.985	3788.54	350.00	223.61	16.00	10.00	0.00	-103.00	7729.68	15.449
2:35:16	59.984	3788.57	350.00	223.61	16.00	10.00	0.00	-103.00	7730.01	16.479
2:35:18	59.985	3788.10	350.00	231.12	16.00	10.00	0.00	-103.00	7730.34	15.449
2:35:20	59.984	3787.13	350.00	231.12	16.00	10.00	0.00	-103.00	7730.67	16.479
2:35:22	59.982	3786.45	350.00	231.12	16.00	10.00	0.00	-103.00	7731.00	18.542
2:35:24	59.981	3787.73	350.00	231.12	16.00	10.00	0.00	-103.00	7731.33	19.571
2:35:26	59.982	3788.81	350.00	231.12	16.00	10.00	0.00	-103.00	7731.66	18.542
2:35:28	59.979	3789.29	350.00	237.21	16.00	10.00	0.00	-103.00	7731.99	21.630
2:35:30	59.977	3788.26	350.00	237.21	16.00	10.00	0.00	-103.00	7732.32	23.689
2:35:32	59.976	3788.41	350.00	237.21	16.00	10.00	0.00	-103.00	7732.65	24.718
2:35:34	59.976	3790.47	350.00	237.21	16.00	10.00	0.00	-103.00	7732.98	24.718
2:35:36	59.979	3790.66	350.00	237.21	16.00	10.00	0.00	-103.00	7733.31	21.630
2:35:38	59.982	3790.42	350.00	240.52	16.00	10.00	0.00	-103.00	7733.64	18.542
2:35:40	59.978	3789.67	350.00	240.52	16.00	10.00	0.00	-103.00	7733.97	22.659
2:35:42	59.976	3789.27	350.00	240.52	16.00	10.00	0.00	-103.00	7734.30	24.718
2:35:44	59.974	3789.15	350.00	240.52	16.00	10.00	0.00	-103.00	7734.63	26.781
2:35:46	59.976	3790.43	350.00	240.52	16.00	10.00	0.00	-103.00	7734.96	24.718
2:35:48	59.977	3789.91	350.00	237.57	16.00	10.00	0.00	-103.00	7735.29	23.689
2:35:50	59.977	3786.24	350.00	237.57	16.00	10.00	0.00	-103.00	7735.62	23.689
2:35:52	59.975	3787.44	350.00	237.57	16.00	10.00	0.00	-103.00	7735.95	25.752
2:35:54	59.973	3788.96	350.00	237.57	16.00	10.00	0.00	-103.00	7736.28	27.810
2:35:56	59.969	3790.60	350.00	237.57	16.00	10.00	0.00	-103.00	7736.61	31.928
2:35:58	59.970	3791.88	350.00	231.58	16.00	10.00	0.00	-103.00	7736.94	30.899
2:36:00	59.971	3792.91	350.00	231.58	16.00	10.00	0.00	-103.00	7737.27	29.869
2:36:02	59.973	3792.31	350.00	231.58	16.00	10.00	0.00	-103.00	7737.60	27.810
2:36:04	59.978	3789.13	350.00	231.58	16.00	10.00	0.00	-103.00	7737.93	22.659
2:36:06	59.981	3788.08	350.00	231.58	16.00	10.00	0.00	-103.00	7738.26	19.571
2:36:08	59.978	3787.84	350.00	235.85	16.00	10.00	0.00	-103.00	7738.59	22.659
2:36:10	59.975	3787.14	350.00	235.85	16.00	10.00	0.00	-103.00	7738.92	25.752
2:36:12	59.972	3787.16	350.00	235.85	16.00	10.00	0.00	-103.00	7739.25	28.840

2:36:14	59.976	3787.00	350.00	235.85	16.00	10.00	0.00	-103.00	7739.58	24.718
2:36:16	59.975	3787.40	350.00	235.85	16.00	10.00	0.00	-103.00	7739.91	25.752
2:36:18	59.973	3786.49	350.00	233.56	16.00	10.00	0.00	-103.00	7740.24	27.810
2:36:20	59.969	3787.08	350.00	233.56	16.00	10.00	0.00	-103.00	7740.57	31.928
2:36:22	59.966	3789.21	350.00	233.56	16.00	10.00	0.00	-103.00	7740.90	35.020
2:36:24	59.965	3790.51	350.00	233.56	16.00	10.00	0.00	-103.00	7741.23	36.050
2:36:26	59.966	3791.22	350.00	233.56	16.00	10.00	0.00	-103.00	7741.56	35.020
2:36:28	59.969	3792.22	350.00	219.01	16.00	10.00	0.00	-103.00	7741.89	31.928
2:36:30	59.970	3790.96	350.00	219.01	16.00	10.00	0.00	-103.00	7742.22	30.899
2:36:32	59.968	3788.82	350.00	219.01	16.00	10.00	0.00	-103.00	7742.55	32.962
2:36:34	59.965	3789.03	350.00	219.01	16.00	10.00	0.00	-103.00	7742.88	36.050
2:36:36	59.964	3789.17	350.00	219.01	16.00	10.00	0.00	-103.00	7743.21	37.079
2:36:38	59.970	3787.39	350.00	205.34	16.00	10.00	0.00	-103.00	7743.54	30.899
2:36:40	59.972	3785.69	350.00	205.34	16.00	10.00	0.00	-103.00	7743.87	28.840
2:36:42	59.967	3784.83	350.00	205.34	16.00	10.00	0.00	-103.00	7744.20	33.991
2:36:44	59.967	3785.01	350.00	205.34	16.00	10.00	0.00	-103.00	7744.53	33.991
2:36:46	59.969	3784.32	350.00	205.34	16.00	10.00	0.00	-103.00	7744.86	31.928
2:36:48	59.968	3782.81	350.00	236.29	16.00	10.00	0.00	-103.00	7745.19	32.962
2:36:50	59.969	3782.11	350.00	236.29	16.00	10.00	0.00	-103.00	7745.52	31.928
2:36:52	59.967	3779.35	350.00	236.29	16.00	10.00	0.00	-103.00	7745.85	33.991
2:36:54	59.967	3779.06	350.00	236.29	16.00	10.00	0.00	-103.00	7746.18	33.991
2:36:56	59.966	3778.63	350.00	236.29	16.00	10.00	0.00	-103.00	7746.51	35.020
2:36:58	59.965	3779.21	350.00	223.02	16.00	10.00	0.00	-103.00	7746.84	36.050
2:37:00	59.971	3779.33	350.00	223.02	16.00	10.00	0.00	-103.00	7747.17	29.869
2:37:02	59.967	3776.43	350.00	223.02	16.00	10.00	0.00	-103.00	7747.50	33.991
2:37:04	59.965	3775.65	350.00	223.02	16.00	10.00	0.00	-103.00	7747.83	36.050
2:37:06	59.962	3776.60	350.00	223.02	16.00	10.00	0.00	-103.00	7748.16	39.138
2:37:08	59.964	3776.56	350.00	223.02	16.00	10.00	0.00	-103.00	7748.49	37.079
2:37:10	59.970	3776.02	350.00	223.02	16.00	10.00	0.00	-103.00	7748.82	30.899
2:37:12	59.967	3773.17	350.00	223.02	16.00	10.00	0.00	-103.00	7749.15	33.991
2:37:14	59.969	3771.73	350.00	223.02	16.00	10.00	0.00	-103.00	7749.48	31.928
2:37:16	59.968	3768.79	350.00	223.02	16.00	10.00	0.00	-103.00	7749.81	32.962
2:37:18	59.963	3768.50	350.00	223.02	16.00	10.00	0.00	-103.00	7750.14	38.109
2:37:20	59.965	3768.92	350.00	223.02	16.00	10.00	0.00	-103.00	7750.47	36.050
2:37:22	59.970	3767.37	350.00	223.02	16.00	10.00	0.00	-103.00	7750.80	30.899
2:37:24	59.973	3764.79	350.00	223.02	16.00	10.00	0.00	-103.00	7751.13	27.810
2:37:26	59.968	3760.30	350.00	223.02	16.00	10.00	0.00	-103.00	7751.46	32.962
2:37:28	59.965	3759.59	350.00	223.02	16.00	10.00	0.00	-103.00	7751.79	36.050
2:37:30	59.968	3761.89	350.00	223.02	16.00	10.00	0.00	-103.00	7752.12	32.962
2:37:32	59.969	3761.78	350.00	223.02	16.00	10.00	0.00	-103.00	7752.45	31.928
2:37:34	59.967	3760.58	350.00	223.02	16.00	10.00	0.00	-103.00	7752.78	33.991
2:37:36	59.964	3760.16	350.00	223.02	16.00	10.00	0.00	-103.00	7753.11	37.079
2:37:38	59.966	3759.78	350.00	223.02	16.00	10.00	0.00	-103.00	7753.44	35.020
2:37:40	59.979	3759.49	350.00	223.02	16.00	10.00	0.00	-103.00	7753.77	21.630
2:37:42	59.990	3757.77	350.00	223.02	16.00	10.00	0.00	-103.00	7754.10	10.298
2:37:44	59.983	3753.28	350.00	223.02	16.00	10.00	0.00	-103.00	7754.43	17.508
2:37:46	59.974	3753.09	350.00	223.02	16.00	10.00	0.00	-103.00	7754.76	26.781
2:37:48	59.967	3751.64	350.00	223.02	16.00	10.00	0.00	-103.00	7755.09	33.991
2:37:50	59.965	3753.75	350.00	223.02	16.00	10.00	0.00	-103.00	7755.42	36.050

2:37:52	59.962	3758.22	350.00	223.02	16.00	10.00	0.00	-103.00	7755.75	39.138
2:37:54	59.962	3759.25	350.00	223.02	16.00	10.00	0.00	-103.00	7756.08	39.138
2:37:56	59.961	3758.04	350.00	223.02	16.00	10.00	0.00	-103.00	7756.41	40.172
2:37:58	59.961	3760.96	350.00	223.02	16.00	10.00	0.00	-103.00	7756.74	40.172
2:38:00	59.960	3762.02	350.00	223.02	16.00	10.00	0.00	-103.00	7757.07	41.201
2:38:02	59.963	3763.82	350.00	223.02	16.00	10.00	0.00	-103.00	7757.40	38.109
2:38:04	59.959	3763.10	350.00	223.02	16.00	10.00	0.00	-103.00	7757.73	42.230
2:38:06	59.956	3763.86	350.00	223.02	16.00	10.00	0.00	-103.00	7758.06	45.319
2:38:08	59.951	3764.16	350.00	223.02	16.00	10.00	0.00	-103.00	7758.39	50.470
2:38:10	59.953	3766.13	350.00	223.02	16.00	10.00	0.00	-103.00	7758.72	48.411
2:38:12	59.954	3768.34	350.00	223.02	16.00	10.00	0.00	-103.00	7759.05	47.381
2:38:14	59.957	3767.97	350.00	223.02	16.00	10.00	0.00	-103.00	7759.38	44.289
2:38:16	59.956	3767.44	350.00	223.02	16.00	10.00	0.00	-103.00	7759.71	45.319
2:38:18	59.961	3765.61	350.00	223.02	16.00	10.00	0.00	-103.00	7760.04	40.172
2:38:20	59.963	3762.69	350.00	223.02	16.00	10.00	0.00	-103.00	7760.37	38.109
2:38:22	59.961	3761.57	350.00	223.02	16.00	10.00	0.00	-103.00	7760.70	40.172
2:38:24	59.959	3761.92	350.00	223.02	16.00	10.00	0.00	-103.00	7761.03	42.230
2:38:26	59.963	3759.63	350.00	223.02	16.00	10.00	0.00	-103.00	7761.36	38.109
2:38:28	59.963	3758.52	350.00	223.02	16.00	10.00	0.00	-103.00	7761.69	38.109
2:38:30	59.965	3752.43	350.00	223.02	16.00	10.00	0.00	-103.00	7762.02	36.050
2:38:32	59.968	3750.10	350.00	223.02	16.00	10.00	0.00	-103.00	7762.35	32.962
2:38:34	59.968	3753.83	350.00	223.02	16.00	10.00	0.00	-103.00	7762.68	32.962
2:38:36	59.968	3753.51	350.00	223.02	16.00	10.00	0.00	-103.00	7763.01	32.962
2:38:38	59.970	3753.52	350.00	223.02	16.00	10.00	0.00	-103.00	7763.34	30.899
2:38:40	59.973	3752.74	350.00	223.02	16.00	10.00	0.00	-103.00	7763.67	27.810
2:38:42	59.971	3753.18	350.00	223.02	16.00	10.00	0.00	-103.00	7764.00	29.869
2:38:44	59.965	3752.73	350.00	223.02	16.00	10.00	0.00	-103.00	7764.33	36.050
2:38:46	59.967	3753.29	350.00	223.02	16.00	10.00	0.00	-103.00	7764.66	33.991
2:38:48	59.967	3752.87	350.00	223.02	16.00	10.00	0.00	-103.00	7764.99	33.991
2:38:50	59.972	3752.36	350.00	223.02	16.00	10.00	0.00	-103.00	7765.32	28.840
2:38:52	59.976	3749.40	350.00	223.02	16.00	10.00	0.00	-103.00	7765.65	24.718
2:38:54	59.975	3747.48	350.00	223.02	16.00	10.00	0.00	-103.00	7765.98	25.752
2:38:56	59.969	3740.37	350.00	223.02	16.00	10.00	0.00	-103.00	7766.31	31.928
2:38:58	59.973	3741.29	350.00	223.02	16.00	10.00	0.00	-103.00	7766.64	27.810
2:39:00	59.974	3746.65	350.00	223.02	16.00	10.00	0.00	-103.00	7766.97	26.781
2:39:02	59.978	3745.74	350.00	223.02	16.00	10.00	0.00	-103.00	7767.30	22.659
2:39:04	59.981	3743.35	350.00	223.02	16.00	10.00	0.00	-103.00	7767.63	19.571
2:39:06	59.981	3741.62	350.00	223.02	16.00	10.00	0.00	-103.00	7767.96	19.571
2:39:08	59.981	3740.31	350.00	223.02	16.00	10.00	0.00	-103.00	7768.29	19.571
2:39:10	59.982	3738.48	350.00	223.02	16.00	10.00	0.00	-103.00	7768.62	18.542
2:39:12	59.982	3738.90	350.00	223.02	16.00	10.00	0.00	-103.00	7768.95	18.542
2:39:14	59.984	3737.40	350.00	223.02	16.00	10.00	0.00	-103.00	7769.28	16.479
2:39:16	59.982	3737.27	350.00	223.02	16.00	10.00	0.00	-103.00	7769.61	18.542
2:39:18	59.981	3736.31	350.00	223.02	16.00	10.00	0.00	-103.00	7769.94	19.571
2:39:20	59.979	3736.27	350.00	223.02	16.00	10.00	0.00	-103.00	7770.27	21.630
2:39:22	59.980	3735.45	350.00	223.02	16.00	10.00	0.00	-103.00	7770.60	20.600
2:39:24	59.978	3735.65	350.00	223.02	16.00	10.00	0.00	-103.00	7770.93	22.659
2:39:26	59.978	3737.54	350.00	223.02	16.00	10.00	0.00	-103.00	7771.26	22.659
2:39:28	59.980	3738.01	350.00	223.02	16.00	10.00	0.00	-103.00	7771.59	20.600

2:39:30	59.981	3736.75	350.00	223.02	16.00	10.00	0.00	-103.00	7771.92	19.571
2:39:32	59.980	3736.69	350.00	223.02	16.00	10.00	0.00	-103.00	7772.25	20.600
2:39:34	59.978	3736.07	350.00	223.02	16.00	10.00	0.00	-103.00	7772.58	22.659
2:39:36	59.976	3736.09	350.00	223.02	16.00	10.00	0.00	-103.00	7772.91	24.718
2:39:38	59.972	3736.57	350.00	223.02	16.00	10.00	0.00	-103.00	7773.24	28.840
2:39:40	59.971	3738.57	350.00	223.02	16.00	10.00	0.00	-103.00	7773.57	29.869
2:39:42	59.969	3738.87	350.00	223.02	16.00	10.00	0.00	-103.00	7773.90	31.928
2:39:44	59.974	3738.93	350.00	223.02	16.00	10.00	0.00	-103.00	7774.23	26.781
2:39:46	59.975	3738.65	350.00	223.02	16.00	10.00	0.00	-103.00	7774.56	25.752
2:39:48	59.976	3737.68	350.00	223.02	16.00	10.00	0.00	-103.00	7774.89	24.718
2:39:50	59.972	3737.38	350.00	223.02	16.00	10.00	0.00	-103.00	7775.22	28.840
2:39:52	59.969	3737.89	350.00	223.02	16.00	10.00	0.00	-103.00	7775.55	31.928
2:39:54	59.971	3740.02	350.00	223.02	16.00	10.00	0.00	-103.00	7775.88	29.869
2:39:56	59.974	3740.33	350.00	223.02	16.00	10.00	0.00	-103.00	7776.21	26.781
2:39:58	59.972	3742.05	350.00	223.02	16.00	10.00	0.00	-103.00	7776.54	28.840
2:40:00	59.972	3742.42	350.00	223.02	16.00	10.00	0.00	-103.00	7776.87	28.840
2:40:02	59.972	3742.52	350.00	223.02	16.00	10.00	0.00	-103.00	7777.20	28.840
2:40:04	59.977	3742.25	350.00	223.02	16.00	10.00	0.00	-103.00	7777.53	23.689
2:40:06	59.982	3741.72	350.00	223.02	16.00	10.00	0.00	-103.00	7777.86	18.542
2:40:08	59.978	3740.09	350.00	223.02	16.00	10.00	0.00	-103.00	7778.19	22.659
2:40:10	59.976	3740.63	350.00	223.02	16.00	10.00	0.00	-103.00	7778.52	24.718
2:40:12	59.973	3739.96	350.00	223.02	16.00	10.00	0.00	-103.00	7778.85	27.810
2:40:14	59.974	3740.78	350.00	223.02	16.00	10.00	0.00	-103.00	7779.18	26.781
2:40:16	59.977	3742.83	350.00	223.02	16.00	10.00	0.00	-103.00	7779.51	23.689
2:40:18	59.977	3741.27	350.00	223.02	16.00	10.00	0.00	-103.00	7779.84	23.689
2:40:20	59.978	3739.78	350.00	223.02	16.00	10.00	0.00	-103.00	7780.17	22.659
2:40:22	59.979	3738.97	350.00	223.02	16.00	10.00	0.00	-103.00	7780.50	21.630
2:40:24	59.981	3738.71	350.00	223.02	16.00	10.00	0.00	-103.00	7780.83	19.571
2:40:26	59.977	3738.88	350.00	223.02	16.00	10.00	0.00	-103.00	7781.16	23.689
2:40:28	59.974	3739.86	350.00	223.02	16.00	10.00	0.00	-103.00	7781.49	26.781
2:40:30	59.971	3738.10	350.00	223.02	16.00	10.00	0.00	-103.00	7781.82	29.869
2:40:32	59.971	3738.56	350.00	223.02	16.00	10.00	0.00	-103.00	7782.15	29.869
2:40:34	59.971	3743.51	350.00	223.02	16.00	10.00	0.00	-103.00	7782.48	29.869
2:40:36	59.972	3743.42	350.00	223.02	16.00	10.00	0.00	-103.00	7782.81	28.840
2:40:38	59.968	3745.25	350.00	223.02	16.00	10.00	0.00	-103.00	7783.14	32.962
2:40:40	59.966	3745.74	350.00	223.02	16.00	10.00	0.00	-103.00	7783.47	35.020
2:40:42	59.966	3747.34	350.00	223.02	16.00	10.00	0.00	-103.00	7783.80	35.020
2:40:44	59.971	3750.70	350.00	223.02	16.00	10.00	0.00	-103.00	7784.13	29.869
2:40:46	59.973	3749.75	350.00	223.02	16.00	10.00	0.00	-103.00	7784.46	27.810
2:40:48	59.972	3746.22	350.00	223.02	16.00	10.00	0.00	-103.00	7784.79	28.840
2:40:50	59.969	3744.68	350.00	223.02	16.00	10.00	0.00	-103.00	7785.12	31.928
2:40:52	59.972	3743.75	350.00	223.02	16.00	10.00	0.00	-103.00	7785.45	28.840
2:40:54	59.974	3743.15	350.00	223.02	16.00	10.00	0.00	-103.00	7785.78	26.781
2:40:56	59.973	3740.30	350.00	223.02	16.00	10.00	0.00	-103.00	7786.11	27.810
2:40:58	59.970	3739.45	350.00	223.02	16.00	10.00	0.00	-103.00	7786.44	30.899
2:41:00	59.971	3733.38	350.00	223.02	16.00	10.00	0.00	-103.00	7786.77	29.869
2:41:02	59.974	3731.83	350.00	223.02	16.00	10.00	0.00	-103.00	7787.10	26.781
2:41:04	59.982	3737.58	350.00	223.02	16.00	10.00	0.00	-103.00	7787.43	18.542
2:41:06	59.985	3736.23	350.00	223.02	16.00	10.00	0.00	-103.00	7787.76	15.449

2:41:08	59.985	3734.90	350.00	223.02	16.00	10.00	0.00	-103.00	7788.09	15.449
2:41:10	59.985	3733.43	350.00	223.02	16.00	10.00	0.00	-103.00	7788.42	15.449
2:41:12	59.987	3733.12	350.00	223.02	16.00	10.00	0.00	-103.00	7788.75	13.391
2:41:14	59.989	3730.51	350.00	223.02	16.00	10.00	0.00	-103.00	7789.08	11.332
2:41:16	59.989	3729.18	350.00	223.02	16.00	10.00	0.00	-103.00	7789.41	11.332
2:41:18	59.986	3725.46	350.00	223.02	16.00	10.00	0.00	-103.00	7789.74	14.420
2:41:20	59.987	3724.78	350.00	223.02	16.00	10.00	0.00	-103.00	7790.07	13.391
2:41:22	59.990	3720.11	350.00	223.02	16.00	10.00	0.00	-103.00	7790.40	10.298
2:41:24	59.994	3720.94	350.00	223.02	16.00	10.00	0.00	-103.00	7790.73	6.181
2:41:26	59.996	3725.66	350.00	223.02	16.00	10.00	0.00	-103.00	7791.06	4.122
2:41:28	60.001	3725.68	350.00	223.02	16.00	10.00	0.00	-103.00	7791.39	-1.029
2:41:30	60.003	3727.75	350.00	223.02	16.00	10.00	0.00	-103.00	7791.72	-3.088
2:41:32	60.004	3727.82	350.00	223.02	16.00	10.00	0.00	-103.00	7792.05	-4.122
2:41:34	60.006	3727.68	350.00	223.02	16.00	10.00	0.00	-103.00	7792.38	-6.181
2:41:36	60.012	3727.23	350.00	223.02	16.00	10.00	0.00	-103.00	7792.71	-12.361
2:41:38	60.014	3725.01	350.00	223.02	16.00	10.00	0.00	-103.00	7793.04	-14.420
2:41:40	60.019	3726.45	350.00	223.02	16.00	10.00	0.00	-103.00	7793.37	-19.571
2:41:42	60.021	3726.02	350.00	223.02	16.00	10.00	0.00	-103.00	7793.70	-21.630
2:41:44	60.025	3719.12	350.00	223.02	16.00	10.00	0.00	-103.00	7794.03	-25.752
2:41:46	60.026	3716.37	350.00	223.02	16.00	10.00	0.00	-103.00	7794.36	-26.781
2:41:48	60.027	3717.33	350.00	223.02	16.00	10.00	0.00	-103.00	7794.69	-27.810
2:41:50	60.029	3717.56	350.00	223.02	16.00	10.00	0.00	-103.00	7795.02	-29.869
2:41:52	60.029	3717.14	350.00	223.02	16.00	10.00	0.00	-103.00	7795.35	-29.869
2:41:54	60.037	3715.17	350.00	223.02	16.00	10.00	0.00	-103.00	7795.68	-38.109
2:41:56	60.036	3713.63	350.00	223.02	16.00	10.00	0.00	-103.00	7796.01	-37.079
2:41:58	60.037	3710.28	350.00	223.02	16.00	10.00	0.00	-103.00	7796.34	-38.109
2:42:00	60.037	3710.16	350.00	223.02	16.00	10.00	0.00	-103.00	7796.67	-38.109
2:42:02	60.036	3699.36	350.00	223.02	16.00	10.00	0.00	-103.00	7797.00	-37.079
2:42:04	60.041	3698.59	350.00	223.02	16.00	10.00	0.00	-103.00	7797.33	-42.230
2:42:06	60.043	3704.59	350.00	223.02	16.00	10.00	0.00	-103.00	7797.66	-44.289
2:42:08	60.044	3703.28	350.00	223.02	16.00	10.00	0.00	-103.00	7797.99	-45.319
2:42:10	60.043	3702.48	350.00	223.02	16.00	10.00	0.00	-103.00	7798.32	-44.289
2:42:12	60.046	3701.32	350.00	223.02	16.00	10.00	0.00	-103.00	7798.65	-47.381
2:42:14	60.048	3700.83	350.00	223.02	16.00	10.00	0.00	-103.00	7798.98	-49.440
2:42:16	60.046	3699.53	350.00	223.02	16.00	10.00	0.00	-103.00	7799.31	-47.381
2:42:18	60.046	3699.73	350.00	223.02	16.00	10.00	0.00	-103.00	7799.64	-47.381
2:42:20	60.043	3690.10	350.00	223.02	16.00	10.00	0.00	-103.00	7799.97	-44.289
2:42:22	60.043	3690.48	350.00	223.02	16.00	10.00	0.00	-103.00	7800.30	-44.289
2:42:24	60.044	3696.86	350.00	223.02	16.00	10.00	0.00	-103.00	7800.63	-45.319
2:42:26	60.043	3696.88	350.00	223.02	16.00	10.00	0.00	-103.00	7800.96	-44.289

Date:	Monday, October 12, 2009	
Time of T(0)	2:27:26	
:o 60 Hz or Pre-Perturbation Hz	2:33:00	
age Frequency [T(-2) to T(-16)]	60.042	Hz
ge Frequency [T(+20 to T(+52)]	59.889	Hz
rbation Delta Frequency Actual	-0.153	Hz
:erchange MW [T(-2) to T(-16)]	3645.73	MW
erchange MW [T(+20 to T(+52)]	3803.35	MW
ı Interchange Delta MW Actual	157.63	MW
EPFR Pre-Perturbation Average	-43.39	MW
PFR Post-Perturbation Average	114.21	MW
EPFR Unadjusted	157.60	MW
EPFR Adjusted	198.04	MW
re JOU Dynamic Schedules MW	350.00	MW
Pre Non-Conforming Load MW	165.34	MW
Pre Pumped Hydro MW	0.00	MW
erred Frequency Response MW	-4.21	MW
ingent BA Lost Generation MW	15.00	MW
f Pre Perturbation Adjustments	526.12	MW
st JOU Dynamic Schedules MW	335.00	MW
ost Non-Conforming Load MW	214.13	MW
Post Pumped Hydro MW	6.35	MW
erred Frequency Response MW	11.09	MW
ingent BA Lost Generation MW	0.00	MW
Post Perturbation Adjustments	566.57	MW
Net Total Adjustments MW	40.45	MW

eriod Evaluation

nitial P.U. Performance for FRO	1.000	P.U.
Performance Adjusted for FRO	0.744	P.U.

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

Frequency @ T(+46)	59.890	Hz							
Frequency @ T(+76)	59.863	Hz	Actual		JOU	Non-		Transferred	Contingent
Frequency @ T(+106)	59.899	Hz	Primary	Un-adjusted	Dynamic	Conforming	Pumped	Frequency	BA
Frequency @ T(+136)	59.920	Hz	Freq Response	P.U.	Schedules	Load	Hydro	Response	Lost Generation
Frequency @ T(+166)	59.937	Hz	MW	Performance	Adjustment	Adjustment	Adjustment	Adjustment	Adjustment
EPFR @ T(+46)	113.30	MW	158.51	1.399	-15.00	50.26	11.00	15.21	-15.00
EPFR @ T(+76)	141.11	MW	182.41	1.293	-15.00	49.49	16.00	17.91	-15.00
EPFR @ T(+106)	104.03	MW	164.54	1.582	-15.00	63.03	16.00	14.31	-15.00
EPFR @ T(+136)	82.40	MW	129.49	1.571	-15.00	64.13	16.00	12.21	-15.00
EPFR @ T(+166)	64.89	MW	119.99	1.849	-15.00	63.75	16.00	10.51	-15.00

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-103.00	MW/0.1 Hz
Post-Perturbation Bias Setting	-103.00	MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	-43.39	MW
EPFR for Bias Setting Post-Perturbation Average	114.21	MW
EPFR for Bias Setting Delta	157.60	MW
Primary Frequency Response Delivery % of Bias	100.02%	
Pre-Perturbation BA Load	7651.3	MW
Post-Perturbation BA Load	7632.0	MW
Pre to Post Perturbation BA Load Change	-19.305	MW
Load Dampening Frequency Response	-12.617	MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	12.25%	
Average Bias Setting when Hz is greater than +/-0.036 Hz	-103.00	MW/0.1 Hz

JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected Net Actual Interchange MW	Actual Primary Freq Response MW	Actual Primary Freq Response Beta MW/0.1 Hz
										0.0270
										0.0260
										0.0260
										0.0220
										0.0190
										0.0170

										0.0190	
										0.0200	
										0.0190	
										0.0210	
										0.0210	
										0.0210	
										0.0190	
										0.0180	
										0.0220	
										0.0310	
										0.0370	-103
										0.0370	-103
										0.0360	
										0.0370	-103
										0.0460	-103
										0.0480	-103
										0.0480	-103
										0.0430	-103
										0.0410	-103
										0.0410	-103
										0.0410	-103
										0.0390	-103
350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0410	-103
350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0430	-103
350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0450	-103
350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0460	-103
350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0410	-103
350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0410	-103
350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0410	-103
350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0390	-103
										0.0220	
									51.252	-26.96	0.1480 -103
									89.794	-43.56	0.1640 -103
									89.563	-51.73	0.1310 -103
									89.563	-51.73	0.1310 -103
									92.047	-61.31	0.1080 -103
									116.139	-76.85	0.1090 -103
									121.003	-74.64	0.1200 -103
									121.084	-72.89	0.1240 -103
									123.767	-74.06	0.1250 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	124.815	-78.44	0.1170 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	135.511	-87.36	0.1130 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	136.482	-87.42	0.1140 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	137.389	-87.44	0.1150 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.852	-90.15	0.1130 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.620	-90.59	0.1120 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.309	-91.57	0.1100 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	142.962	-97.17	0.1050 -103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.218	-96.69	0.1060 -103

335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.758	-96.40	0.1070	-103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.362	-96.78	0.1060	-103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	147.166	-99.35	0.1060	-103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	147.964	-97.91	0.1090	-103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	149.264	-98.12	0.1100	-103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	154.318	-98.21	0.1150	-103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	155.317	-98.85	0.1150	-103
335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	154.849	-100.47	0.1120	-103
									158.515	-102.19	0.1130	-103
									157.815	-102.39	0.1120	-103
									157.841	-102.41	0.1120	-103
									159.278	-104.70	0.1100	-103
									160.386	-104.74	0.1110	-103
									160.507	-100.24	0.1180	-103
									164.127	-97.05	0.1270	-103
									166.393	-89.88	0.1430	-103
									169.752	-87.90	0.1510	-103
									170.779	-89.82	0.1480	-103
									180.532	-98.05	0.1420	-103
									180.943	-101.01	0.1370	-103
									180.892	-102.71	0.1340	-103
									182.414	-102.99	0.1350	-103
									181.643	-103.72	0.1330	-103
									181.673	-103.15	0.1340	-103
									181.344	-105.97	0.1290	-103
									180.603	-107.42	0.1260	-103
									178.716	-109.56	0.1210	-103
									177.395	-109.42	0.1200	-103
									173.971	-109.33	0.1170	-103
									172.945	-110.77	0.1140	-103
									171.705	-112.87	0.1100	-103
									169.900	-113.17	0.1080	-103
									168.673	-110.15	0.1110	-103
									166.728	-111.81	0.1070	-103
									164.542	-114.96	0.1010	-103
									161.862	-116.34	0.0970	-103
									160.483	-114.53	0.0980	-103
									159.078	-113.53	0.0980	-103
									150.968	-109.30	0.0960	-103
									148.865	-110.17	0.0930	-103
									147.059	-112.15	0.0890	-103
									146.392	-116.07	0.0840	-103
									144.424	-114.51	0.0840	-103
									143.022	-114.30	0.0830	-103
									139.453	-112.35	0.0820	-103
									137.918	-112.93	0.0800	-103
									136.591	-112.77	0.0790	-103
									131.248	-107.47	0.0800	-103
									130.525	-104.32	0.0830	-103

129.494	-106.03	0.0800	-103
128.224	-105.86	0.0790	-103
128.848	-108.16	0.0770	-103
127.612	-109.89	0.0740	-103
126.560	-108.05	0.0750	-103
124.520	-109.11	0.0720	-103
123.597	-107.36	0.0730	-103
122.533	-111.27	0.0680	-103
121.911	-105.89	0.0730	-103
122.298	-107.16	0.0720	-103
121.678	-109.50	0.0690	-103
121.149	-107.09	0.0710	-103
120.562	-108.49	0.0690	-103
121.012	-110.89	0.0670	-103
119.133	-113.32	0.0630	-103
119.995	-114.15	0.0630	-103
117.825	-121.31	0.0550	-103
113.277	-121.64	0.0510	-103
108.812	-114.39	0.0530	-103
104.757	-104.63	0.0580	-103
101.779	-100.65	0.0590	-103
102.765	-102.64	0.0580	-103
104.483	-107.58	0.0550	-103
103.551	-110.02	0.0520	-103
101.596	-106.80	0.0530	-103
103.967	-111.64	0.0510	-103
97.631	-107.14	0.0490	-103
95.149	-105.57	0.0480	-103
91.029	-102.14	0.0470	-103
86.272	-94.67	0.0490	-103
82.728	-91.79	0.0480	-103
80.842	-89.70	0.0480	-103
77.539	-86.03	0.0480	-103
75.468	-86.62	0.0450	-103
72.886	-80.87	0.0480	-103
73.032	-82.87	0.0460	-103
70.643	-78.38	0.0480	-103
68.584	-76.95	0.0470	-103
68.374	-76.72	0.0470	-103
65.738	-72.94	0.0480	-103
65.700	-74.55	0.0460	-103
66.982	-76.01	0.0460	-103
69.512	-83.62	0.0410	-103
70.020	-82.26	0.0430	-103
71.058	-82.51	0.0440	-103
71.351	-80.96	0.0460	-103
71.870	-83.45	0.0440	-103
72.649	-83.39	0.0450	-103
77.251	-91.83	0.0420	-103

76.863	-94.74	0.0390	-103
77.548	-96.79	0.0380	-103
77.157	-96.30	0.0380	-103
77.168	-104.10	0.0320	
76.677	-100.72	0.0340	
77.981	-102.44	0.0340	
78.874	-106.40	0.0320	
78.324	-108.60	0.0300	
78.783	-115.64	0.0260	
80.293	-111.33	0.0300	
82.011	-112.15	0.0310	
82.943	-113.43	0.0310	
86.020	-119.27	0.0300	
87.420	-122.91	0.0290	
88.217	-127.62	0.0270	
91.425	-132.26	0.0270	
91.797	-138.83	0.0240	
91.712	-143.02	0.0220	
93.589	-145.95	0.0220	
94.834	-143.42	0.0240	
95.767	-149.35	0.0220	
96.684	-146.22	0.0240	
100.124	-156.14	0.0220	
101.498	-155.85	0.0230	
103.190	-166.10	0.0200	
105.606	-175.64	0.0180	
106.448	-174.14	0.0190	
107.637	-173.26	0.0200	
110.489	-175.03	0.0210	
111.297	-179.15	0.0200	
111.865	-177.21	0.0210	
115.295	-195.01	0.0170	
115.872	-195.98	0.0170	
116.297	-200.08	0.0160	
117.627	-217.32	0.0120	
118.102	-222.30	0.0110	
119.847	-217.41	0.0130	
120.975	-219.45	0.0130	
121.323	-237.31	0.0090	
122.141	-248.63	0.0070	
122.682	-244.75	0.0080	
123.523	-241.61	0.0090	
126.036	-237.24	0.0110	
127.335	-226.88	0.0140	
128.585	-217.48	0.0170	
129.558	-219.13	0.0170	
130.731	-241.53	0.0120	
130.253	-265.15	0.0070	
129.756	-281.30	0.0040	

130.382	-295.49	0.0020
131.310	-304.49	0.0010
132.827		0.0010
133.965		0.0010
135.529		0.0010
134.868		0.0010
137.365		0.0020
138.168		0.0050
138.694		0.0070
140.041		0.0080
139.736		0.0110
141.123		0.0140
140.577		0.0170
141.532		0.0190
141.789		0.0210
142.228		0.0170
142.303		0.0170
142.880		0.0190
143.489		0.0230
141.810		0.0240
140.115		0.0250
140.350		0.0210
142.203		0.0190
143.033		0.0240
141.148		0.0240
140.823		0.0210
141.631		0.0200
139.291		0.0250
139.887		0.0240
140.222		0.0200
140.077		0.0200
141.137		0.0220
141.150		0.0220
139.527		0.0220
139.999		0.0210
140.620		0.0210
140.094		0.0230
140.071		0.0230
140.557		0.0220
141.212		0.0190
141.900		0.0160
143.717		0.0180
143.946		0.0180
143.677		0.0180
142.752		0.0190
143.456		0.0190
143.642		0.0160
143.278		0.0150
142.938		0.0160

143.206	0.0140
144.940	0.0130
145.078	0.0120
144.684	0.0120
144.042	0.0100
145.813	0.0070
147.218	0.0070
145.300	0.0090
145.716	0.0090
145.699	0.0100
144.876	0.0030
144.730	0.0010
144.489	0.0050
143.858	0.0080
142.730	0.0090
142.378	0.0080
142.330	0.0080
142.462	0.0120
142.770	0.0140
142.813	0.0150
142.844	0.0160
142.374	0.0150
141.406	0.0160
140.726	0.0180
142.005	0.0190
143.086	0.0180
143.558	0.0210
142.529	0.0230
142.683	0.0240
144.740	0.0240
144.938	0.0210
144.693	0.0180
143.947	0.0220
143.540	0.0240
143.421	0.0260
144.703	0.0240
144.187	0.0230
140.516	0.0230
141.715	0.0250
143.236	0.0270
144.875	0.0310
146.150	0.0300
147.184	0.0290
146.584	0.0270
143.398	0.0220
142.353	0.0190
142.117	0.0220
141.408	0.0250
141.437	0.0280

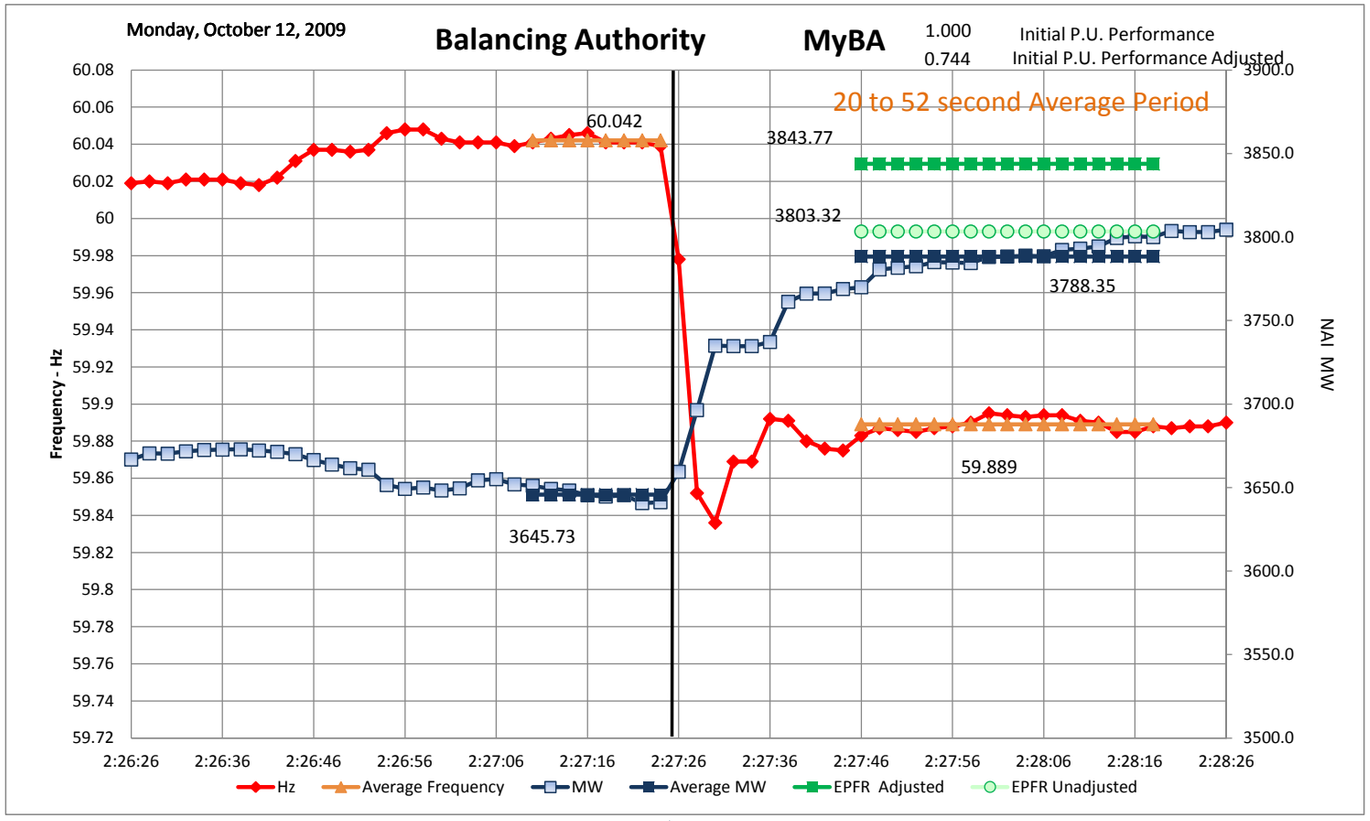
141.269	0.0240	
141.678	0.0250	
140.760	0.0270	
141.352	0.0310	
143.487	0.0340	
144.785	0.0350	
145.494	0.0340	
146.491	0.0310	
145.232	0.0300	
143.097	0.0320	
143.299	0.0350	
143.440	0.0360	
141.667	0.0300	
139.963	0.0280	
139.104	0.0330	
139.282	0.0330	
138.593	0.0310	
137.082	0.0320	
136.383	0.0310	
133.625	0.0330	
133.329	0.0330	
132.906	0.0340	
133.485	0.0350	
133.608	0.0290	
130.702	0.0330	
129.920	0.0350	
130.870	0.0380	-103
130.832	0.0360	
130.296	0.0300	
127.443	0.0330	
126.003	0.0310	
123.066	0.0320	
122.776	0.0370	-103
123.190	0.0350	
121.639	0.0300	
119.059	0.0270	
114.568	0.0320	
113.865	0.0350	
116.167	0.0320	
116.050	0.0310	
114.855	0.0330	
114.430	0.0360	
114.054	0.0340	
113.768	0.0210	
112.046	0.0100	
107.550	0.0170	
107.360	0.0260	
105.910	0.0330	
108.024	0.0350	

112.498	0.0380	-103
113.523	0.0380	-103
112.314	0.0390	-103
115.238	0.0390	-103
116.295	0.0400	-103
118.095	0.0370	-103
117.373	0.0410	-103
118.131	0.0440	-103
118.431	0.0490	-103
120.400	0.0470	-103
122.612	0.0460	-103
122.245	0.0430	-103
121.710	0.0440	-103
119.879	0.0390	-103
116.961	0.0370	-103
115.843	0.0390	-103
116.193	0.0410	-103
113.900	0.0370	-103
112.795	0.0370	-103
106.702	0.0350	
104.375	0.0320	
108.103	0.0320	
107.783	0.0320	
107.796	0.0300	
107.014	0.0270	
107.451	0.0290	
107.002	0.0350	
107.563	0.0330	
107.145	0.0330	
106.632	0.0280	
103.671	0.0240	
101.749	0.0250	
94.643	0.0310	
95.558	0.0270	
100.924	0.0260	
100.011	0.0220	
97.624	0.0190	
95.891	0.0190	
94.579	0.0190	
92.757	0.0180	
93.174	0.0180	
91.677	0.0160	
91.546	0.0180	
90.581	0.0190	
90.545	0.0210	
89.721	0.0200	
89.923	0.0220	
91.813	0.0220	
92.285	0.0200	

91.021	0.0190
90.966	0.0200
90.340	0.0220
90.367	0.0240
90.848	0.0280
92.844	0.0290
93.148	0.0310
93.208	0.0260
92.920	0.0250
91.957	0.0240
91.655	0.0280
92.165	0.0310
94.290	0.0290
94.602	0.0260
96.326	0.0280
96.697	0.0280
96.797	0.0280
96.518	0.0230
95.996	0.0180
94.358	0.0220
94.902	0.0240
94.237	0.0270
95.048	0.0260
97.105	0.0230
95.541	0.0230
94.049	0.0220
93.239	0.0210
92.979	0.0190
93.152	0.0230
94.133	0.0260
92.375	0.0290
92.831	0.0290
97.780	0.0290
97.692	0.0280
99.524	0.0320
100.017	0.0340
101.613	0.0340
104.973	0.0290
104.023	0.0270
100.490	0.0280
98.956	0.0310
98.018	0.0280
97.422	0.0260
94.572	0.0270
93.726	0.0300
87.649	0.0290
86.103	0.0260
91.855	0.0180
90.502	0.0150

89.170	0.0150	
87.707	0.0150	
87.388	0.0130	
84.783	0.0110	
83.453	0.0110	
79.732	0.0140	
79.058	0.0130	
74.381	0.0100	
75.211	0.0060	
79.934	0.0040	
79.950	0.0010	
82.027	0.0030	
82.098	0.0040	
81.956	0.0060	
81.504	0.0120	
79.285	0.0140	
80.719	0.0190	
80.289	0.0210	
73.396	0.0250	
70.647	0.0260	
71.605	0.0270	
71.833	0.0290	
71.415	0.0290	
69.439	0.0370	-103
67.905	0.0360	
64.556	0.0370	-103
64.431	0.0370	-103
53.629	0.0360	
52.864	0.0410	-103
58.864	0.0430	-103
57.548	0.0440	-103
56.755	0.0430	-103
55.589	0.0460	-103
55.099	0.0480	-103
53.802	0.0460	-103
53.999	0.0460	-103
44.373	0.0430	-103
44.750	0.0430	-103
51.137	0.0440	-103
51.150	0.0430	-103

Adjusted P.U. Performance
0.856
0.808
0.829
0.633
0.689



T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

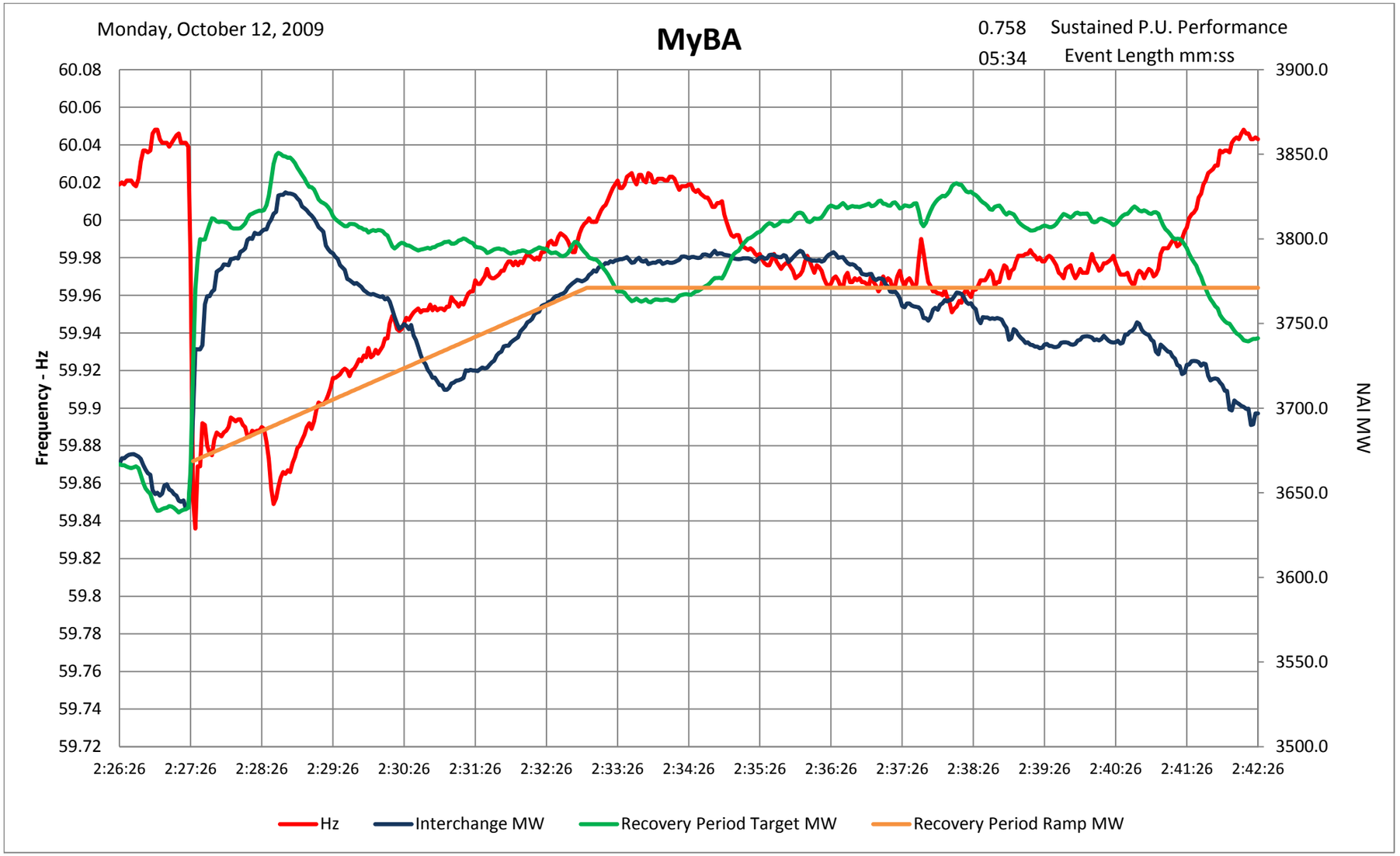
# of rows to shift T(0)

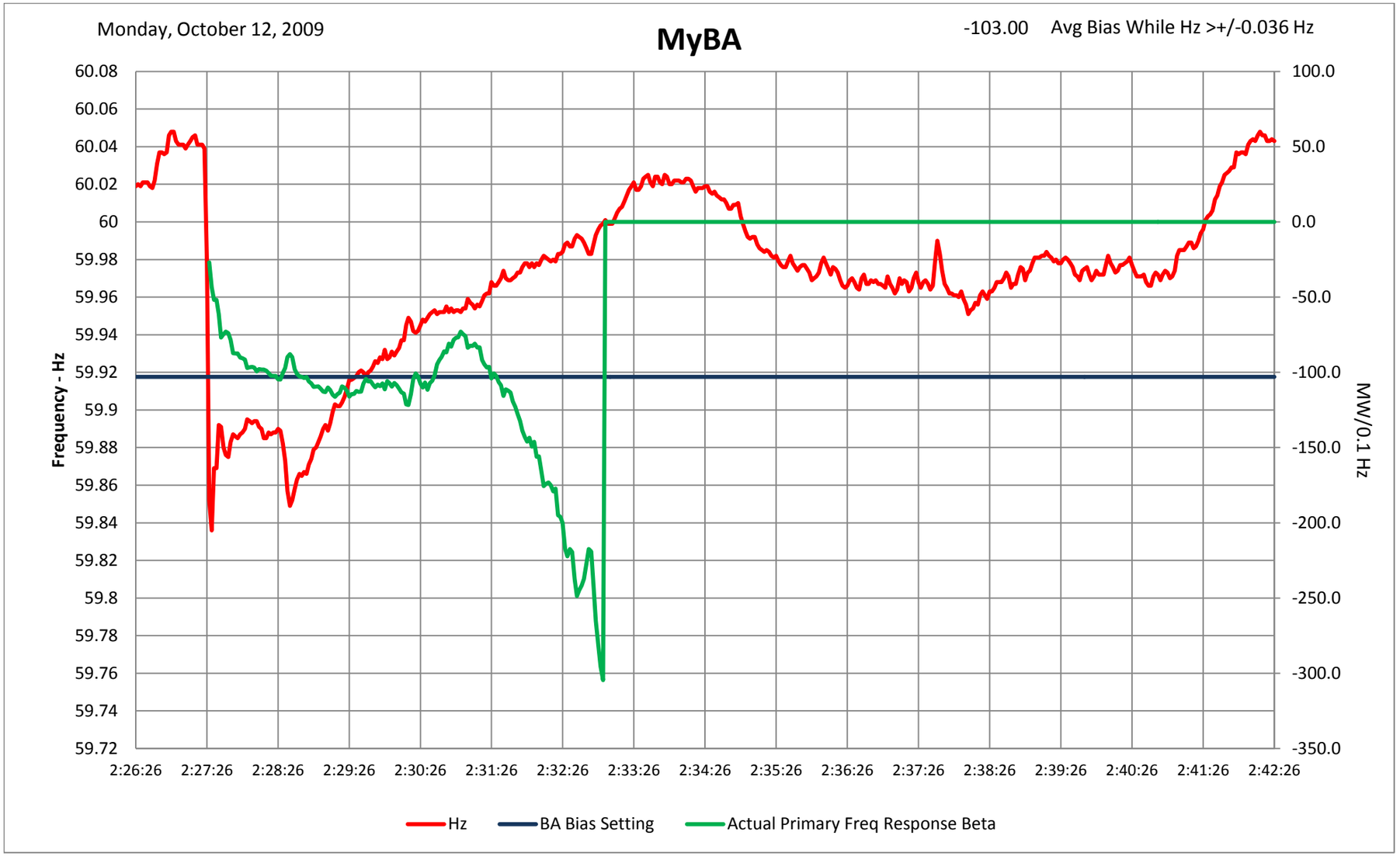
1

A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.


Monday, October 12, 2009
MyBA
0.758 Sustained P.U. Performance
05:34 Event Length mm:ss
Frequency - Hz
NAI MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
3900.0
3850.0
3800.0
3750.0
3700.0
3650.0
3600.0
3550.0
3500.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Interchange MW
Recovery Period Target MW
Recovery Period Ramp MW


Monday, October 12, 2009
MyBA
-103.00 Avg Bias While Hz >+/-0.036 Hz
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
-250.0
-300.0
-350.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
BA Bias Setting
Actual Primary Freq Response Beta

Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Value A Data BA Performance Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW
Monday, October 12, 2009	2:27:26	60.039	60.042	2:27:26	59.836	60.042	3645.73	350.00	165.34	0.00	0.00	-4.21	15.00

Value B 20 to 52 second Average Period Evaluation

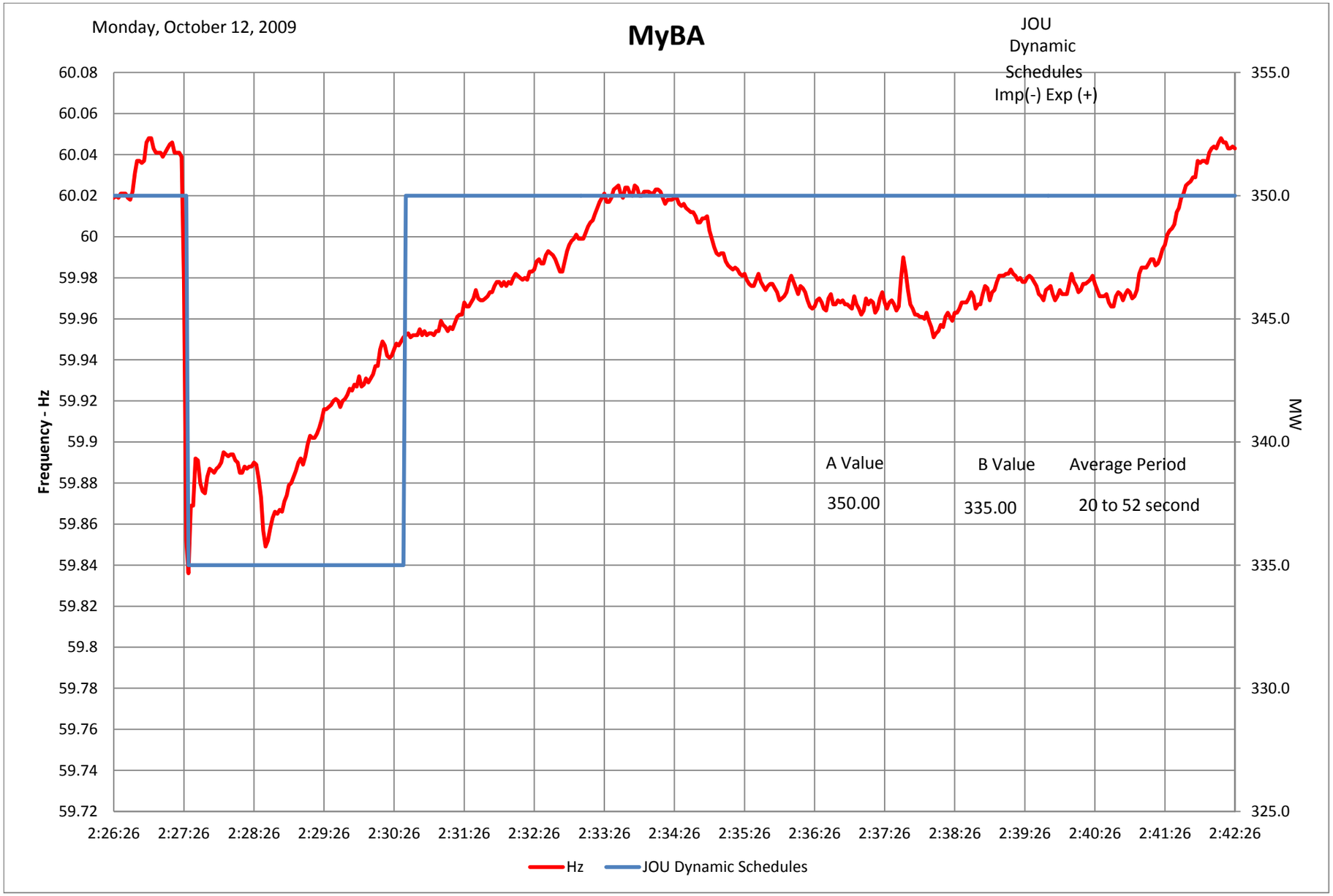
BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.
-103.00	7651.305	-43.39	59.889	3803.35	335.00	165.34	6.35	0.00	11.09	0.00	0.744	1.000	0.758

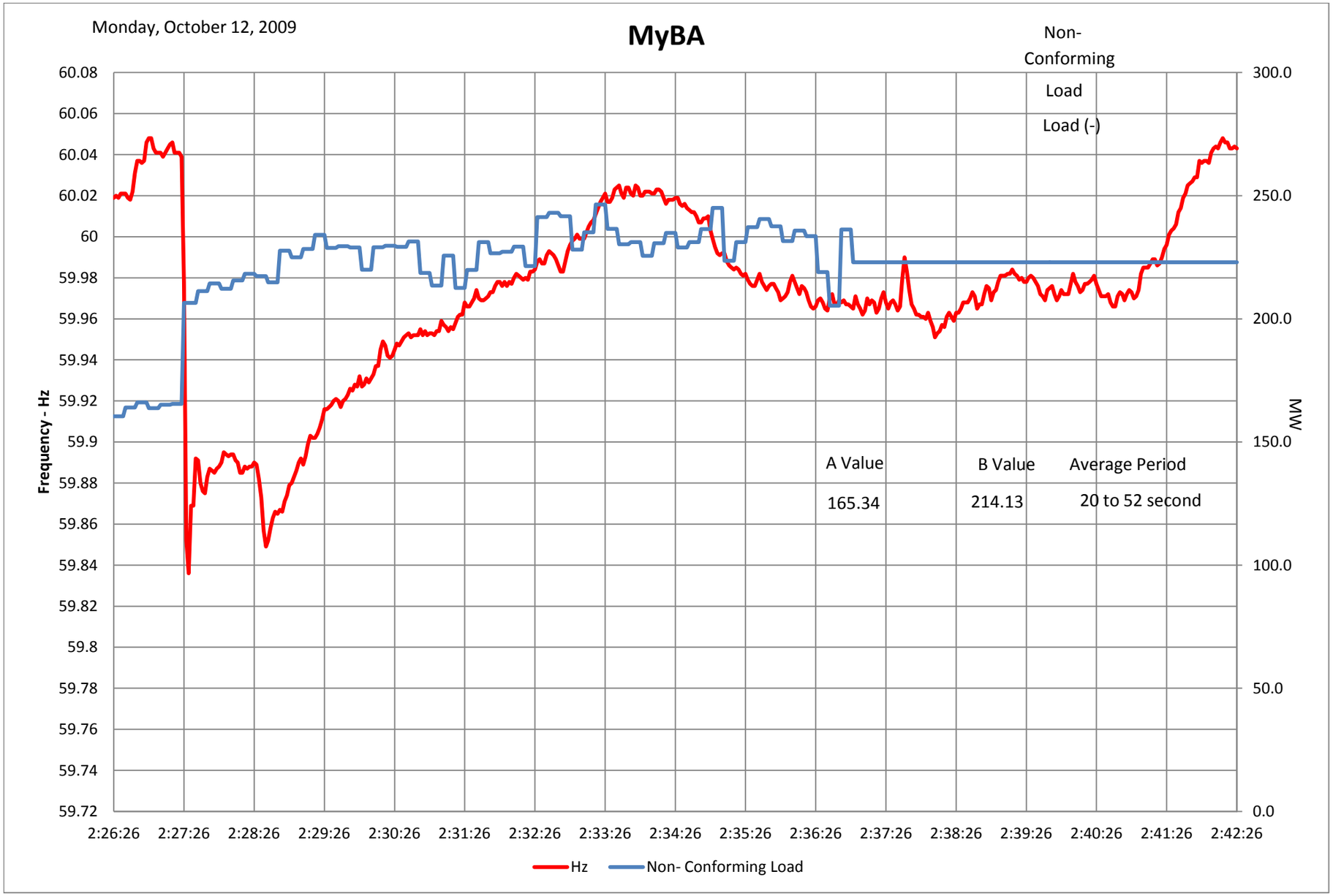
				Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points									
BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.
-103.00	7632.00	114.21	-103.00	1.399	1.293	1.582	1.571	1.849	0.856	0.808	0.829	0.633	0.689

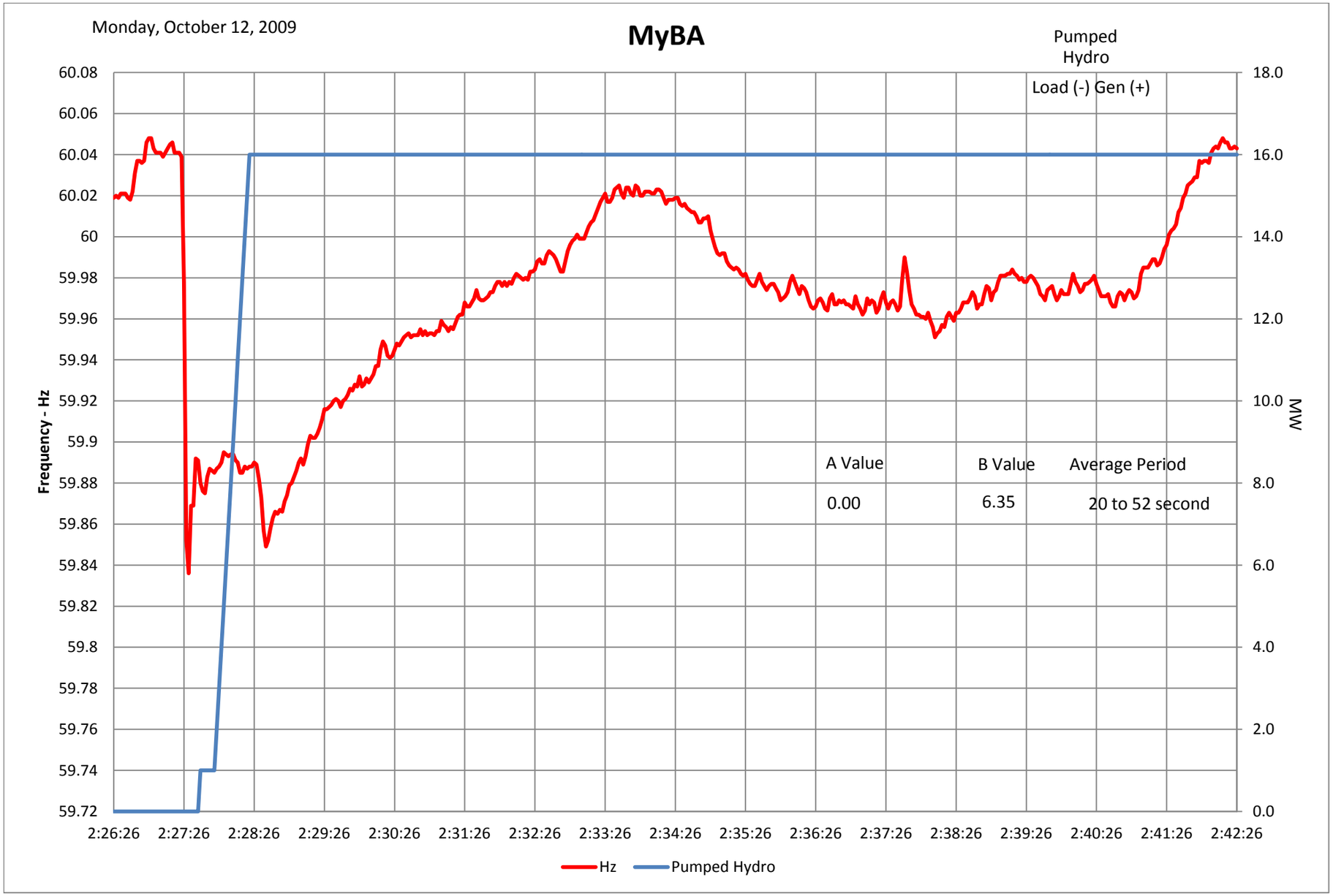
Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
-103.00	-103.00

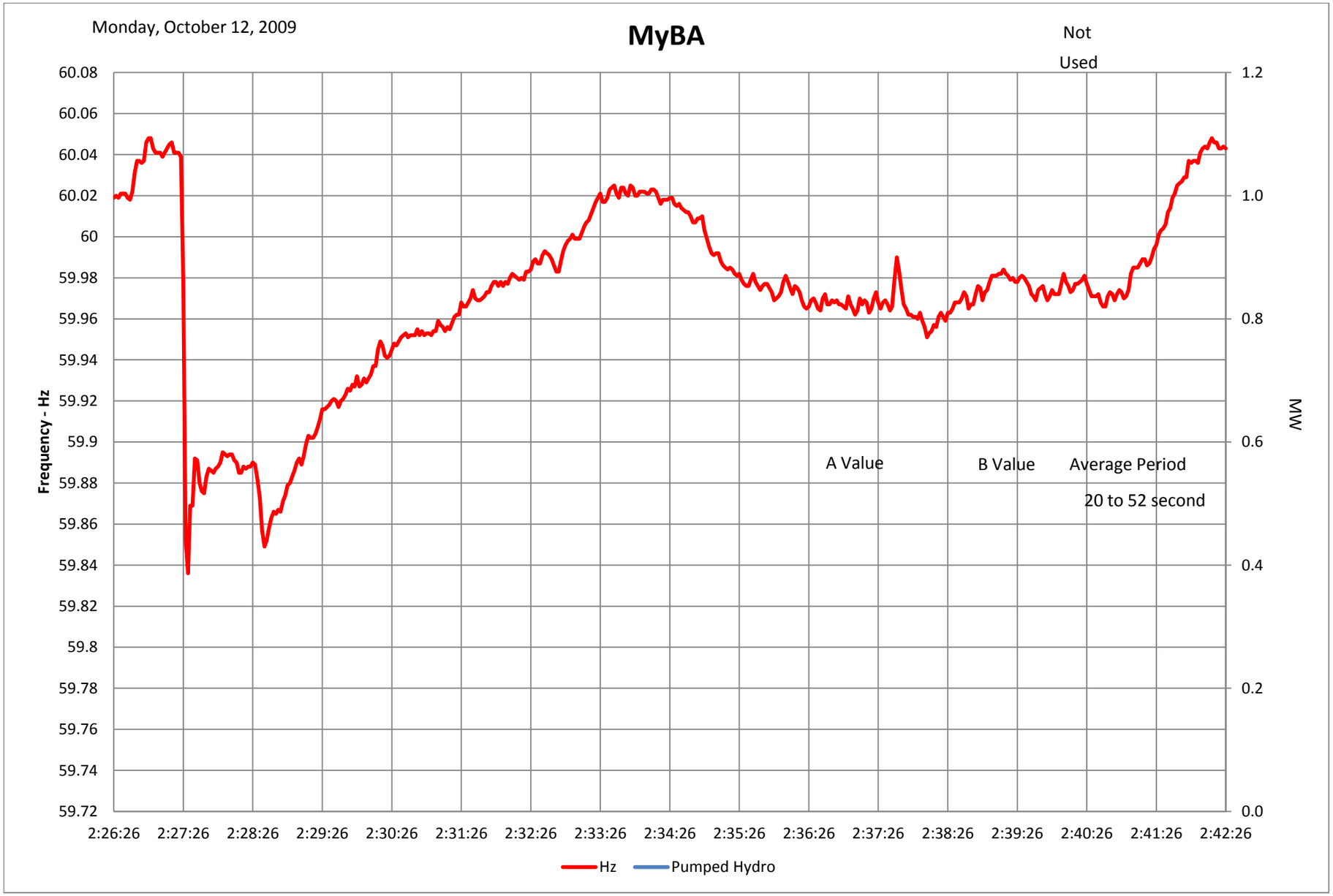
Steps	**To be completed for each event evaluated.**
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order: Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Net Actual Interchange Column D: Joint Owned Unit dynamic schedule Column E: Non Conforming Load Column F: Pumped Hydro Column G: Not Used Column H: Transferred Frequency Response Column I: Contingent BA Lost load or generation Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D, E, F and H are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data. Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time. If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary. To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events) This value controls the end of the "Sustained Frequency Response" evaluation period. Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

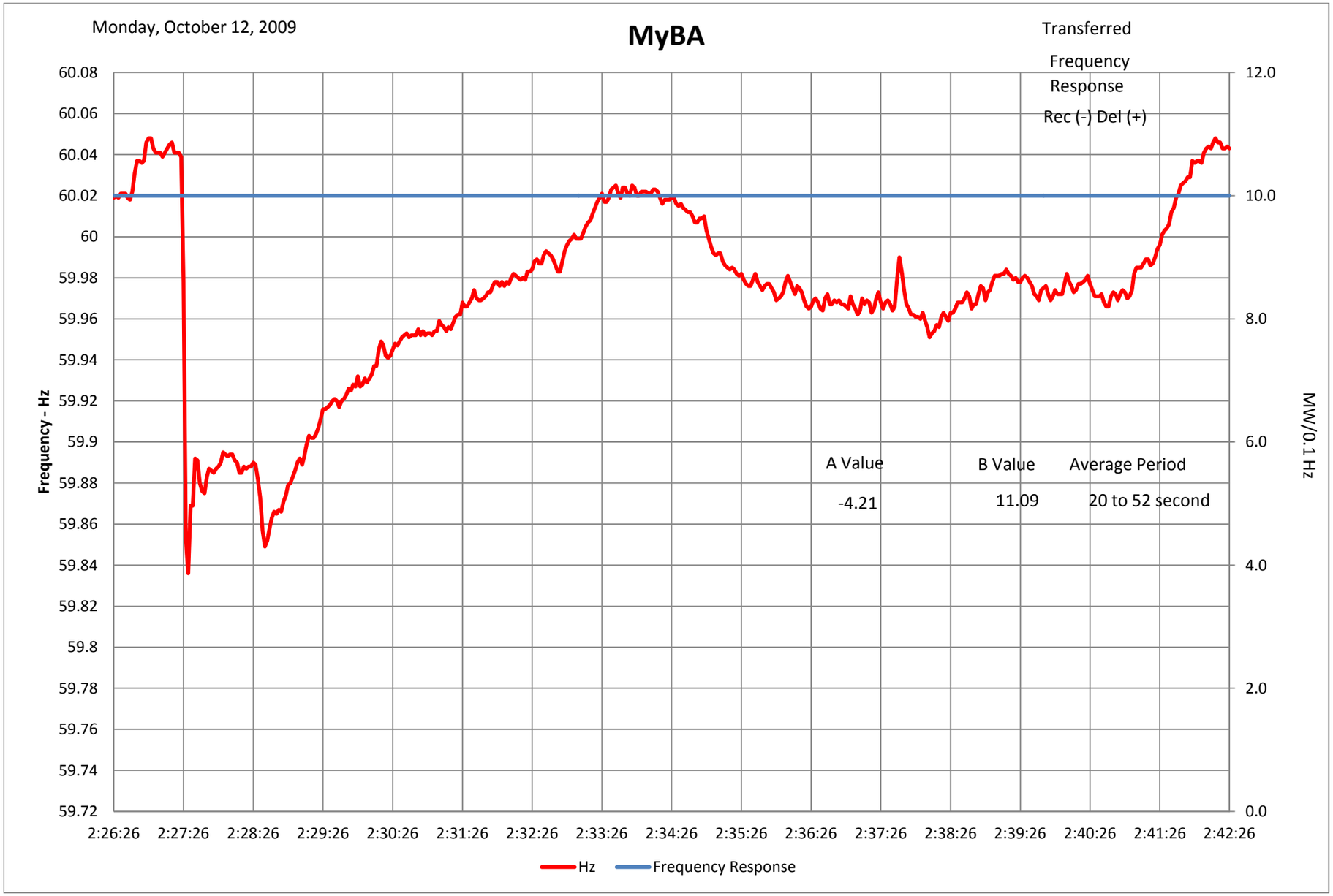
Steps	**To be completed the first time you use Form 2 for your BA.**
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "NYISO".
B	For informational and educational purposes, a "Sustained" performance evaluation is provided in the "Evaluation" worksheet and in the "Sustained" Graph. This evaluation uses a Time Constant (TC) to model the frequency response of your BA. The time constant is located in cell "L13" of the "Evaluation" spreadsheet and should be edited for the types of generators in your BA. Presently this time constant is set at 0.35. The higher the value of the time constant, the faster the delivery of frequency response is expected. Setting the TC to 1.0 effectively turns off the delay and instantaneous frequency response will be modeled. Do not set higher than 1.0. This time constant is only used in the "Sustained" evaluation and is not used for the Field Trial evaluation of performance to the FRO. A typical setting for this time constant is 0.08 to 0.15 for hydro units, 0.10 to 0.20 for large steam turbines and 0.20 to 0.40 for combustion turbines. By observing the slope of your "Interchange Actual" on the "Sustained" Graph, adjust the time constant until the initial slope of the "Target" is similar to the slope of the NAI data. When set appropriately, the "Target" trend on the "Sustained" graph will model what the Net Actua Interchange should have done during the event recovery period based on your Bias setting during the event.

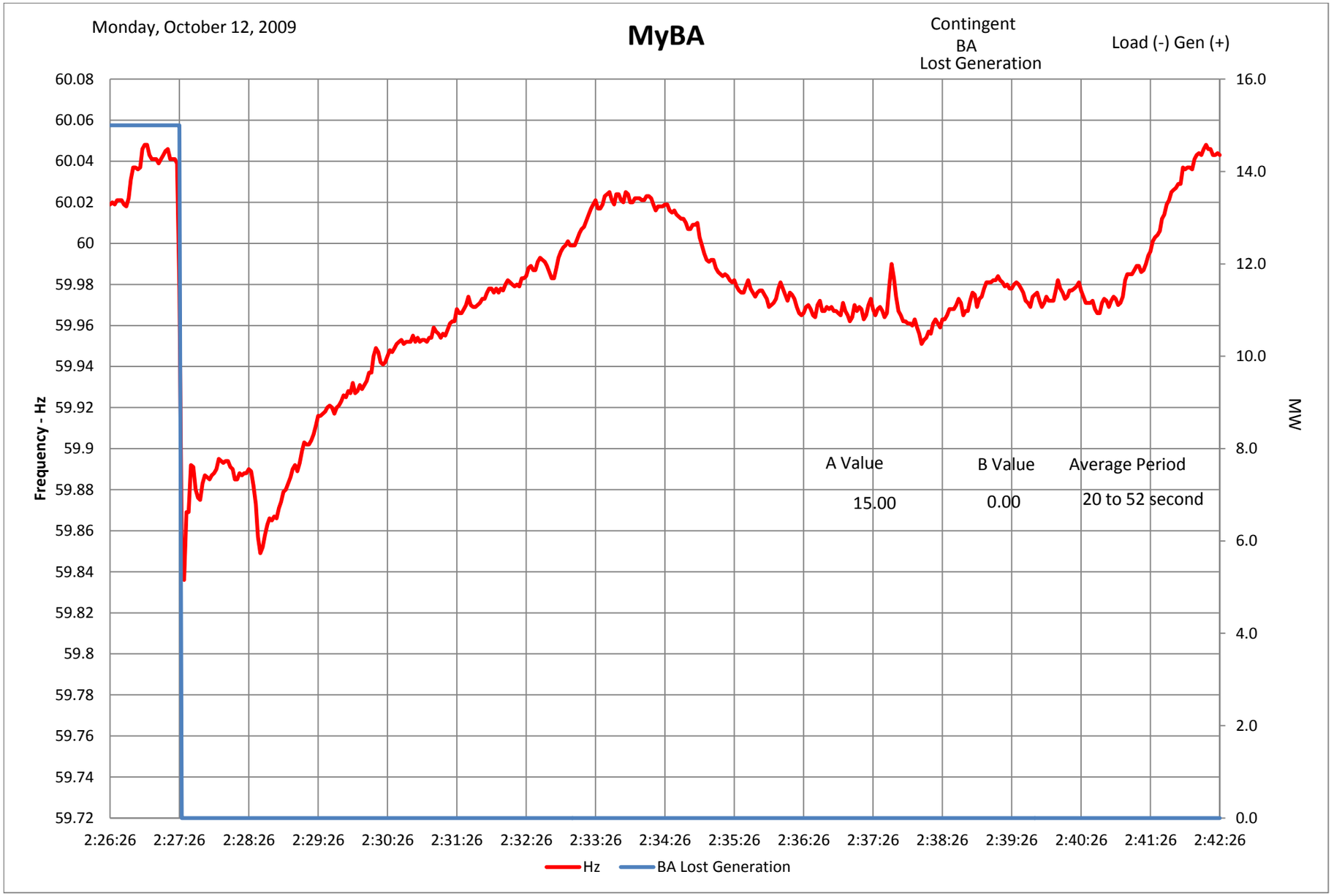

Monday, October 12, 2009
MyBA
JOU Dynamic Schedules Imp(-) Exp (+)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
355.0
350.0
345.0
340.0
335.0
330.0
325.0
MW
A Value
350.00
B Value
335.00
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
JOU Dynamic Schedules

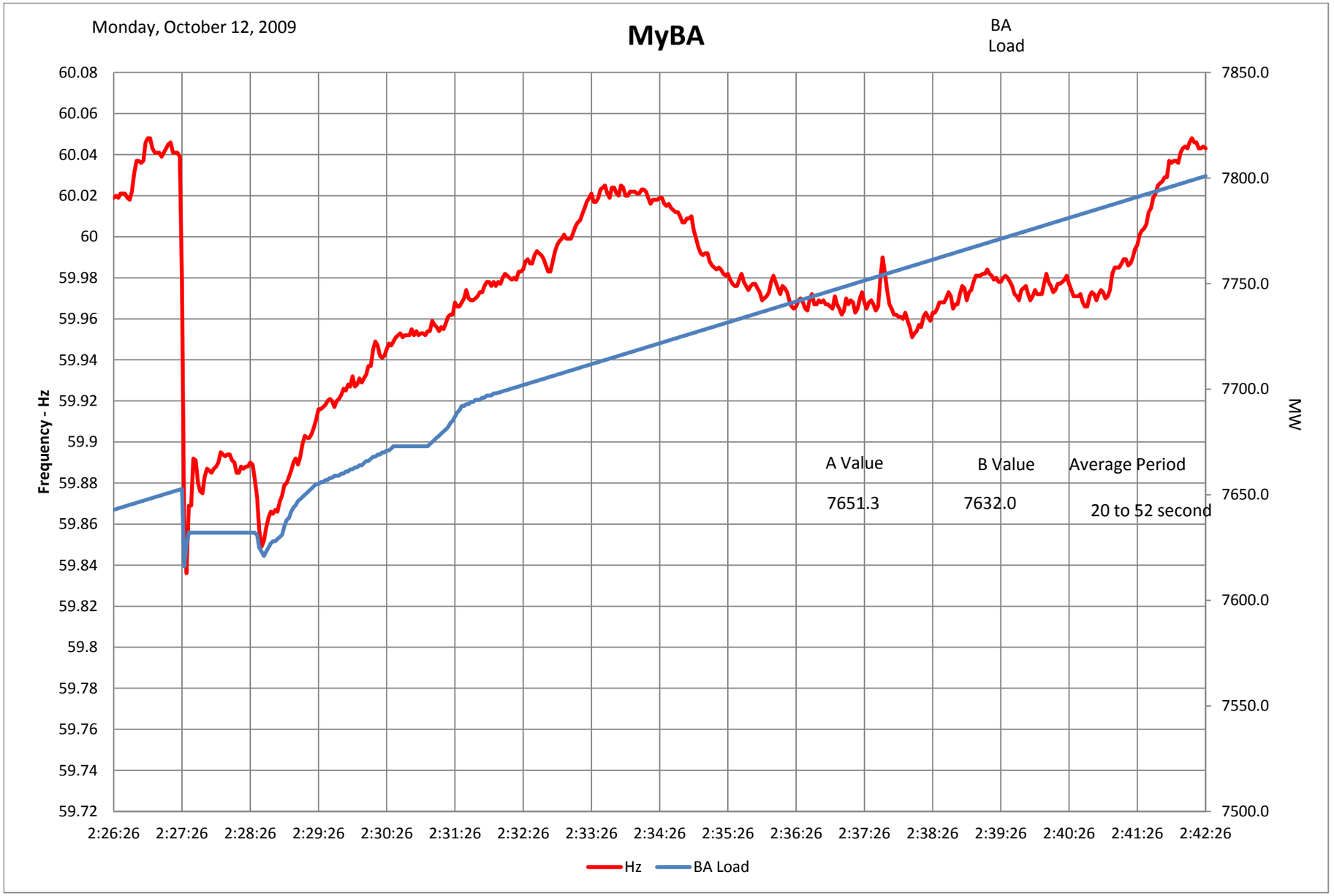

Monday, October 12, 2009
MyBA
Non-Conforming Load
Load (-)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
300.0
250.0
200.0
150.0
100.0
50.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
165.34
B Value
214.13
Average Period
20 to 52 second
Hz
Non- Conforming Load

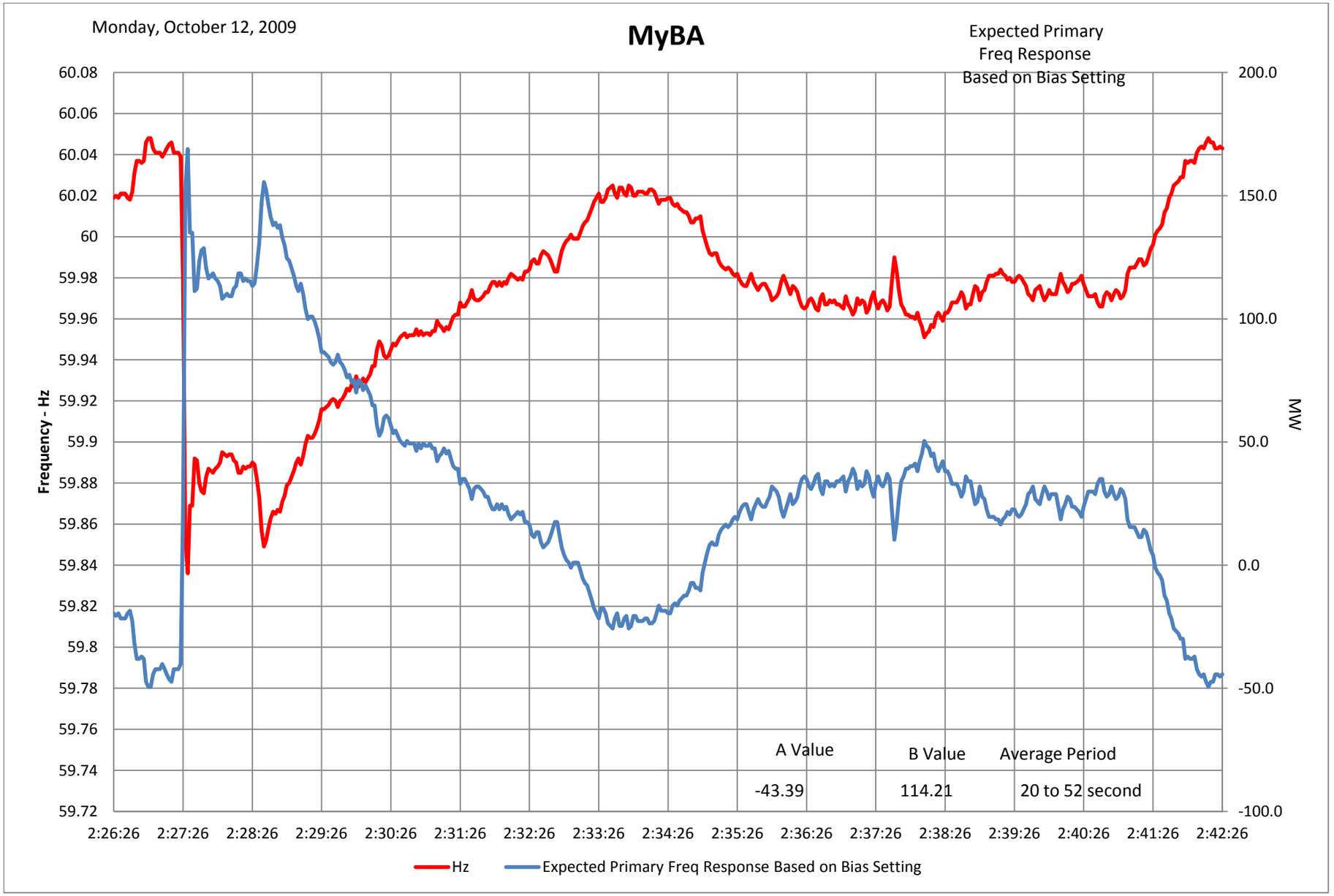

Monday, October 12, 2009
MyBA
Pumped Hydro
Load (-) Gen (+)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
0.00
B Value
6.35
Average Period
20 to 52 second
Hz
Pumped Hydro


Monday, October 12, 2009
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
1.2
1.0
0.8
0.6
0.4
0.2
0.0
MW
A Value
B Value
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Pumped Hydro


Monday, October 12, 2009
MyBA
Transferred
Frequency
Response
Rec (-) Del (+)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
12.0
10.0
8.0
6.0
4.0
2.0
0.0
MW/0.1 Hz
A Value
-4.21
B Value
11.09
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Frequency Response


Monday, October 12, 2009
MyBA
Contingent
BA
Lost Generation
Load (-) Gen (+)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
MW
A Value
15.00
B Value
0.00
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
BA Lost Generation


Monday, October 12, 2009
MyBA
BA
Load
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
7850.0
7800.0
7750.0
7700.0
7650.0
7600.0
7550.0
7500.0
MW
A Value
7651.3
B Value
7632.0
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
BA Load


Monday, October 12, 2009
MyBA
Expected Primary
Freq Response
Based on Bias Setting
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
B Value
Average Period
-43.39
114.21
20 to 52 second
Hz
Expected Primary Freq Response Based on Bias Setting

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 07:40:00	60.0097	471		0	0				-653	29756.85		0				
05/16/11 07:40:02	60.00745	471		0	0				-653	29756.85	0	0	0	-0.002	0.002	
05/16/11 07:40:04	60.00452	471		0	0				-653	29756.82	0	0	0	-0.003	0.003	
05/16/11 07:40:06	60.00259	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:08	60.00034	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:10	59.99872	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:12	59.9971	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:14	59.99548	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:16	59.99353	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:18	59.99063	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:20	59.9874	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:22	59.98416	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:24	59.98093	471		0	0				-653	29766.37	0	0	0	-0.003	0.003	
05/16/11 07:40:26	59.97867	471		0	0				-653	29766.37	0	0	0	-0.002	0.002	
05/16/11 07:40:28	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:30	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:32	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:34	59.97577	471		0	0				-653	29780.98	0	0	0	-0.003	0.003	
05/16/11 07:40:36	59.97382	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:38	59.97223	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:40	59.97223	471		0	0				-653	29780.98	0	0	0	0.000	0.000	
05/16/11 07:40:42	59.97318	471		0	0				-653	29780.98	0	0	0	0.001	0.001	
05/16/11 07:40:44	59.97351	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:46	59.97415	471		0	0				-653	29780.95	0	0	0	0.001	0.001	
05/16/11 07:40:48	59.97287	471		0	0				-653	29780.95	0	0	0	-0.001	0.001	
05/16/11 07:40:50	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:52	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:54	59.96832	471		0	0				-653	29770.34	0	0	0	-0.005	0.005	
05/16/11 07:40:56	59.96768	471		0	0				-653	29770.34	0	0	0	-0.001	0.001	
05/16/11 07:40:58	59.96899	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:00	59.97028	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:02	59.97223	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:04	59.97382	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:06	59.97479	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:08	59.9761	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:10	59.97769	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:12	59.97998	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:14	59.98318	471		0	0				-653	29782.73	0	0	0	0.003	0.003	
05/16/11 07:41:16	59.98578	471		0	0				-653	29782.73	0	0	0	0.003	0.003	
05/16/11 07:41:18	59.9874	471		0	0				-653	29782.73	0	0	0	0.002	0.002	
05/16/11 07:41:20	59.98868	471		0	0				-653	29782.73	0	0	0	0.001	0.001	

05/16/11 07:41:22	59.98999	471	0	0	-653	29782.73	0	0	0	0.001	0.001
05/16/11 07:41:24	59.99191	471	0	0	-653	29782.82	0	0	0	0.002	0.002
05/16/11 07:41:26	59.99353	471	0	0	-653	29782.82	0	0	0	0.002	0.002
05/16/11 07:41:28	59.99612	471	0	0	-653	29782.82	0	0	0	0.003	0.003
05/16/11 07:41:30	59.99805	471	0	0	-653	29782.82	0	0	0	0.002	0.002
05/16/11 07:41:32	59.99902	471	0	0	-653	29782.82	0	0	0	0.001	0.001
05/16/11 07:41:34	59.99902	471	0	0	-653	29786.15	0	0	0	0.000	0.000
05/16/11 07:41:36	59.99774	471	0	0	-653	29786.15	0	0	0	-0.001	0.001
05/16/11 07:41:38	59.99646	471	0	0	-653	29786.15	0	0	0	-0.001	0.001
05/16/11 07:41:40	59.99579	471	0	0	-653	29786.15	0	0	0	-0.001	0.001
05/16/11 07:41:42	59.99612	471	0	0	-653	29786.15	0	0	0	0.000	0.000
05/16/11 07:41:44	59.9971	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:46	59.99774	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:48	59.99838	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:50	59.99936	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:52	60	471	0	0	-653	29786.21	0	0	0	0.001	0.001
05/16/11 07:41:54	60.00064	471	0	0	-653	29778.98	0	0	0	0.001	0.001
05/16/11 07:41:56	60.00128	471	0	0	-653	29778.98	0	0	0	0.001	0.001
05/16/11 07:41:58	60.00226	471	0	0	-653	29778.98	0	0	0	0.001	0.001
05/16/11 07:42:00	60.00388	471	0	0	-653	29778.98	0	0	0	0.002	0.002
05/16/11 07:42:02	60.00647	471	0	0	-653	29778.98	0	0	0	0.003	0.003
05/16/11 07:42:04	60.0097	471	0	0	-653	29778.92	0	0	0	0.003	0.003
05/16/11 07:42:06	60.01358	471	0	0	-653	29778.92	0	0	0	0.004	0.004
05/16/11 07:42:08	60.01614	471	0	0	-653	29778.92	0	0	0	0.003	0.003
05/16/11 07:42:10	60.01776	471	0	0	-653	29778.92	0	0	0	0.002	0.002
05/16/11 07:42:12	60.01776	471	0	0	-653	29778.92	0	0	0	0.000	0.000
05/16/11 07:42:14	60.01486	471	0	0	-653	29787.9	0	0	0	-0.003	0.003
05/16/11 07:42:16	60.01163	471	0	0	-653	29787.9	0	0	0	-0.003	0.003
05/16/11 07:42:18	60.00903	471	0	0	-653	29787.9	0	0	0	-0.003	0.003
05/16/11 07:42:20	60.00775	471	0	0	-653	29787.9	0	0	0	-0.001	0.001
05/16/11 07:42:22	60.00775	471	0	0	-653	29787.9	0	0	0	0.000	0.000
05/16/11 07:42:24	60.00903	471	0	0	-653	29787.84	0	0	0	0.001	0.001
05/16/11 07:42:26	60.00903	471	0	0	-653	29787.84	0	0	0	0.000	0.000
05/16/11 07:42:28	60.01324	471	0	0	-653	29787.84	0	0	0	0.004	0.004
05/16/11 07:42:30	60.01486	471	0	0	-653	29787.84	0	0	0	0.002	0.002
05/16/11 07:42:32	60.0152	471	0	0	-653	29787.84	0	0	0	0.000	0.000
05/16/11 07:42:34	60.0152	471	0	0	-653	29813.39	0	0	0	0.000	0.000
05/16/11 07:42:36	60.01486	471	0	0	-653	29813.39	0	0	0	0.000	0.000
05/16/11 07:42:38	60.01422	471	0	0	-653	29813.39	0	0	0	-0.001	0.001
05/16/11 07:42:40	60.01358	471	0	0	-653	29813.39	0	0	0	-0.001	0.001
05/16/11 07:42:42	60.01227	471	0	0	-653	29813.39	0	0	0	-0.001	0.001
05/16/11 07:42:44	60.01099	471	0	0	-653	29813.33	0	0	0	-0.001	0.001
05/16/11 07:42:46	60.00873	471	0	0	-653	29813.33	0	0	0	-0.002	0.002
05/16/11 07:42:48	60.00647	471	0	0	-653	29813.33	0	0	0	-0.002	0.002
05/16/11 07:42:50	60.00485	471	0	0	-653	29813.33	0	0	0	-0.002	0.002
05/16/11 07:42:52	60.00354	471	0	0	-653	29813.33	0	0	0	-0.001	0.001
05/16/11 07:42:54	60.00195	471	0	0	-653	29797.46	0	0	0	-0.002	0.002
05/16/11 07:42:56	60	471	0	0	-653	29797.46	0	0	0	-0.002	0.002
05/16/11 07:42:58	59.99774	471	0	0	-653	29797.46	0	0	0	-0.002	0.002

05/16/11 07:43:00	59.99612	471	0	0	-653	29797.46	0	0	0	-0.002	0.002
05/16/11 07:43:02	59.99646	471	0	0	-653	29797.46	0	0	0	0.000	0.000
05/16/11 07:43:04	59.99741	471	0	0	-653	29797.52	0	0	0	0.001	0.001
05/16/11 07:43:06	59.99838	471	0	0	-653	29797.52	0	0	0	0.001	0.001
05/16/11 07:43:08	59.99936	471	0	0	-653	29797.52	0	0	0	0.001	0.001
05/16/11 07:43:10	59.99902	471	0	0	-653	29797.52	0	0	0	0.000	0.000
05/16/11 07:43:12	59.99872	471	0	0	-653	29797.52	0	0	0	0.000	0.000
05/16/11 07:43:14	59.99774	471	0	0	-653	29780.33	0	0	0	-0.001	0.001
05/16/11 07:43:16	59.99646	471	0	0	-653	29780.33	0	0	0	-0.001	0.001
05/16/11 07:43:18	59.99677	471	0	0	-653	29780.33	0	0	0	0.000	0.000
05/16/11 07:43:20	59.99677	471	0	0	-653	29780.33	0	0	0	0.000	0.000
05/16/11 07:43:22	59.99774	471	0	0	-653	29780.33	0	0	0	0.001	0.001
05/16/11 07:43:24	59.99805	471	0	0	-653	29780.27	0	0	0	0.000	0.000
05/16/11 07:43:26	59.99774	471	0	0	-653	29780.27	0	0	0	0.000	0.000
05/16/11 07:43:28	59.99579	471	0	0	-653	29780.27	0	0	0	-0.002	0.002
05/16/11 07:43:30	59.99387	471	0	0	-653	29780.27	0	0	0	-0.002	0.002
05/16/11 07:43:32	59.99255	471	0	0	-653	29780.27	0	0	0	-0.001	0.001
05/16/11 07:43:34	59.99127	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:36	59.98999	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:38	59.98965	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:40	59.98837	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:42	59.98709	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:44	59.98642	471	0	0	-653	29785.63	0	0	0	-0.001	0.001
05/16/11 07:43:46	59.98642	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:48	59.98642	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:50	59.98676	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:52	59.98676	471	0	0	-653	29785.63	0	0	0	0.000	0.000
05/16/11 07:43:54	59.98642	471	0	0	-653	29787.12	0	0	0	0.000	0.000
05/16/11 07:43:56	59.98611	471	0	0	-653	29787.12	0	0	0	0.000	0.000
05/16/11 07:43:58	59.98611	471	0	0	-653	29787.12	0	0	0	0.000	0.000
05/16/11 07:44:00	59.98514	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:02	59.98416	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:04	59.98352	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:06	59.98224	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:08	59.98029	471	0	0	-653	29787.12	0	0	0	-0.002	0.002
05/16/11 07:44:10	59.979	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:12	59.97769	471	0	0	-653	29787.12	0	0	0	-0.001	0.001
05/16/11 07:44:14	59.97675	471	0	0	-653	29780.67	0	0	0	-0.001	0.001
05/16/11 07:44:16	59.97641	471	0	0	-653	29780.67	0	0	0	0.000	0.000
05/16/11 07:44:18	59.97739	471	0	0	-653	29780.67	0	0	0	0.001	0.001
05/16/11 07:44:20	59.97998	471	0	0	-653	29780.67	0	0	0	0.003	0.003
05/16/11 07:44:22	59.98318	471	0	0	-653	29780.67	0	0	0	0.003	0.003
05/16/11 07:44:24	59.98611	471	0	0	-653	29780.76	0	0	0	0.003	0.003
05/16/11 07:44:26	59.98837	471	0	0	-653	29780.76	0	0	0	0.002	0.002
05/16/11 07:44:28	59.9903	471	0	0	-653	29780.76	0	0	0	0.002	0.002
05/16/11 07:44:30	59.99191	471	0	0	-653	29780.76	0	0	0	0.002	0.002
05/16/11 07:44:32	59.99353	471	0	0	-653	29780.76	0	0	0	0.002	0.002
05/16/11 07:44:34	59.99579	471	0	0	-653	29777.7	0	0	0	0.002	0.002
05/16/11 07:44:36	60	471	0	0	-653	29777.7	0	0	0	0.004	0.004

05/16/11 07:44:38	60.00354	471	0	0	-653	29777.7	0	0	0	0.004	0.004
05/16/11 07:44:40	60.00647	471	0	0	-653	29777.7	0	0	0	0.003	0.003
05/16/11 07:44:42	60.00839	471	0	0	-653	29777.7	0	0	0	0.002	0.002
05/16/11 07:44:44	60.00903	471	0	0	-653	29777.7	0	0	0	0.001	0.001
05/16/11 07:44:46	60.00873	471	0	0	-653	29777.7	0	0	0	0.000	0.000
05/16/11 07:44:48	60.00873	471	0	0	-653	29777.7	0	0	0	0.000	0.000
05/16/11 07:44:50	60.00937	471	0	0	-653	29777.7	0	0	0	0.001	0.001
05/16/11 07:44:52	60.01099	471	0	0	-653	29777.7	0	0	0	0.002	0.002
05/16/11 07:44:54	60.01453	471	0	0	-653	29788.63	0	0	0	0.004	0.004
05/16/11 07:44:56	60.0181	471	0	0	-653	29788.63	0	0	0	0.004	0.004
05/16/11 07:44:58	60.02002	471	0	0	-653	29788.63	0	0	0	0.002	0.002
05/16/11 07:45:00	60.02036	471	0	0	-653	29788.63	0	0	0	0.000	0.000
05/16/11 07:45:02	60.02002	471	0	0	-653	29788.63	0	0	0	0.000	0.000
05/16/11 07:45:04	60.02002	471	0	0	-653	29788.63	0	0	0	0.000	0.000
05/16/11 07:45:06	60.01907	471	0	0	-653	29788.63	0	0	0	-0.001	0.001
05/16/11 07:45:08	60.0181	471	0	0	-653	29788.63	0	0	0	-0.001	0.001
05/16/11 07:45:10	60.01712	471	0	0	-653	29788.63	0	0	0	-0.001	0.001
05/16/11 07:45:12	60.01712	471	0	0	-653	29788.63	0	0	0	0.000	0.000
05/16/11 07:45:14	60.01712	471	0	0	-653	29788.51	0	0	0	0.000	0.000
05/16/11 07:45:16	60.01453	471	0	0	-653	29788.51	0	0	0	-0.003	0.003
05/16/11 07:45:18	60.01358	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:20	60.01227	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:22	60.01163	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:24	60.01065	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:26	60.0097	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:28	60.00839	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:30	60.00745	471	0	0	-653	29788.51	0	0	0	-0.001	0.001
05/16/11 07:45:32	60.00775	471	0	0	-653	29788.51	0	0	0	0.000	0.000
05/16/11 07:45:34	60.00839	471	0	0	-653	29780.62	0	0	0	0.001	0.001
05/16/11 07:45:36	60.00839	471	0	0	-653	29780.62	0	0	0	0.000	0.000
05/16/11 07:45:38	60.00809	471	0	0	-653	29780.62	0	0	0	0.000	0.000
05/16/11 07:45:40	60.00745	471	0	0	-653	29780.62	0	0	0	-0.001	0.001
05/16/11 07:45:42	60.00711	471	0	0	-653	29780.62	0	0	0	0.000	0.000
05/16/11 07:45:44	60.00839	471	0	0	-653	29780.56	0	0	0	0.001	0.001
05/16/11 07:45:46	60.00937	471	0	0	-653	29780.56	0	0	0	0.001	0.001
05/16/11 07:45:48	60.0097	471	0	0	-653	29780.56	0	0	0	0.000	0.000
05/16/11 07:45:50	60.01001	471	0	0	-653	29780.56	0	0	0	0.000	0.000
05/16/11 07:45:52	60.01065	471	0	0	-653	29780.56	0	0	0	0.001	0.001
05/16/11 07:45:54	60.01196	471	0	0	-653	29784.96	0	0	0	0.001	0.001
05/16/11 07:45:56	60.01324	471	0	0	-653	29784.96	0	0	0	0.001	0.001
05/16/11 07:45:58	60.01453	471	0	0	-653	29784.96	0	0	0	0.001	0.001
05/16/11 07:46:00	60.01614	471	0	0	-653	29784.96	0	0	0	0.002	0.002
05/16/11 07:46:02	60.01712	471	0	0	-653	29784.96	0	0	0	0.001	0.001
05/16/11 07:46:04	60.01712	471	0	0	-653	29784.93	0	0	0	0.000	0.000
05/16/11 07:46:06	60.01614	471	0	0	-653	29784.93	0	0	0	-0.001	0.001
05/16/11 07:46:08	60.01584	471	0	0	-653	29784.93	0	0	0	0.000	0.000
05/16/11 07:46:10	60.01614	471	0	0	-653	29784.93	0	0	0	0.000	0.000
05/16/11 07:46:12	60.01584	471	0	0	-653	29784.93	0	0	0	0.000	0.000
05/16/11 07:46:14	60.01486	471	0	0	-653	29760.42	0	0	0	-0.001	0.001

05/16/11 07:46:16	60.01422	471	0	0	-653	29760.42	0	0	0	-0.001	0.001
05/16/11 07:46:18	60.01227	471	0	0	-653	29760.42	0	0	0	-0.002	0.002
05/16/11 07:46:20	60.0097	471	0	0	-653	29760.42	0	0	0	-0.003	0.003
05/16/11 07:46:22	60.00711	471	0	0	-653	29760.42	0	0	0	-0.003	0.003
05/16/11 07:46:24	60.00583	471	0	0	-653	29760.42	0	0	0	-0.001	0.001
05/16/11 07:46:26	60.00516	471	0	0	-653	29760.42	0	0	0	-0.001	0.001
05/16/11 07:46:28	60.00516	471	0	0	-653	29760.42	0	0	0	0.000	0.000
05/16/11 07:46:30	60.00485	471	0	0	-653	29760.42	0	0	0	0.000	0.000
05/16/11 07:46:32	60.00388	471	0	0	-653	29760.42	0	0	0	-0.001	0.001
05/16/11 07:46:34	60.00259	471	0	0	-653	29782.35	0	0	0	-0.001	0.001
05/16/11 07:46:36	59.99902	471	0	0	-653	29782.35	0	0	0	-0.004	0.004
05/16/11 07:46:38	59.9971	471	0	0	-653	29782.35	0	0	0	-0.002	0.002
05/16/11 07:46:40	59.99646	471	0	0	-653	29782.35	0	0	0	-0.001	0.001
05/16/11 07:46:42	59.99579	471	0	0	-653	29782.35	0	0	0	-0.001	0.001
05/16/11 07:46:44	59.99417	471	0	0	-653	29782.44	0	0	0	-0.002	0.002
05/16/11 07:46:46	59.99225	471	0	0	-653	29782.44	0	0	0	-0.002	0.002
05/16/11 07:46:48	59.9903	471	0	0	-653	29782.44	0	0	0	-0.002	0.002
05/16/11 07:46:50	59.98804	471	0	0	-653	29782.44	0	0	0	-0.002	0.002
05/16/11 07:46:52	59.98709	471	0	0	-653	29782.44	0	0	0	-0.001	0.001
05/16/11 07:46:54	59.98676	471	0	0	-653	29785.52	0	0	0	0.000	0.000
05/16/11 07:46:56	59.98578	471	0	0	-653	29785.52	0	0	0	-0.001	0.001
05/16/11 07:46:58	59.9845	471	0	0	-653	29785.52	0	0	0	-0.001	0.001
05/16/11 07:47:00	59.98288	471	0	0	-653	29785.52	0	0	0	-0.002	0.002
05/16/11 07:47:02	59.98224	471	0	0	-653	29785.52	0	0	0	-0.001	0.001
05/16/11 07:47:04	59.98224	471	0	0	-653	29785.55	0	0	0	0.000	0.000
05/16/11 07:47:06	59.98224	471	0	0	-653	29785.55	0	0	0	0.000	0.000
05/16/11 07:47:08	59.98254	471	0	0	-653	29785.55	0	0	0	0.000	0.000
05/16/11 07:47:10	59.98386	471	0	0	-653	29785.55	0	0	0	0.001	0.001
05/16/11 07:47:12	59.9848	471	0	0	-653	29785.55	0	0	0	0.001	0.001
05/16/11 07:47:14	59.98578	471	0	0	-653	29788.21	0	0	0	0.001	0.001
05/16/11 07:47:16	59.98642	471	0	0	-653	29788.21	0	0	0	0.001	0.001
05/16/11 07:47:18	59.98999	471	0	0	-653	29788.21	0	0	0	0.004	0.004
05/16/11 07:47:20	59.99225	471	0	0	-653	29788.21	0	0	0	0.002	0.002
05/16/11 07:47:22	59.99323	471	0	0	-653	29788.21	0	0	0	0.001	0.001
05/16/11 07:47:24	59.99646	471	0	0	-653	29788.06	0	0	0	0.003	0.003
05/16/11 07:47:26	59.99902	471	0	0	-653	29788.06	0	0	0	0.003	0.003
05/16/11 07:47:28	60.00064	471	0	0	-653	29788.06	0	0	0	0.002	0.002
05/16/11 07:47:30	60.00647	471	0	0	-653	29788.06	0	0	0	0.006	0.006
05/16/11 07:47:32	60.00903	471	0	0	-653	29788.06	0	0	0	0.003	0.003
05/16/11 07:47:34	60.01099	471	0	0	-653	29776.11	0	0	0	0.002	0.002
05/16/11 07:47:36	60.01132	471	0	0	-653	29776.11	0	0	0	0.000	0.000
05/16/11 07:47:38	60.01291	471	0	0	-653	29776.11	0	0	0	0.002	0.002
05/16/11 07:47:40	60.01324	471	0	0	-653	29776.11	0	0	0	0.000	0.000
05/16/11 07:47:42	60.01324	471	0	0	-653	29776.11	0	0	0	0.000	0.000
05/16/11 07:47:44	60.01422	471	0	0	-653	29776.17	0	0	0	0.001	0.001
05/16/11 07:47:46	60.0181	471	0	0	-653	29776.17	0	0	0	0.004	0.004
05/16/11 07:47:48	60.01907	471	0	0	-653	29776.17	0	0	0	0.001	0.001
05/16/11 07:47:50	60.02133	471	0	0	-653	29776.17	0	0	0	0.002	0.002
05/16/11 07:47:52	60.02197	471	0	0	-653	29776.17	0	0	0	0.001	0.001

05/16/11 07:47:54	60.02164	471	0	0	-653	29794.69	0	0	0	0.000	0.000
05/16/11 07:47:56	60.01971	471	0	0	-653	29794.69	0	0	0	-0.002	0.002
05/16/11 07:47:58	60.01907	471	0	0	-653	29794.69	0	0	0	-0.001	0.001
05/16/11 07:48:00	60.01746	471	0	0	-653	29794.69	0	0	0	-0.002	0.002
05/16/11 07:48:02	60.01776	471	0	0	-653	29794.69	0	0	0	0.000	0.000
05/16/11 07:48:04	60.0184	471	0	0	-653	29794.66	0	0	0	0.001	0.001
05/16/11 07:48:06	60.01776	471	0	0	-653	29794.66	0	0	0	-0.001	0.001
05/16/11 07:48:08	60.0152	471	0	0	-653	29794.66	0	0	0	-0.003	0.003
05/16/11 07:48:10	60.01389	471	0	0	-653	29794.66	0	0	0	-0.001	0.001
05/16/11 07:48:12	60.01422	471	0	0	-653	29794.66	0	0	0	0.000	0.000
05/16/11 07:48:14	60.0152	471	0	0	-653	29804.78	0	0	0	0.001	0.001
05/16/11 07:48:16	60.01614	471	0	0	-653	29804.78	0	0	0	0.001	0.001
05/16/11 07:48:18	60.01614	471	0	0	-653	29804.78	0	0	0	0.000	0.000
05/16/11 07:48:20	60.01422	471	0	0	-653	29804.78	0	0	0	-0.002	0.002
05/16/11 07:48:22	60.01196	471	0	0	-653	29804.78	0	0	0	-0.002	0.002
05/16/11 07:48:24	60.01035	471	0	0	-653	29804.86	0	0	0	-0.002	0.002
05/16/11 07:48:26	60.00809	471	0	0	-653	29804.86	0	0	0	-0.002	0.002
05/16/11 07:48:28	60.00613	471	0	0	-653	29804.86	0	0	0	-0.002	0.002
05/16/11 07:48:30	60.00516	471	0	0	-653	29804.86	0	0	0	-0.001	0.001
05/16/11 07:48:32	60.00452	471	0	0	-653	29804.86	0	0	0	-0.001	0.001
05/16/11 07:48:34	60.00354	471	0	0	-653	29800.12	0	0	0	-0.001	0.001
05/16/11 07:48:36	60.00128	471	0	0	-653	29800.12	0	0	0	-0.002	0.002
05/16/11 07:48:38	60	471	0	0	-653	29800.12	0	0	0	-0.001	0.001
05/16/11 07:48:40	59.99936	471	0	0	-653	29800.12	0	0	0	-0.001	0.001
05/16/11 07:48:42	59.99838	471	0	0	-653	29800.12	0	0	0	-0.001	0.001
05/16/11 07:48:44	59.99741	471	0	0	-653	29800.18	0	0	0	-0.001	0.001
05/16/11 07:48:46	59.99579	471	0	0	-653	29800.18	0	0	0	-0.002	0.002
05/16/11 07:48:48	59.99515	471	0	0	-653	29800.18	0	0	0	-0.001	0.001
05/16/11 07:48:50	59.99646	471	0	0	-653	29800.18	0	0	0	0.001	0.001
05/16/11 07:48:52	59.99872	471	0	0	-653	29800.18	0	0	0	0.002	0.002
05/16/11 07:48:54	60.00128	471	0	0	-653	29799.82	0	0	0	0.003	0.003
05/16/11 07:48:56	60.00323	471	0	0	-653	29799.82	0	0	0	0.002	0.002
05/16/11 07:48:58	60.00421	471	0	0	-653	29799.82	0	0	0	0.001	0.001
05/16/11 07:49:00	60.00485	471	0	0	-653	29799.82	0	0	0	0.001	0.001
05/16/11 07:49:02	60.00549	471	0	0	-653	29799.82	0	0	0	0.001	0.001
05/16/11 07:49:04	60.00583	471	0	0	-653	29799.79	0	0	0	0.000	0.000
05/16/11 07:49:06	60.00583	471	0	0	-653	29799.79	0	0	0	0.000	0.000
05/16/11 07:49:08	60.00549	471	0	0	-653	29799.79	0	0	0	0.000	0.000
05/16/11 07:49:10	60.00388	471	0	0	-653	29799.79	0	0	0	-0.002	0.002
05/16/11 07:49:12	60.00226	471	0	0	-653	29799.79	0	0	0	-0.002	0.002
05/16/11 07:49:14	60.00226	471	0	0	-653	29795.67	0	0	0	0.000	0.000
05/16/11 07:49:16	60	471	0	0	-653	29795.67	0	0	0	-0.002	0.002
05/16/11 07:49:18	60	471	0	0	-653	29795.67	0	0	0	0.000	0.000
05/16/11 07:49:20	60	471	0	0	-653	29795.67	0	0	0	0.000	0.000
05/16/11 07:49:22	60	471	0	0	-653	29795.67	0	0	0	0.000	0.000
05/16/11 07:49:24	60.00452	471	0	0	-653	29795.55	0	0	0	0.005	0.005
05/16/11 07:49:26	60.00583	471	0	0	-653	29795.55	0	0	0	0.001	0.001
05/16/11 07:49:28	60.00613	471	0	0	-653	29795.55	0	0	0	0.000	0.000
05/16/11 07:49:30	60.00583	471	0	0	-653	29795.55	0	0	0	0.000	0.000

05/16/11 07:49:32	60.00516	471	0	0	-653	29795.55	0	0	0	-0.001	0.001
05/16/11 07:49:34	60.00388	471	0	0	-653	29783.53	0	0	0	-0.001	0.001
05/16/11 07:49:36	60.00195	471	0	0	-653	29783.53	0	0	0	-0.002	0.002
05/16/11 07:49:38	60.00128	471	0	0	-653	29783.53	0	0	0	-0.001	0.001
05/16/11 07:49:40	60.00098	471	0	0	-653	29783.53	0	0	0	0.000	0.000
05/16/11 07:49:42	60.00034	471	0	0	-653	29783.53	0	0	0	-0.001	0.001
05/16/11 07:49:44	60	471	0	0	-653	29783.47	0	0	0	0.000	0.000
05/16/11 07:49:46	59.99902	471	0	0	-653	29783.47	0	0	0	-0.001	0.001
05/16/11 07:49:48	59.99872	471	0	0	-653	29783.47	0	0	0	0.000	0.000
05/16/11 07:49:50	59.99838	471	0	0	-653	29783.47	0	0	0	0.000	0.000
05/16/11 07:49:52	59.99612	471	0	0	-653	29783.47	0	0	0	-0.002	0.002
05/16/11 07:49:54	59.99579	471	0	0	-653	29788.38	0	0	0	0.000	0.000
05/16/11 07:49:56	59.99515	471	0	0	-653	29788.38	0	0	0	-0.001	0.001
05/16/11 07:49:58	59.99387	471	0	0	-653	29788.38	0	0	0	-0.001	0.001
05/16/11 07:50:00	59.99225	471	0	0	-653	29788.38	0	0	0	-0.002	0.002
05/16/11 07:50:02	59.99225	471	0	0	-653	29788.38	0	0	0	0.000	0.000
05/16/11 07:50:04	59.99484	471	0	0	-653	29788.38	0	0	0	0.003	0.003
05/16/11 07:50:06	59.99646	471	0	0	-653	29788.38	0	0	0	0.002	0.002
05/16/11 07:50:08	59.9971	471	0	0	-653	29788.38	0	0	0	0.001	0.001
05/16/11 07:50:10	59.99548	471	0	0	-653	29788.38	0	0	0	-0.002	0.002
05/16/11 07:50:12	59.99289	471	0	0	-653	29788.38	0	0	0	-0.003	0.003
05/16/11 07:50:14	59.98999	471	0	0	-653	29790.16	0	0	0	-0.003	0.003
05/16/11 07:50:16	59.98773	471	0	0	-653	29790.16	0	0	0	-0.002	0.002
05/16/11 07:50:18	59.98642	471	0	0	-653	29790.16	0	0	0	-0.001	0.001
05/16/11 07:50:20	59.98547	471	0	0	-653	29790.16	0	0	0	-0.001	0.001
05/16/11 07:50:22	59.98547	471	0	0	-653	29790.16	0	0	0	0.000	0.000
05/16/11 07:50:24	59.98611	471	0	0	-653	29790.07	0	0	0	0.001	0.001
05/16/11 07:50:26	59.98611	471	0	0	-653	29790.07	0	0	0	0.000	0.000
05/16/11 07:50:28	59.98676	471	0	0	-653	29790.07	0	0	0	0.001	0.001
05/16/11 07:50:30	59.98709	471	0	0	-653	29790.07	0	0	0	0.000	0.000
05/16/11 07:50:32	59.9874	471	0	0	-653	29790.07	0	0	0	0.000	0.000
05/16/11 07:50:34	59.98676	471	0	0	-653	29777.49	0	0	0	-0.001	0.001
05/16/11 07:50:36	59.98611	471	0	0	-653	29777.49	0	0	0	-0.001	0.001
05/16/11 07:50:38	59.98642	471	0	0	-653	29777.49	0	0	0	0.000	0.000
05/16/11 07:50:40	59.9874	471	0	0	-653	29777.49	0	0	0	0.001	0.001
05/16/11 07:50:42	59.98804	471	0	0	-653	29777.49	0	0	0	0.001	0.001
05/16/11 07:50:44	59.9874	471	0	0	-653	29777.49	0	0	0	-0.001	0.001
05/16/11 07:50:46	59.98676	471	0	0	-653	29777.49	0	0	0	-0.001	0.001
05/16/11 07:50:48	59.9848	471	0	0	-653	29777.49	0	0	0	-0.002	0.002
05/16/11 07:50:50	59.98288	471	0	0	-653	29777.49	0	0	0	-0.002	0.002
05/16/11 07:50:52	59.98062	471	0	0	-653	29777.49	0	0	0	-0.002	0.002
05/16/11 07:50:54	59.97998	471	0	0	-653	29782.49	0	0	0	-0.001	0.001
05/16/11 07:50:56	59.97931	471	0	0	-653	29782.49	0	0	0	-0.001	0.001
05/16/11 07:50:58	59.979	471	0	0	-653	29782.49	0	0	0	0.000	0.000
05/16/11 07:51:00	59.97931	471	0	0	-653	29782.49	0	0	0	0.000	0.000
05/16/11 07:51:02	59.98093	471	0	0	-653	29782.49	0	0	0	0.002	0.002
05/16/11 07:51:04	59.98126	471	0	0	-653	29782.46	0	0	0	0.000	0.000
05/16/11 07:51:06	59.98126	471	0	0	-653	29782.46	0	0	0	0.000	0.000
05/16/11 07:51:08	59.9819	471	0	0	-653	29782.46	0	0	0	0.001	0.001

05/16/11 07:51:10	59.98126	471	0	0	-653	29782.46	0	0	0	-0.001	0.001
05/16/11 07:51:12	59.97964	471	0	0	-653	29782.46	0	0	0	-0.002	0.002
05/16/11 07:51:14	59.97705	471	0	0	-653	29756.13	0	0	0	-0.003	0.003
05/16/11 07:51:16	59.97479	471	0	0	-653	29756.13	0	0	0	-0.002	0.002
05/16/11 07:51:18	59.97351	471	0	0	-653	29756.13	0	0	0	-0.001	0.001
05/16/11 07:51:20	59.97287	471	0	0	-653	29756.13	0	0	0	-0.001	0.001
05/16/11 07:51:22	59.97223	471	0	0	-653	29756.13	0	0	0	-0.001	0.001
05/16/11 07:51:24	59.97189	471	0	0	-653	29756.18	0	0	0	0.000	0.000
05/16/11 07:51:26	59.97125	471	0	0	-653	29756.18	0	0	0	-0.001	0.001
05/16/11 07:51:28	59.97156	471	0	0	-653	29756.18	0	0	0	0.000	0.000
05/16/11 07:51:30	59.97318	471	0	0	-653	29756.18	0	0	0	0.002	0.002
05/16/11 07:51:32	59.97415	471	0	0	-653	29756.18	0	0	0	0.001	0.001
05/16/11 07:51:34	59.97479	471	0	0	-653	29777.58	0	0	0	0.001	0.001
05/16/11 07:51:36	59.97382	471	0	0	-653	29777.58	0	0	0	-0.001	0.001
05/16/11 07:51:38	59.97287	471	0	0	-653	29777.58	0	0	0	-0.001	0.001
05/16/11 07:51:40	59.97318	471	0	0	-653	29777.58	0	0	0	0.000	0.000
05/16/11 07:51:42	59.97449	471	0	0	-653	29777.58	0	0	0	0.001	0.001
05/16/11 07:51:44	59.97675	471	0	0	-653	29777.4	0	0	0	0.002	0.002
05/16/11 07:51:46	59.97803	471	0	0	-653	29777.4	0	0	0	0.001	0.001
05/16/11 07:51:48	59.97998	471	0	0	-653	29777.4	0	0	0	0.002	0.002
05/16/11 07:51:50	59.98093	471	0	0	-653	29777.4	0	0	0	0.001	0.001
05/16/11 07:51:52	59.98093	471	0	0	-653	29777.4	0	0	0	0.000	0.000
05/16/11 07:51:54	59.97964	471	0	0	-653	29802.24	0	0	0	-0.001	0.001
05/16/11 07:51:56	59.97803	471	0	0	-653	29802.24	0	0	0	-0.002	0.002
05/16/11 07:51:58	59.97705	471	0	0	-653	29802.24	0	0	0	-0.001	0.001
05/16/11 07:52:00	59.97739	471	0	0	-653	29802.24	0	0	0	0.000	0.000
05/16/11 07:52:02	59.97836	471	0	0	-653	29802.24	0	0	0	0.001	0.001
05/16/11 07:52:04	59.97931	471	0	0	-653	29802.18	0	0	0	0.001	0.001
05/16/11 07:52:06	59.98126	471	0	0	-653	29802.18	0	0	0	0.002	0.002
05/16/11 07:52:08	59.98416	471	0	0	-653	29802.18	0	0	0	0.003	0.003
05/16/11 07:52:10	59.98611	471	0	0	-653	29802.18	0	0	0	0.002	0.002
05/16/11 07:52:12	59.98709	471	0	0	-653	29802.18	0	0	0	0.001	0.001
05/16/11 07:52:14	59.9874	471	0	0	-653	29802.29	0	0	0	0.000	0.000
05/16/11 07:52:16	59.98804	471	0	0	-653	29802.29	0	0	0	0.001	0.001
05/16/11 07:52:18	59.98804	471	0	0	-653	29802.29	0	0	0	0.000	0.000
05/16/11 07:52:20	59.98773	471	0	0	-653	29802.29	0	0	0	0.000	0.000
05/16/11 07:52:22	59.9874	471	0	0	-653	29802.29	0	0	0	0.000	0.000
05/16/11 07:52:24	59.9874	471	0	0	-653	29802.32	0	0	0	0.000	0.000
05/16/11 07:52:26	59.9874	471	0	0	-653	29802.32	0	0	0	0.000	0.000
05/16/11 07:52:28	59.9874	471	0	0	-653	29802.32	0	0	0	0.000	0.000
05/16/11 07:52:30	59.98773	471	0	0	-653	29802.32	0	0	0	0.000	0.000
05/16/11 07:52:32	59.98901	471	0	0	-653	29802.32	0	0	0	0.001	0.001
05/16/11 07:52:34	59.98965	471	0	0	-653	29795.02	0	0	0	0.001	0.001
05/16/11 07:52:36	59.98935	471	0	0	-653	29795.02	0	0	0	0.000	0.000
05/16/11 07:52:38	59.98837	471	0	0	-653	29795.02	0	0	0	-0.001	0.001
05/16/11 07:52:40	59.98868	471	0	0	-653	29795.02	0	0	0	0.000	0.000
05/16/11 07:52:42	59.98868	471	0	0	-653	29795.02	0	0	0	0.000	0.000
05/16/11 07:52:44	59.9874	471	0	0	-653	29795.05	0	0	0	-0.001	0.001
05/16/11 07:52:46	59.98611	471	0	0	-653	29795.05	0	0	0	-0.001	0.001

05/16/11 07:52:48	59.98611	471	0	0	-653	29795.05	0	0	0	0.000	0.000
05/16/11 07:52:50	59.98709	471	0	0	-653	29795.05	0	0	0	0.001	0.001
05/16/11 07:52:52	59.98837	471	0	0	-653	29795.05	0	0	0	0.001	0.001
05/16/11 07:52:54	59.98935	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:52:56	59.98999	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:52:58	59.99127	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:53:00	59.99255	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:53:02	59.99387	471	0	0	-653	29781.42	0	0	0	0.001	0.001
05/16/11 07:53:04	59.99387	471	0	0	-653	29781.45	0	0	0	0.000	0.000
05/16/11 07:53:06	59.99289	471	0	0	-653	29781.45	0	0	0	-0.001	0.001
05/16/11 07:53:08	59.99097	471	0	0	-653	29781.45	0	0	0	-0.002	0.002
05/16/11 07:53:10	59.98868	471	0	0	-653	29781.45	0	0	0	-0.002	0.002
05/16/11 07:53:12	59.98642	471	0	0	-653	29781.45	0	0	0	-0.002	0.002
05/16/11 07:53:14	59.98386	471	0	0	-653	29802.43	0	0	0	-0.003	0.003
05/16/11 07:53:16	59.9816	471	0	0	-653	29802.43	0	0	0	-0.002	0.002
05/16/11 07:53:18	59.97931	471	0	0	-653	29802.43	0	0	0	-0.002	0.002
05/16/11 07:53:20	59.97675	471	0	0	-653	29802.43	0	0	0	-0.003	0.003
05/16/11 07:53:22	59.97415	471	0	0	-653	29802.43	0	0	0	-0.003	0.003
05/16/11 07:53:24	59.97287	471	0	0	-653	29802.4	0	0	0	-0.001	0.001
05/16/11 07:53:26	59.97223	471	0	0	-653	29802.4	0	0	0	-0.001	0.001
05/16/11 07:53:28	59.97318	471	0	0	-653	29802.4	0	0	0	0.001	0.001
05/16/11 07:53:30	59.97449	471	0	0	-653	29802.4	0	0	0	0.001	0.001
05/16/11 07:53:32	59.97351	471	0	0	-653	29802.4	0	0	0	-0.001	0.001
05/16/11 07:53:34	59.97253	471	0	0	-653	29804.4	0	0	0	-0.001	0.001
05/16/11 07:53:36	59.97253	471	0	0	-653	29804.4	0	0	0	0.000	0.000
05/16/11 07:53:38	59.97223	471	0	0	-653	29804.4	0	0	0	0.000	0.000
05/16/11 07:53:40	59.97156	471	0	0	-653	29804.4	0	0	0	-0.001	0.001
05/16/11 07:53:42	59.97189	471	0	0	-653	29804.4	0	0	0	0.000	0.000
05/16/11 07:53:44	59.97318	471	0	0	-653	29804.4	0	0	0	0.001	0.001
05/16/11 07:53:46	59.97479	471	0	0	-653	29804.4	0	0	0	0.002	0.002
05/16/11 07:53:48	59.9761	471	0	0	-653	29804.4	0	0	0	0.001	0.001
05/16/11 07:53:50	59.97803	471	0	0	-653	29804.4	0	0	0	0.002	0.002
05/16/11 07:53:52	59.98062	471	0	0	-653	29804.4	0	0	0	0.003	0.003
05/16/11 07:53:54	59.98254	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:53:56	59.98416	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:53:58	59.98611	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:54:00	59.98804	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:54:02	59.9903	471	0	0	-653	29797.32	0	0	0	0.002	0.002
05/16/11 07:54:04	59.99161	471	0	0	-653	29797.29	0	0	0	0.001	0.001
05/16/11 07:54:06	59.99323	471	0	0	-653	29797.29	0	0	0	0.002	0.002
05/16/11 07:54:08	59.99484	471	0	0	-653	29797.29	0	0	0	0.002	0.002
05/16/11 07:54:10	59.99579	471	0	0	-653	29797.29	0	0	0	0.001	0.001
05/16/11 07:54:12	59.99515	471	0	0	-653	29797.29	0	0	0	-0.001	0.001
05/16/11 07:54:14	59.99612	471	0	0	-653	29823.76	0	0	0	0.001	0.001
05/16/11 07:54:16	59.99805	471	0	0	-653	29823.76	0	0	0	0.002	0.002
05/16/11 07:54:18	59.99936	471	0	0	-653	29823.76	0	0	0	0.001	0.001
05/16/11 07:54:20	60.00064	471	0	0	-653	29823.76	0	0	0	0.001	0.001
05/16/11 07:54:22	60.00098	471	0	0	-653	29823.76	0	0	0	0.000	0.000
05/16/11 07:54:24	60.00064	471	0	0	-653	29818.41	0	0	0	0.000	0.000

05/16/11 07:54:26	60	471	0	0	-653	29818.41	0	0	0	-0.001	0.001
05/16/11 07:54:28	59.99902	471	0	0	-653	29818.41	0	0	0	-0.001	0.001
05/16/11 07:54:30	59.99872	471	0	0	-653	29818.41	0	0	0	0.000	0.000
05/16/11 07:54:32	59.99936	471	0	0	-653	29818.41	0	0	0	0.001	0.001
05/16/11 07:54:34	60.00034	471	0	0	-653	29808.89	0	0	0	0.001	0.001
05/16/11 07:54:36	60.00162	471	0	0	-653	29808.89	0	0	0	0.001	0.001
05/16/11 07:54:38	60.00354	471	0	0	-653	29808.89	0	0	0	0.002	0.002
05/16/11 07:54:40	60.00485	471	0	0	-653	29808.89	0	0	0	0.001	0.001
05/16/11 07:54:42	60.00421	471	0	0	-653	29808.89	0	0	0	-0.001	0.001
05/16/11 07:54:44	60.00195	471	0	0	-653	29814.89	0	0	0	-0.002	0.002
05/16/11 07:54:46	59.99902	471	0	0	-653	29814.89	0	0	0	-0.003	0.003
05/16/11 07:54:48	59.99646	471	0	0	-653	29814.89	0	0	0	-0.003	0.003
05/16/11 07:54:50	59.99417	471	0	0	-653	29814.89	0	0	0	-0.002	0.002
05/16/11 07:54:52	59.99323	471	0	0	-653	29814.89	0	0	0	-0.001	0.001
05/16/11 07:54:54	59.99127	471	0	0	-653	29826.47	0	0	0	-0.002	0.002
05/16/11 07:54:56	59.98935	471	0	0	-653	29826.47	0	0	0	-0.002	0.002
05/16/11 07:54:58	59.98709	471	0	0	-653	29826.47	0	0	0	-0.002	0.002
05/16/11 07:55:00	59.98578	471	0	0	-653	29826.47	0	0	0	-0.001	0.001
05/16/11 07:55:02	59.98547	471	0	0	-653	29826.47	0	0	0	0.000	0.000
05/16/11 07:55:04	59.98547	471	0	0	-653	29826.41	0	0	0	0.000	0.000
05/16/11 07:55:06	59.98514	471	0	0	-653	29826.41	0	0	0	0.000	0.000
05/16/11 07:55:08	59.9845	471	0	0	-653	29826.41	0	0	0	-0.001	0.001
05/16/11 07:55:10	59.9845	471	0	0	-653	29826.41	0	0	0	0.000	0.000
05/16/11 07:55:12	59.9848	471	0	0	-653	29826.41	0	0	0	0.000	0.000
05/16/11 07:55:14	59.9848	471	0	0	-653	29834.18	0	0	0	0.000	0.000
05/16/11 07:55:16	59.98611	471	0	0	-653	29834.18	0	0	0	0.001	0.001
05/16/11 07:55:18	59.9874	471	0	0	-653	29834.18	0	0	0	0.001	0.001
05/16/11 07:55:20	59.98868	471	0	0	-653	29834.18	0	0	0	0.001	0.001
05/16/11 07:55:22	59.98837	471	0	0	-653	29834.18	0	0	0	0.000	0.000
05/16/11 07:55:24	59.98837	471	0	0	-653	29836.13	0	0	0	0.000	0.000
05/16/11 07:55:26	59.98578	471	0	0	-653	29836.13	0	0	0	-0.003	0.003
05/16/11 07:55:28	59.9845	471	0	0	-653	29836.13	0	0	0	-0.001	0.001
05/16/11 07:55:30	59.9848	471	0	0	-653	29836.13	0	0	0	0.000	0.000
05/16/11 07:55:32	59.98547	471	0	0	-653	29836.13	0	0	0	0.001	0.001
05/16/11 07:55:34	59.98642	471	0	0	-653	29821.84	0	0	0	0.001	0.001
05/16/11 07:55:36	59.98773	471	0	0	-653	29821.84	0	0	0	0.001	0.001
05/16/11 07:55:38	59.98965	471	0	0	-653	29821.84	0	0	0	0.002	0.002
05/16/11 07:55:40	59.99063	471	0	0	-653	29821.84	0	0	0	0.001	0.001
05/16/11 07:55:42	59.99063	471	0	0	-653	29821.84	0	0	0	0.000	0.000
05/16/11 07:55:44	59.99063	471	0	0	-653	29821.87	0	0	0	0.000	0.000
05/16/11 07:55:46	59.99063	471	0	0	-653	29821.87	0	0	0	0.000	0.000
05/16/11 07:55:48	59.98642	471	0	0	-653	29821.87	0	0	0	-0.004	0.004
05/16/11 07:55:50	59.9845	471	0	0	-653	29821.87	0	0	0	-0.002	0.002
05/16/11 07:55:52	59.98224	471	0	0	-653	29821.87	0	0	0	-0.002	0.002
05/16/11 07:55:54	59.98062	471	0	0	-653	29831.33	0	0	0	-0.002	0.002
05/16/11 07:55:56	59.97739	471	0	0	-653	29831.33	0	0	0	-0.003	0.003
05/16/11 07:55:58	59.97641	471	0	0	-653	29831.33	0	0	0	-0.001	0.001
05/16/11 07:56:00	59.97641	471	0	0	-653	29831.33	0	0	0	0.000	0.000
05/16/11 07:56:02	59.9761	471	0	0	-653	29831.33	0	0	0	0.000	0.000

05/16/11 07:56:04	59.97543	471	0	0	-653	29831.33	0	0	0	-0.001	0.001
05/16/11 07:56:06	59.97577	471	0	0	-653	29831.33	0	0	0	0.000	0.000
05/16/11 07:56:08	59.97675	471	0	0	-653	29831.33	0	0	0	0.001	0.001
05/16/11 07:56:10	59.97705	471	0	0	-653	29831.33	0	0	0	0.000	0.000
05/16/11 07:56:12	59.97705	471	0	0	-653	29831.33	0	0	0	0.000	0.000
05/16/11 07:56:14	59.97705	471	0	0	-653	29835.51	0	0	0	0.000	0.000
05/16/11 07:56:16	59.97675	471	0	0	-653	29835.51	0	0	0	0.000	0.000
05/16/11 07:56:18	59.97705	471	0	0	-653	29835.51	0	0	0	0.000	0.000
05/16/11 07:56:20	59.97739	471	0	0	-653	29835.51	0	0	0	0.000	0.000
05/16/11 07:56:22	59.97803	471	0	0	-653	29835.51	0	0	0	0.001	0.001
05/16/11 07:56:24	59.97803	471	0	0	-653	29856.55	0	0	0	0.000	0.000
05/16/11 07:56:26	59.97867	471	0	0	-653	29856.55	0	0	0	0.001	0.001
05/16/11 07:56:28	59.97964	471	0	0	-653	29856.55	0	0	0	0.001	0.001
05/16/11 07:56:30	59.9816	471	0	0	-653	29856.55	0	0	0	0.002	0.002
05/16/11 07:56:32	59.98352	471	0	0	-653	29856.55	0	0	0	0.002	0.002
05/16/11 07:56:34	59.98642	471	0	0	-653	29846.76	0	0	0	0.003	0.003
05/16/11 07:56:36	59.9903	471	0	0	-653	29846.76	0	0	0	0.004	0.004
05/16/11 07:56:38	59.99451	471	0	0	-653	29846.76	0	0	0	0.004	0.004
05/16/11 07:56:40	59.99741	471	0	0	-653	29846.76	0	0	0	0.003	0.003
05/16/11 07:56:42	59.99838	471	0	0	-653	29846.76	0	0	0	0.001	0.001
05/16/11 07:56:44	59.99805	471	0	0	-653	29860.05	0	0	0	0.000	0.000
05/16/11 07:56:46	59.99677	471	0	0	-653	29860.05	0	0	0	-0.001	0.001
05/16/11 07:56:48	59.99612	471	0	0	-653	29860.05	0	0	0	-0.001	0.001
05/16/11 07:56:50	59.99548	471	0	0	-653	29860.05	0	0	0	-0.001	0.001
05/16/11 07:56:52	59.99612	471	0	0	-653	29860.05	0	0	0	0.001	0.001
05/16/11 07:56:54	59.99936	471	0	0	-653	29873.15	0	0	0	0.003	0.003
05/16/11 07:56:56	60.00323	471	0	0	-653	29873.15	0	0	0	0.004	0.004
05/16/11 07:56:58	60.00745	471	0	0	-653	29873.15	0	0	0	0.004	0.004
05/16/11 07:57:00	60.01163	471	0	0	-653	29873.15	0	0	0	0.004	0.004
05/16/11 07:57:02	60.01453	471	0	0	-653	29873.15	0	0	0	0.003	0.003
05/16/11 07:57:04	60.01746	471	0	0	-653	29873.15	0	0	0	0.003	0.003
05/16/11 07:57:06	60.01907	471	0	0	-653	29873.15	0	0	0	0.002	0.002
05/16/11 07:57:08	60.01938	471	0	0	-653	29873.15	0	0	0	0.000	0.000
05/16/11 07:57:10	60.01938	471	0	0	-653	29873.15	0	0	0	0.000	0.000
05/16/11 07:57:12	60.01938	471	0	0	-653	29873.15	0	0	0	0.000	0.000
05/16/11 07:57:14	60.02036	471	0	0	-653	29889.67	0	0	0	0.001	0.001
05/16/11 07:57:16	60.02197	471	0	0	-653	29889.67	0	0	0	0.002	0.002
05/16/11 07:57:18	60.02423	471	0	0	-653	29889.67	0	0	0	0.002	0.002
05/16/11 07:57:20	60.02682	471	0	0	-653	29889.67	0	0	0	0.003	0.003
05/16/11 07:57:22	60.02811	471	0	0	-653	29889.67	0	0	0	0.001	0.001
05/16/11 07:57:24	60.02939	471	0	0	-653	29886.6	0	0	0	0.001	0.001
05/16/11 07:57:26	60.03036	471	0	0	-653	29886.6	0	0	0	0.001	0.001
05/16/11 07:57:28	60.02875	471	0	0	-653	29886.6	0	0	0	-0.002	0.002
05/16/11 07:57:30	60.02682	471	0	0	-653	29886.6	0	0	0	-0.002	0.002
05/16/11 07:57:32	60.02457	471	0	0	-653	29886.6	0	0	0	-0.002	0.002
05/16/11 07:57:34	60.02261	471	0	0	-653	29891.67	0	0	0	-0.002	0.002
05/16/11 07:57:36	60.02231	471	0	0	-653	29891.67	0	0	0	0.000	0.000
05/16/11 07:57:38	60.02295	471	0	0	-653	29891.67	0	0	0	0.001	0.001
05/16/11 07:57:40	60.02359	471	0	0	-653	29891.67	0	0	0	0.001	0.001

05/16/11 07:57:42	60.02261	471	0	0	-653	29891.67	0	0	0	-0.001	0.001
05/16/11 07:57:44	60.02164	471	0	0	-653	29891.64	0	0	0	-0.001	0.001
05/16/11 07:57:46	60.01971	471	0	0	-653	29891.64	0	0	0	-0.002	0.002
05/16/11 07:57:48	60.01776	471	0	0	-653	29891.64	0	0	0	-0.002	0.002
05/16/11 07:57:50	60.01746	471	0	0	-653	29891.64	0	0	0	0.000	0.000
05/16/11 07:57:52	60.01682	471	0	0	-653	29891.64	0	0	0	-0.001	0.001
05/16/11 07:57:54	60.01712	471	0	0	-653	29891.51	0	0	0	0.000	0.000
05/16/11 07:57:56	60.0184	471	0	0	-653	29891.51	0	0	0	0.001	0.001
05/16/11 07:57:58	60.01874	471	0	0	-653	29891.51	0	0	0	0.000	0.000
05/16/11 07:58:00	60.0181	471	0	0	-653	29891.51	0	0	0	-0.001	0.001
05/16/11 07:58:02	60.01682	471	0	0	-653	29891.51	0	0	0	-0.001	0.001
05/16/11 07:58:04	60.0152	471	0	0	-653	29891.6	0	0	0	-0.002	0.002
05/16/11 07:58:06	60.0152	471	0	0	-653	29891.6	0	0	0	0.000	0.000
05/16/11 07:58:08	60.0155	471	0	0	-653	29891.6	0	0	0	0.000	0.000
05/16/11 07:58:10	60.0155	471	0	0	-653	29891.6	0	0	0	0.000	0.000
05/16/11 07:58:12	60.01453	471	0	0	-653	29891.6	0	0	0	-0.001	0.001
05/16/11 07:58:14	60.01453	471	0	0	-653	29884.5	0	0	0	0.000	0.000
05/16/11 07:58:16	60.0152	471	0	0	-653	29884.5	0	0	0	0.001	0.001
05/16/11 07:58:18	60.01584	471	0	0	-653	29884.5	0	0	0	0.001	0.001
05/16/11 07:58:20	60.01614	471	0	0	-653	29884.5	0	0	0	0.000	0.000
05/16/11 07:58:22	60.01584	471	0	0	-653	29884.5	0	0	0	0.000	0.000
05/16/11 07:58:24	60.0152	471	0	0	-653	29881.79	0	0	0	-0.001	0.001
05/16/11 07:58:26	60.0155	471	0	0	-653	29881.79	0	0	0	0.000	0.000
05/16/11 07:58:28	60.01614	471	0	0	-653	29881.79	0	0	0	0.001	0.001
05/16/11 07:58:30	60.01776	471	0	0	-653	29881.79	0	0	0	0.002	0.002
05/16/11 07:58:32	60.01907	471	0	0	-653	29881.79	0	0	0	0.001	0.001
05/16/11 07:58:34	60.02069	471	0	0	-653	29887.14	0	0	0	0.002	0.002
05/16/11 07:58:36	60.02133	471	0	0	-653	29887.14	0	0	0	0.001	0.001
05/16/11 07:58:38	60.02069	471	0	0	-653	29887.14	0	0	0	-0.001	0.001
05/16/11 07:58:40	60.01907	471	0	0	-653	29887.14	0	0	0	-0.002	0.002
05/16/11 07:58:42	60.01746	471	0	0	-653	29887.14	0	0	0	-0.002	0.002
05/16/11 07:58:44	60.01614	471	0	0	-653	29873.08	0	0	0	-0.001	0.001
05/16/11 07:58:46	60.0152	471	0	0	-653	29873.08	0	0	0	-0.001	0.001
05/16/11 07:58:48	60.01453	471	0	0	-653	29873.08	0	0	0	-0.001	0.001
05/16/11 07:58:50	60.01389	471	0	0	-653	29873.08	0	0	0	-0.001	0.001
05/16/11 07:58:52	60.01358	471	0	0	-653	29873.08	0	0	0	0.000	0.000
05/16/11 07:58:54	60.01099	471	0	0	-653	29862.1	0	0	0	-0.003	0.003
05/16/11 07:58:56	60.00549	471	0	0	-653	29862.1	0	0	0	-0.005	0.005
05/16/11 07:58:58	59.99966	471	0	0	-653	29862.1	0	0	0	-0.006	0.006
05/16/11 07:59:00	59.99451	471	0	0	-653	29862.1	0	0	0	-0.005	0.005
05/16/11 07:59:02	59.99127	471	0	0	-653	29862.1	0	0	0	-0.003	0.003
05/16/11 07:59:04	59.98965	471	0	0	-653	29861.95	0	0	0	-0.002	0.002
05/16/11 07:59:06	59.98868	471	0	0	-653	29861.95	0	0	0	-0.001	0.001
05/16/11 07:59:08	59.98676	471	0	0	-653	29861.95	0	0	0	-0.002	0.002
05/16/11 07:59:10	59.9848	471	0	0	-653	29861.95	0	0	0	-0.002	0.002
05/16/11 07:59:12	59.98288	471	0	0	-653	29861.95	0	0	0	-0.002	0.002
05/16/11 07:59:14	59.98062	471	0	0	-653	29906.21	0	0	0	-0.002	0.002
05/16/11 07:59:16	59.97803	471	0	0	-653	29906.21	0	0	0	-0.003	0.003
05/16/11 07:59:18	59.9761	471	0	0	-653	29906.21	0	0	0	-0.002	0.002

05/16/11 07:59:20	59.97577	471	0	0	-653	29906.21	0	0	0	0.000	0.000
05/16/11 07:59:22	59.9761	471	0	0	-653	29906.21	0	0	0	0.000	0.000
05/16/11 07:59:24	59.9761	471	0	0	-653	29878.69	0	0	0	0.000	0.000
05/16/11 07:59:26	59.97641	471	0	0	-653	29878.69	0	0	0	0.000	0.000
05/16/11 07:59:28	59.97543	471	0	0	-653	29878.69	0	0	0	-0.001	0.001
05/16/11 07:59:30	59.97479	471	0	0	-653	29878.69	0	0	0	-0.001	0.001
05/16/11 07:59:32	59.97382	471	0	0	-653	29878.69	0	0	0	-0.001	0.001
05/16/11 07:59:34	59.97253	471	0	0	-653	29900.56	0	0	0	-0.001	0.001
05/16/11 07:59:36	59.97223	471	0	0	-653	29900.56	0	0	0	0.000	0.000
05/16/11 07:59:38	59.97253	471	0	0	-653	29900.56	0	0	0	0.000	0.000
05/16/11 07:59:40	59.97351	471	0	0	-653	29900.56	0	0	0	0.001	0.001
05/16/11 07:59:42	59.97351	471	0	0	-653	29900.56	0	0	0	0.000	0.000
05/16/11 07:59:44	59.97318	471	0	0	-653	29896.99	0	0	0	0.000	0.000
05/16/11 07:59:46	59.97189	471	0	0	-653	29896.99	0	0	0	-0.001	0.001
05/16/11 07:59:48	59.97092	471	0	0	-653	29896.99	0	0	0	-0.001	0.001
05/16/11 07:59:50	59.97028	471	0	0	-653	29896.99	0	0	0	-0.001	0.001
05/16/11 07:59:52	59.97028	471	0	0	-653	29896.99	0	0	0	0.000	0.000
05/16/11 07:59:54	59.97028	471	0	0	-653	29905.8	0	0	0	0.000	0.000
05/16/11 07:59:56	59.97028	471	0	0	-653	29905.8	0	0	0	0.000	0.000
05/16/11 07:59:58	59.97061	471	0	0	-653	29905.8	0	0	0	0.000	0.000
05/16/11 08:00:00	59.97287	471	0	0	-653	29905.8	0	0	0	0.002	0.002
05/16/11 08:00:02	59.97287	471	0	0	-653	29905.8	0	0	0	0.000	0.000
05/16/11 08:00:04	59.97479	471	0	0	-653	29905.77	0	0	0	0.002	0.002
05/16/11 08:00:06	59.97479	471	0	0	-653	29905.77	0	0	0	0.000	0.000
05/16/11 08:00:08	59.97382	471	0	0	-653	29905.77	0	0	0	-0.001	0.001
05/16/11 08:00:10	59.96832	471	0	0	-653	29905.77	0	0	0	-0.005	0.005
05/16/11 08:00:12	59.96802	471	0	0	-653	29905.77	0	0	0	0.000	0.000
05/16/11 08:00:14	59.96899	471	0	0	-653	29914.9	0	0	0	0.001	0.001
05/16/11 08:00:16	59.96994	471	0	0	-653	29914.9	0	0	0	0.001	0.001
05/16/11 08:00:18	59.97382	471	0	0	-653	29914.9	0	0	0	0.004	0.004
05/16/11 08:00:20	59.97382	471	0	0	-653	29914.9	0	0	0	0.000	0.000
05/16/11 08:00:22	59.97382	471	0	0	-653	29914.9	0	0	0	0.000	0.000
05/16/11 08:00:24	59.97769	471	0	0	-653	29925.58	0	0	0	0.004	0.004
05/16/11 08:00:26	59.97739	471	0	0	-653	29925.58	0	0	0	0.000	0.000
05/16/11 08:00:28	59.9761	471	0	0	-653	29925.58	0	0	0	-0.001	0.001
05/16/11 08:00:30	59.9761	471	0	0	-653	29925.58	0	0	0	0.000	0.000
05/16/11 08:00:32	59.97705	471	0	0	-653	29925.58	0	0	0	0.001	0.001
05/16/11 08:00:34	59.97769	471	0	0	-653	29938.87	0	0	0	0.001	0.001
05/16/11 08:00:36	59.97803	471	0	0	-653	29938.87	0	0	0	0.000	0.000
05/16/11 08:00:38	59.97803	471	0	0	-653	29938.87	0	0	0	0.000	0.000
05/16/11 08:00:40	59.97739	471	0	0	-653	29938.87	0	0	0	-0.001	0.001
05/16/11 08:00:42	59.97675	471	0	0	-653	29938.87	0	0	0	-0.001	0.001
05/16/11 08:00:44	59.97641	471	0	0	-653	29952.51	0	0	0	0.000	0.000
05/16/11 08:00:46	59.97479	471	0	0	-653	29952.51	0	0	0	-0.002	0.002
05/16/11 08:00:48	59.97449	471	0	0	-653	29952.51	0	0	0	0.000	0.000
05/16/11 08:00:50	59.97543	471	0	0	-653	29952.51	0	0	0	0.001	0.001
05/16/11 08:00:52	59.97705	471	0	0	-653	29952.51	0	0	0	0.002	0.002
05/16/11 08:00:54	59.97931	471	0	0	-653	29952.51	0	0	0	0.002	0.002
05/16/11 08:00:56	59.97964	471	0	0	-653	29948.95	0	0	0	0.000	0.000

05/16/11 08:00:58	59.979	471	0	0	-653	29948.95	0	0	0	-0.001	0.001
05/16/11 08:01:00	59.97803	471	0	0	-653	29948.95	0	0	0	-0.001	0.001
05/16/11 08:01:02	59.97803	471	0	0	-653	29948.95	0	0	0	0.000	0.000
05/16/11 08:01:04	59.979	471	0	0	-653	29948.95	0	0	0	0.001	0.001
05/16/11 08:01:06	59.98029	471	0	0	-653	29948.95	0	0	0	0.001	0.001
05/16/11 08:01:08	59.9819	471	0	0	-653	29948.95	0	0	0	0.002	0.002
05/16/11 08:01:10	59.98318	471	0	0	-653	29948.95	0	0	0	0.001	0.001
05/16/11 08:01:12	59.9845	471	0	0	-653	29948.95	0	0	0	0.001	0.001
05/16/11 08:01:14	59.98578	471	0	0	-653	29951.05	0	0	0	0.001	0.001
05/16/11 08:01:16	59.98642	471	0	0	-653	29951.05	0	0	0	0.001	0.001
05/16/11 08:01:18	59.98642	471	0	0	-653	29951.05	0	0	0	0.000	0.000
05/16/11 08:01:20	59.98709	471	0	0	-653	29951.05	0	0	0	0.001	0.001
05/16/11 08:01:22	59.98773	471	0	0	-653	29951.05	0	0	0	0.001	0.001
05/16/11 08:01:24	59.98965	471	0	0	-653	29955.09	0	0	0	0.002	0.002
05/16/11 08:01:26	59.99161	471	0	0	-653	29955.09	0	0	0	0.002	0.002
05/16/11 08:01:28	59.99255	471	0	0	-653	29955.09	0	0	0	0.001	0.001
05/16/11 08:01:30	59.99323	471	0	0	-653	29955.09	0	0	0	0.001	0.001
05/16/11 08:01:32	59.99289	471	0	0	-653	29955.09	0	0	0	0.000	0.000
05/16/11 08:01:34	59.99097	471	0	0	-653	29967.69	0	0	0	-0.002	0.002
05/16/11 08:01:36	59.98804	471	0	0	-653	29967.69	0	0	0	-0.003	0.003
05/16/11 08:01:38	59.98578	471	0	0	-653	29967.69	0	0	0	-0.002	0.002
05/16/11 08:01:40	59.98386	471	0	0	-653	29967.69	0	0	0	-0.002	0.002
05/16/11 08:01:42	59.98318	471	0	0	-653	29967.69	0	0	0	-0.001	0.001
05/16/11 08:01:44	59.98318	471	0	0	-653	29983.13	0	0	0	0.000	0.000
05/16/11 08:01:46	59.98288	471	0	0	-653	29983.13	0	0	0	0.000	0.000
05/16/11 08:01:48	59.98126	471	0	0	-653	29983.13	0	0	0	-0.002	0.002
05/16/11 08:01:50	59.97998	471	0	0	-653	29983.13	0	0	0	-0.001	0.001
05/16/11 08:01:52	59.97964	471	0	0	-653	29983.13	0	0	0	0.000	0.000
05/16/11 08:01:54	59.98029	471	0	0	-653	29976.75	0	0	0	0.001	0.001
05/16/11 08:01:56	59.98126	471	0	0	-653	29976.75	0	0	0	0.001	0.001
05/16/11 08:01:58	59.98352	471	0	0	-653	29976.75	0	0	0	0.002	0.002
05/16/11 08:02:00	59.98386	471	0	0	-653	29976.75	0	0	0	0.000	0.000
05/16/11 08:02:02	59.98126	471	0	0	-653	29976.75	0	0	0	-0.003	0.003
05/16/11 08:02:04	59.97543	471	0	0	-653	29976.78	0	0	0	-0.006	0.006
05/16/11 08:02:06	59.96832	471	0	0	-653	29976.78	0	0	0	-0.007	0.007
05/16/11 08:02:08	59.9635	471	0	0	-653	29976.78	0	0	0	-0.005	0.005
05/16/11 08:02:10	59.96155	471	0	0	-653	29976.78	0	0	0	-0.002	0.002
05/16/11 08:02:12	59.96091	471	0	0	-653	29976.78	0	0	0	-0.001	0.001
05/16/11 08:02:14	59.96155	471	0	0	-653	30008.51	0	0	0	0.001	0.001
05/16/11 08:02:16	59.96057	471	0	0	-653	30008.51	0	0	0	-0.001	0.001
05/16/11 08:02:18	59.95801	471	0	0	-653	30008.51	0	0	0	-0.003	0.003
05/16/11 08:02:20	59.95575	471	0	0	-653	30008.51	0	0	0	-0.002	0.002
05/16/11 08:02:22	59.95575	471	0	0	-653	30008.51	0	0	0	0.000	0.000
05/16/11 08:02:24	59.95703	471	0	0	-653	30037.25	0	0	0	0.001	0.001
05/16/11 08:02:26	59.95895	471	0	0	-653	30037.25	0	0	0	0.002	0.002
05/16/11 08:02:28	59.96057	471	0	0	-653	30037.25	0	0	0	0.002	0.002
05/16/11 08:02:30	59.96155	471	0	0	-653	30037.25	0	0	0	0.001	0.001
05/16/11 08:02:32	59.96252	471	0	0	-653	30037.25	0	0	0	0.001	0.001
05/16/11 08:02:34	59.96414	471	0	0	-653	30055.73	0	0	0	0.002	0.002

05/16/11 08:02:36	59.96512	471	0	0	-653	30055.73	0	0	0	0.001	0.001
05/16/11 08:02:38	59.96512	471	0	0	-653	30055.73	0	0	0	0.000	0.000
05/16/11 08:02:40	59.96576	471	0	0	-653	30055.73	0	0	0	0.001	0.001
05/16/11 08:02:42	59.96704	471	0	0	-653	30055.73	0	0	0	0.001	0.001
05/16/11 08:02:44	59.96994	471	0	0	-653	30068.76	0	0	0	0.003	0.003
05/16/11 08:02:46	59.97253	471	0	0	-653	30068.76	0	0	0	0.003	0.003
05/16/11 08:02:48	59.97415	471	0	0	-653	30068.76	0	0	0	0.002	0.002
05/16/11 08:02:50	59.9761	471	0	0	-653	30068.76	0	0	0	0.002	0.002
05/16/11 08:02:52	59.97739	471	0	0	-653	30068.76	0	0	0	0.001	0.001
05/16/11 08:02:54	59.97931	471	0	0	-653	30068.21	0	0	0	0.002	0.002
05/16/11 08:02:56	59.98029	471	0	0	-653	30068.21	0	0	0	0.001	0.001
05/16/11 08:02:58	59.98062	471	0	0	-653	30068.21	0	0	0	0.000	0.000
05/16/11 08:03:00	59.98029	471	0	0	-653	30068.21	0	0	0	0.000	0.000
05/16/11 08:03:02	59.98029	471	0	0	-653	30068.21	0	0	0	0.000	0.000
05/16/11 08:03:04	59.97836	471	0	0	-653	30068.24	0	0	0	-0.002	0.002
05/16/11 08:03:06	59.97836	471	0	0	-653	30068.24	0	0	0	0.000	0.000
05/16/11 08:03:08	59.979	471	0	0	-653	30068.24	0	0	0	0.001	0.001
05/16/11 08:03:10	59.97998	471	0	0	-653	30068.24	0	0	0	0.001	0.001
05/16/11 08:03:12	59.98029	471	0	0	-653	30068.24	0	0	0	0.000	0.000
05/16/11 08:03:14	59.98093	471	0	0	-653	30076.2	0	0	0	0.001	0.001
05/16/11 08:03:16	59.98093	471	0	0	-653	30076.2	0	0	0	0.000	0.000
05/16/11 08:03:18	59.97998	471	0	0	-653	30076.2	0	0	0	-0.001	0.001
05/16/11 08:03:20	59.98062	471	0	0	-653	30076.2	0	0	0	0.001	0.001
05/16/11 08:03:22	59.98029	471	0	0	-653	30076.2	0	0	0	0.000	0.000
05/16/11 08:03:24	59.97998	471	0	0	-653	30093.95	0	0	0	0.000	0.000
05/16/11 08:03:26	59.979	471	0	0	-653	30093.95	0	0	0	-0.001	0.001
05/16/11 08:03:28	59.97931	471	0	0	-653	30093.95	0	0	0	0.000	0.000
05/16/11 08:03:30	59.97998	471	0	0	-653	30093.95	0	0	0	0.001	0.001
05/16/11 08:03:32	59.98029	471	0	0	-653	30093.95	0	0	0	0.000	0.000
05/16/11 08:03:34	59.98029	471	0	0	-653	30100.97	0	0	0	0.000	0.000
05/16/11 08:03:36	59.98029	471	0	0	-653	30100.97	0	0	0	0.000	0.000
05/16/11 08:03:38	59.97964	471	0	0	-653	30100.97	0	0	0	-0.001	0.001
05/16/11 08:03:40	59.979	471	0	0	-653	30100.97	0	0	0	-0.001	0.001
05/16/11 08:03:42	59.97803	471	0	0	-653	30100.97	0	0	0	-0.001	0.001
05/16/11 08:03:44	59.97803	471	0	0	-653	30118.87	0	0	0	0.000	0.000
05/16/11 08:03:46	59.97867	471	0	0	-653	30118.87	0	0	0	0.001	0.001
05/16/11 08:03:48	59.97964	471	0	0	-653	30118.87	0	0	0	0.001	0.001
05/16/11 08:03:50	59.98224	471	0	0	-653	30118.87	0	0	0	0.003	0.003
05/16/11 08:03:52	59.9848	471	0	0	-653	30118.87	0	0	0	0.003	0.003
05/16/11 08:03:54	59.98514	471	0	0	-653	30118.77	0	0	0	0.000	0.000
05/16/11 08:03:56	59.98416	471	0	0	-653	30118.77	0	0	0	-0.001	0.001
05/16/11 08:03:58	59.98224	471	0	0	-653	30118.77	0	0	0	-0.002	0.002
05/16/11 08:04:00	59.98029	471	0	0	-653	30118.77	0	0	0	-0.002	0.002
05/16/11 08:04:02	59.979	471	0	0	-653	30118.77	0	0	0	-0.001	0.001
05/16/11 08:04:04	59.97867	471	0	0	-653	30118.74	0	0	0	0.000	0.000
05/16/11 08:04:06	59.97931	471	0	0	-653	30118.74	0	0	0	0.001	0.001
05/16/11 08:04:08	59.97998	471	0	0	-653	30118.74	0	0	0	0.001	0.001
05/16/11 08:04:10	59.97931	471	0	0	-653	30118.74	0	0	0	-0.001	0.001
05/16/11 08:04:12	59.979	471	0	0	-653	30118.74	0	0	0	0.000	0.000

05/16/11 08:04:14	59.97803	471	0	0	-653	30106.93	0	0	0	-0.001	0.001
05/16/11 08:04:16	59.97675	471	0	0	-653	30106.93	0	0	0	-0.001	0.001
05/16/11 08:04:18	59.97739	471	0	0	-653	30106.93	0	0	0	0.001	0.001
05/16/11 08:04:20	59.979	471	0	0	-653	30106.93	0	0	0	0.002	0.002
05/16/11 08:04:22	59.97964	471	0	0	-653	30106.93	0	0	0	0.001	0.001
05/16/11 08:04:24	59.98093	471	0	0	-653	30106.61	0	0	0	0.001	0.001
05/16/11 08:04:26	59.98224	471	0	0	-653	30106.61	0	0	0	0.001	0.001
05/16/11 08:04:28	59.98318	471	0	0	-653	30106.61	0	0	0	0.001	0.001
05/16/11 08:04:30	59.98318	471	0	0	-653	30106.61	0	0	0	0.000	0.000
05/16/11 08:04:32	59.98224	471	0	0	-653	30106.61	0	0	0	-0.001	0.001
05/16/11 08:04:34	59.9819	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:36	59.9819	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:38	59.9819	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:40	59.9816	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:42	59.9819	471	0	0	-653	30116.02	0	0	0	0.000	0.000
05/16/11 08:04:44	59.9816	471	0	0	-653	30141.59	0	0	0	0.000	0.000
05/16/11 08:04:46	59.98126	471	0	0	-653	30141.59	0	0	0	0.000	0.000
05/16/11 08:04:48	59.9816	471	0	0	-653	30141.59	0	0	0	0.000	0.000
05/16/11 08:04:50	59.98254	471	0	0	-653	30141.59	0	0	0	0.001	0.001
05/16/11 08:04:52	59.98352	471	0	0	-653	30141.59	0	0	0	0.001	0.001
05/16/11 08:04:54	59.98416	471	0	0	-653	30144.23	0	0	0	0.001	0.001
05/16/11 08:04:56	59.98416	471	0	0	-653	30144.23	0	0	0	0.000	0.000
05/16/11 08:04:58	59.98416	471	0	0	-653	30144.23	0	0	0	0.000	0.000
05/16/11 08:05:00	59.98514	471	0	0	-653	30144.23	0	0	0	0.001	0.001
05/16/11 08:05:02	59.9874	471	0	0	-653	30144.23	0	0	0	0.002	0.002
05/16/11 08:05:04	59.98901	471	0	0	-653	30144.23	0	0	0	0.002	0.002
05/16/11 08:05:06	59.98804	471	0	0	-653	30144.23	0	0	0	-0.001	0.001
05/16/11 08:05:08	59.98642	471	0	0	-653	30144.23	0	0	0	-0.002	0.002
05/16/11 08:05:10	59.98288	471	0	0	-653	30144.23	0	0	0	-0.004	0.004
05/16/11 08:05:12	59.98254	471	0	0	-653	30144.23	0	0	0	0.000	0.000
05/16/11 08:05:14	59.98318	471	0	0	-653	30148.67	0	0	0	0.001	0.001
05/16/11 08:05:16	59.9819	471	0	0	-653	30148.67	0	0	0	-0.001	0.001
05/16/11 08:05:18	59.98062	471	0	0	-653	30148.67	0	0	0	-0.001	0.001
05/16/11 08:05:20	59.97964	471	0	0	-653	30148.67	0	0	0	-0.001	0.001
05/16/11 08:05:22	59.97964	471	0	0	-653	30148.67	0	0	0	0.000	0.000
05/16/11 08:05:24	59.97964	471	0	0	-653	30155.67	0	0	0	0.000	0.000
05/16/11 08:05:26	59.98029	471	0	0	-653	30155.67	0	0	0	0.001	0.001
05/16/11 08:05:28	59.98224	471	0	0	-653	30155.67	0	0	0	0.002	0.002
05/16/11 08:05:30	59.98352	471	0	0	-653	30155.67	0	0	0	0.001	0.001
05/16/11 08:05:32	59.98578	471	0	0	-653	30155.67	0	0	0	0.002	0.002
05/16/11 08:05:34	59.9874	471	0	0	-653	30142.79	0	0	0	0.002	0.002
05/16/11 08:05:36	59.98804	471	0	0	-653	30142.79	0	0	0	0.001	0.001
05/16/11 08:05:38	59.9874	471	0	0	-653	30142.79	0	0	0	-0.001	0.001
05/16/11 08:05:40	59.98611	471	0	0	-653	30142.79	0	0	0	-0.001	0.001
05/16/11 08:05:42	59.9848	471	0	0	-653	30142.79	0	0	0	-0.001	0.001
05/16/11 08:05:44	59.98352	471	0	0	-653	30154.67	0	0	0	-0.001	0.001
05/16/11 08:05:46	59.98318	471	0	0	-653	30154.67	0	0	0	0.000	0.000
05/16/11 08:05:48	59.98352	471	0	0	-653	30154.67	0	0	0	0.000	0.000
05/16/11 08:05:50	59.98416	471.3000183	0	0	-653	30150.35	0	0	0	0.001	0.001

05/16/11 08:05:52	59.98514	471.3000183	0	0	-653	30150.35	0	0	0	0.001	0.001
05/16/11 08:05:54	59.98547	471.3000183	0	0	-653	30159.63	0	0	0	0.000	0.000
05/16/11 08:05:56	59.98642	471.3000183	0	0	-653	30159.63	0	0	0	0.001	0.001
05/16/11 08:05:58	59.98676	471.8999939	0	0	-653	30159.63	0	0	0	0.000	0.000
05/16/11 08:06:00	59.9874	471.8999939	0	0	-653	30159.63	0	0	0	0.001	0.001
05/16/11 08:06:02	59.98773	471.8999939	0	0	-653	30151.42	0	0	0	0.000	0.000
05/16/11 08:06:04	59.98901	471.8999939	0	0	-653	30151.42	0	0	0	0.001	0.001
05/16/11 08:06:06	59.98901	471.8999939	0	0	-653	30156.16	0	0	0	0.000	0.000
05/16/11 08:06:08	59.98804	471.3999939	0	0	-653	30156.16	0	0	0	-0.001	0.001
05/16/11 08:06:10	59.98642	471.3999939	0	0	-653	30156.16	0	0	0	-0.002	0.002
05/16/11 08:06:12	59.98547	471.3999939	0	0	-653	30156.16	0	0	0	-0.001	0.001
05/16/11 08:06:14	59.98642	471.3999939	0	0	-653	30164.15	0	0	0	0.001	0.001
05/16/11 08:06:16	59.98935	471.3999939	0	0	-653	30164.15	0	0	0	0.003	0.003
05/16/11 08:06:18	59.99225	471.3999939	0	0	-653	30164.15	0	0	0	0.003	0.003
05/16/11 08:06:20	59.99515	471.3999939	0	0	-653	30164.15	0	0	0	0.003	0.003
05/16/11 08:06:22	59.99579	471.3999939	0	0	-653	30203.91	0	0	0	0.001	0.001
05/16/11 08:06:24	59.99515	471.3999939	0	0	-653	30203.91	0	0	0	-0.001	0.001
05/16/11 08:06:26	59.99548	471.3999939	0	0	-653	30203.73	0	0	0	0.000	0.000
05/16/11 08:06:28	59.99741	470.8999939	0	0	-653	30203.73	0	0	0	0.002	0.002
05/16/11 08:06:30	60	470.8999939	0	0	-653	30203.73	0	0	0	0.003	0.003
05/16/11 08:06:32	60.00162	470.8999939	0	0	-653	30203.73	0	0	0	0.002	0.002
05/16/11 08:06:34	60.00162	470.8999939	0	0	-653	30199.61	0	0	0	0.000	0.000
05/16/11 08:06:36	60.00195	470.8999939	0	0	-653	30199.61	0	0	0	0.000	0.000
05/16/11 08:06:38	59.95963	0	0	0	-653	30199.61	0	0	1	-0.042	0.042
05/16/11 08:06:40	59.88144	0	0	0	-653	30199.61	1	0	1	-0.078	0.078
05/16/11 08:06:42	59.87237	0	0	0	-653	30086.11	1	0	1	-0.009	0.009
05/16/11 08:06:44	59.87011	0	0	0	-653	30086.11	1	0	1	-0.002	0.002
05/16/11 08:06:46	59.87432	0	0	0	-653	30086.14	1	0	1	0.004	0.004
05/16/11 08:06:48	59.88076	0	0	0	-653	30086.14	1	0	1	0.006	0.006
05/16/11 08:06:50	59.88531	0	0	0	-653	30086.14	1	0	1	0.005	0.005
05/16/11 08:06:52	59.88787	0	0	0	-653	30086.14	1	0	1	0.003	0.003
05/16/11 08:06:54	59.88949	0	0	0	-653	30094.43	1	0	1	0.002	0.002
05/16/11 08:06:56	59.8908	0	0	0	-653	30094.43	1	0	1	0.001	0.001
05/16/11 08:06:58	59.89175	0	0	0	-653	30094.43	1	0	1	0.001	0.001
05/16/11 08:07:00	59.89242	0	0	0	-653	30094.43	1	0	1	0.001	0.001
05/16/11 08:07:02	59.89306	0	0	0	-653	30139.49	1	0	1	0.001	0.001
05/16/11 08:07:04	59.89306	0	0	0	-653	30139.49	1	0	1	0.000	0.000
05/16/11 08:07:06	59.89306	0	0	0	-653	30133.38	1	0	1	0.000	0.000
05/16/11 08:07:08	59.89532	0	0	0	-653	30133.38	1	0	1	0.002	0.002
05/16/11 08:07:10	59.89788	0	0	0	-653	30133.38	1	0	1	0.003	0.003
05/16/11 08:07:12	59.8995	0	0	0	-653	30133.38	1	0	1	0.002	0.002
05/16/11 08:07:14	59.90081	0	0	0	-653	30137.26	1	0	1	0.001	0.001
05/16/11 08:07:16	59.9021	0	0	0	-653	30137.26	1	0	1	0.001	0.001
05/16/11 08:07:18	59.90179	0	0	0	-653	30137.26	1	0	1	0.000	0.000
05/16/11 08:07:20	59.90081	0	0	0	-653	30137.26	1	0	1	-0.001	0.001
05/16/11 08:07:22	59.90081	0	0	0	-653	30171.38	1	0	1	0.000	0.000
05/16/11 08:07:24	59.90048	0	0	0	-653	30171.38	1	0	1	0.000	0.000
05/16/11 08:07:26	59.8992	0	0	0	-653	30168.76	1	0	1	-0.001	0.001
05/16/11 08:07:28	59.89886	0	0	0	-653	30168.76	1	0	1	0.000	0.000

05/16/11 08:07:30	59.89856	0	0	0	-653	30168.76	1	0	1	0.000	0.000
05/16/11 08:07:32	59.90017	0	0	0	-653	30168.76	1	0	1	0.002	0.002
05/16/11 08:07:34	59.90243	0	0	0	-653	30208.99	1	0	1	0.002	0.002
05/16/11 08:07:36	59.90469	0	0	0	-653	30208.99	1	0	1	0.002	0.002
05/16/11 08:07:38	59.90695	0	0	0	-653	30208.99	1	0	1	0.002	0.002
05/16/11 08:07:40	59.90887	0	0	0	-653	30208.99	1	0	1	0.002	0.002
05/16/11 08:07:42	59.90921	0	0	0	-653	30205.66	1	0	1	0.000	0.000
05/16/11 08:07:44	59.90857	0	0	0	-653	30205.66	1	0	1	-0.001	0.001
05/16/11 08:07:46	59.90887	0	0	0	-653	30205.66	1	0	1	0.000	0.000
05/16/11 08:07:48	59.91018	0	0	0	-653	30205.66	1	0	1	0.001	0.001
05/16/11 08:07:50	59.91244	0	0	0	-653	30205.66	1	0	1	0.002	0.002
05/16/11 08:07:52	59.9147	0	0	0	-653	30205.66	1	0	1	0.002	0.002
05/16/11 08:07:54	59.9176	0	0	0	-653	30211.75	1	0	1	0.003	0.003
05/16/11 08:07:56	59.91922	0	0	0	-653	30211.75	1	0	1	0.002	0.002
05/16/11 08:07:58	59.92083	0	0	0	-653	30211.75	1	0	1	0.002	0.002
05/16/11 08:08:00	59.92215	0	0	0	-653	30211.75	1	0	1	0.001	0.001
05/16/11 08:08:02	59.92309	0	0	0	-653	30217.55	1	0	1	0.001	0.001
05/16/11 08:08:04	59.92505	0	0	0	-653	30217.55	1	0	1	0.002	0.002
05/16/11 08:08:06	59.92505	0	0	0	-653	30217.57	1	0	1	0.000	0.000
05/16/11 08:08:08	59.9273	0	0	0	-653	30217.57	1	0	1	0.002	0.002
05/16/11 08:08:10	59.93246	0	0	0	-653	30217.57	1	0	1	0.005	0.005
05/16/11 08:08:12	59.93505	0	0	0	-653	30217.57	1	0	1	0.003	0.003
05/16/11 08:08:14	59.93701	0	0	0	-653	30217.59	1	0	1	0.002	0.002
05/16/11 08:08:16	59.93765	0	0	0	-653	30217.59	1	0	1	0.001	0.001
05/16/11 08:08:18	59.93927	0	0	0	-653	30217.59	1	0	1	0.002	0.002
05/16/11 08:08:20	59.94183	0	0	0	-653	30217.59	1	0	1	0.003	0.003
05/16/11 08:08:22	59.94409	0	0	0	-653	30210.49	1	0	1	0.002	0.002
05/16/11 08:08:24	59.94571	0	0	0	-653	30210.49	1	0	1	0.002	0.002
05/16/11 08:08:26	59.94797	0	0	0	-653	30210.26	1	0	1	0.002	0.002
05/16/11 08:08:28	59.94766	0	0	0	-653	30210.26	1	0	1	0.000	0.000
05/16/11 08:08:30	59.9454	0	0	0	-653	30210.26	1	0	1	-0.002	0.002
05/16/11 08:08:32	59.94443	0	0	0	-653	30210.26	1	0	1	-0.001	0.001
05/16/11 08:08:34	59.94409	0	0	0	-653	30234.59	1	0	1	0.000	0.000
05/16/11 08:08:36	59.94507	0	0	0	-653	30234.59	1	0	1	0.001	0.001
05/16/11 08:08:38	59.94604	0	0	0	-653	30234.59	1	0	1	0.001	0.001
05/16/11 08:08:40	59.94638	0	0	0	-653	30234.59	1	0	1	0.000	0.000
05/16/11 08:08:42	59.94733	0	0	0	-653	30223.6	1	0	1	0.001	0.001
05/16/11 08:08:44	59.9483	0	0	0	-653	30223.6	1	0	1	0.001	0.001
05/16/11 08:08:46	59.94894	0	0	0	-653	30223.73	1	0	1	0.001	0.001
05/16/11 08:08:48	59.94992	0	0	0	-653	30223.73	1	0	1	0.001	0.001
05/16/11 08:08:50	59.9509	0	0	0	-653	30223.73	1	0	1	0.001	0.001
05/16/11 08:08:52	59.95154	0	0	0	-653	30223.73	1	0	1	0.001	0.001
05/16/11 08:08:54	59.95187	0	0	0	-653	30224.39	1	0	1	0.000	0.000
05/16/11 08:08:56	59.95346	0	0	0	-653	30224.39	1	0	1	0.002	0.002
05/16/11 08:08:58	59.95508	0	0	0	-653	30224.39	1	0	1	0.002	0.002
05/16/11 08:09:00	59.95575	0	0	0	-653	30224.39	1	0	1	0.001	0.001
05/16/11 08:09:02	59.95639	0	0	0	-653	30255.53	1	0	1	0.001	0.001
05/16/11 08:09:04	59.95801	0	0	0	-653	30255.53	1	0	1	0.002	0.002
05/16/11 08:09:06	59.96124	0	0	0	-653	30252.87	1	0	1	0.003	0.003

05/16/11 08:09:08	59.96252	0	0	0	-653	30252.87	1	0	1	0.001	0.001
05/16/11 08:09:10	59.96188	0	0	0	-653	30252.87	1	0	1	-0.001	0.001
05/16/11 08:09:12	59.96124	0	0	0	-653	30252.87	1	0	1	-0.001	0.001
05/16/11 08:09:14	59.96027	0	0	0	-653	30232.45	1	0	1	-0.001	0.001
05/16/11 08:09:16	59.96057	0	0	0	-653	30232.45	1	0	1	0.000	0.000
05/16/11 08:09:18	59.96219	0	0	0	-653	30232.45	1	0	1	0.002	0.002
05/16/11 08:09:20	59.96512	0	0	0	-653	30232.45	1	0	1	0.003	0.003
05/16/11 08:09:22	59.96738	0	0	0	-653	30263.99	1	0	1	0.002	0.002
05/16/11 08:09:24	59.96899	0	0	0	-653	30263.99	1	0	1	0.002	0.002
05/16/11 08:09:26	59.97061	0	0	0	-653	30263.68	1	0	1	0.002	0.002
05/16/11 08:09:28	59.97318	0	0	0	-653	30263.68	1	0	1	0.003	0.003
05/16/11 08:09:30	59.97351	0	0	0	-653	30263.68	1	0	1	0.000	0.000
05/16/11 08:09:32	59.97287	0	0	0	-653	30263.68	1	0	1	-0.001	0.001
05/16/11 08:09:34	59.97253	0	0	0	-653	30264.96	1	0	1	0.000	0.000
05/16/11 08:09:36	59.97318	0	0	0	-653	30264.96	1	0	1	0.001	0.001
05/16/11 08:09:38	59.97415	0	0	0	-653	30264.96	1	0	1	0.001	0.001
05/16/11 08:09:40	59.97543	0	0	0	-653	30264.96	1	0	1	0.001	0.001
05/16/11 08:09:42	59.97577	0	0	0	-653	30263.63	1	0	1	0.000	0.000
05/16/11 08:09:44	59.9761	0	0	0	-653	30263.63	1	0	1	0.000	0.000
05/16/11 08:09:46	59.97675	0	0	0	-653	30279.39	1	0	1	0.001	0.001
05/16/11 08:09:48	59.97803	0	0	0	-653	30279.39	1	0	1	0.001	0.001
05/16/11 08:09:50	59.97931	0	0	0	-653	30279.39	1	0	1	0.001	0.001
05/16/11 08:09:52	59.97998	0	0	0	-653	30279.39	1	0	1	0.001	0.001
05/16/11 08:09:54	59.97964	0	0	0	-653	30255.32	1	0	1	0.000	0.000
05/16/11 08:09:56	59.979	0	0	0	-653	30255.32	1	0	1	-0.001	0.001
05/16/11 08:09:58	59.97964	0	0	0	-653	30255.32	1	0	1	0.001	0.001
05/16/11 08:10:00	59.98093	0	0	0	-653	30255.32	1	0	1	0.001	0.001
05/16/11 08:10:02	59.98224	0	0	0	-653	30260.67	1	0	1	0.001	0.001
05/16/11 08:10:04	59.98386	0	0	0	-653	30260.67	1	0	1	0.002	0.002
05/16/11 08:10:06	59.98514	0	0	0	-653	30259.99	1	0	1	0.001	0.001
05/16/11 08:10:08	59.98773	0	0	0	-653	30259.99	1	0	1	0.003	0.003
05/16/11 08:10:10	59.9903	0	0	0	-653	30259.99	1	0	1	0.003	0.003
05/16/11 08:10:12	59.99289	0	0	0	-653	30259.99	1	0	1	0.003	0.003
05/16/11 08:10:14	59.99579	0	0	0	-653	30274.08	1	0	1	0.003	0.003
05/16/11 08:10:16	59.99646	0	0	0	-653	30274.08	1	0	1	0.001	0.001
05/16/11 08:10:18	59.99579	0	0	0	-653	30274.08	1	0	1	-0.001	0.001
05/16/11 08:10:20	59.99612	0	0	0	-653	30274.08	1	0	1	0.000	0.000
05/16/11 08:10:22	59.99579	0	0	0	-653	30297.68	1	0	1	0.000	0.000
05/16/11 08:10:24	59.99484	0	0	0	-653	30297.68	1	0	1	-0.001	0.001
05/16/11 08:10:26	59.99484	0	0	0	-653	30297.65	1	0	1	0.000	0.000
05/16/11 08:10:28	59.99805	0	0	0	-653	30297.65	1	0	1	0.003	0.003
05/16/11 08:10:30	59.99872	0	0	0	-653	30297.65	1	1	1	0.001	0.001
05/16/11 08:10:32	60.00034	0	0	0	-653	30297.65	1	1	1	0.002	0.002
05/16/11 08:10:34	60.00195	0	0	0	-653	30300.1	1	1	1	0.002	0.002
05/16/11 08:10:36	60.00259	0	0	0	-653	30300.1	1	1	1	0.001	0.001
05/16/11 08:10:38	60.00226	0	0	0	-653	30300.1	1	1	1	0.000	0.000
05/16/11 08:10:40	60.00195	0	0	0	-653	30300.1	1	1	1	0.000	0.000
05/16/11 08:10:42	60.00064	0	0	0	-653	30314.84	1	1	1	-0.001	0.001
05/16/11 08:10:44	59.99646	0	0	0	-653	30314.84	1	0	1	-0.004	0.004

05/16/11 08:10:46	59.99191	0	0	0	-653	30309.71	1	0	1	-0.005	0.005
05/16/11 08:10:48	59.98901	0	0	0	-653	30309.71	1	0	1	-0.003	0.003
05/16/11 08:10:50	59.98773	0	0	0	-653	30309.71	1	0	1	-0.001	0.001
05/16/11 08:10:52	59.98901	0	0	0	-653	30309.71	1	0	1	0.001	0.001
05/16/11 08:10:54	59.99255	0	0	0	-653	30319.5	1	0	1	0.004	0.004
05/16/11 08:10:56	59.99579	0	0	0	-653	30319.5	1	0	1	0.003	0.003
05/16/11 08:10:58	59.99902	0	0	0	-653	30319.5	1	1	1	0.003	0.003
05/16/11 08:11:00	60.00195	0	0	0	-653	30319.5	1	1	1	0.003	0.003
05/16/11 08:11:02	60.00485	0	0	0	-653	30357.21	1	1	1	0.003	0.003
05/16/11 08:11:04	60.00809	0	0	0	-653	30357.21	1	1	1	0.003	0.003
05/16/11 08:11:06	60.01163	0	0	0	-653	30357.18	1	1	1	0.004	0.004
05/16/11 08:11:08	60.01422	0	0	0	-653	30357.18	1	1	1	0.003	0.003
05/16/11 08:11:10	60.0152	0	0	0	-653	30357.18	1	1	1	0.001	0.001
05/16/11 08:11:12	60.0155	0	0	0	-653	30357.18	1	1	1	0.000	0.000
05/16/11 08:11:14	60.0155	0	0	0	-653	30354.26	1	1	1	0.000	0.000
05/16/11 08:11:16	60.01682	0	0	0	-653	30354.26	1	1	1	0.001	0.001
05/16/11 08:11:18	60.01907	0	0	0	-653	30354.26	1	1	1	0.002	0.002
05/16/11 08:11:20	60.02295	0	0	0	-653	30354.26	1	1	1	0.004	0.004
05/16/11 08:11:22	60.02618	0	0	0	-653	30354.48	1	1	1	0.003	0.003
05/16/11 08:11:24	60.02972	0	0	0	-653	30354.48	1	1	1	0.004	0.004
05/16/11 08:11:26	60.03262	0	0	0	-653	30353.83	1	1	1	0.003	0.003
05/16/11 08:11:28	60.03458	0	0	0	-653	30353.83	1	1	1	0.002	0.002
05/16/11 08:11:30	60.03522	0	0	0	-653	30353.83	1	1	1	0.001	0.001
05/16/11 08:11:32	60.03424	0	0	0	-653	30353.83	1	1	1	-0.001	0.001
05/16/11 08:11:34	60.0336	0	0	0	-653	30370.41	1	1	1	-0.001	0.001
05/16/11 08:11:36	60.03522	0	0	0	-653	30370.41	1	1	1	0.002	0.002
05/16/11 08:11:38	60.03812	0	0	0	-653	30370.41	1	1	1	0.003	0.003
05/16/11 08:11:40	60.04037	0	0	0	-653	30370.41	1	1	1	0.002	0.002
05/16/11 08:11:42	60.04105	0	0	0	-653	30374.79	1	1	1	0.001	0.001
05/16/11 08:11:44	60.04199	0	0	0	-653	30374.79	1	1	1	0.001	0.001
05/16/11 08:11:46	60.04233	0	0	0	-653	30366.14	1	1	1	0.000	0.000
05/16/11 08:11:48	60.0433	0	0	0	-653	30366.14	1	1	1	0.001	0.001
05/16/11 08:11:50	60.04425	0	0	0	-653	30366.14	1	1	1	0.001	0.001
05/16/11 08:11:52	60.04492	0	0	0	-653	30366.14	1	1	1	0.001	0.001
05/16/11 08:11:54	60.04556	0	0	0	-653	30373.53	1	1	1	0.001	0.001
05/16/11 08:11:56	60.04587	0	0	0	-653	30373.53	1	1	1	0.000	0.000
05/16/11 08:11:58	60.04654	0	0	0	-653	30373.53	1	1	1	0.001	0.001
05/16/11 08:12:00	60.0488	0	0	0	-653	30373.53	1	1	1	0.002	0.002
05/16/11 08:12:02	60.04974	0	0	0	-653	30343.46	1	1	1	0.001	0.001
05/16/11 08:12:04	60.0491	0	0	0	-653	30343.46	1	1	1	-0.001	0.001
05/16/11 08:12:06	60.0491	0	0	0	-653	30335.12	1	1	1	0.000	0.000
05/16/11 08:12:08	60.05042	0	0	0	-653	30335.12	1	1	1	0.001	0.001
05/16/11 08:12:10	60.04974	0	0	0	-653	30335.12	1	1	1	-0.001	0.001
05/16/11 08:12:12	60.04846	0	0	0	-653	30335.12	1	1	1	-0.001	0.001
05/16/11 08:12:14	60.04718	0	0	0	-653	30337.29	1	1	1	-0.001	0.001
05/16/11 08:12:16	60.04587	0	0	0	-653	30337.29	1	1	1	-0.001	0.001
05/16/11 08:12:18	60.04587	0	0	0	-653	30337.29	1	1	1	0.000	0.000
05/16/11 08:12:20	60.04556	0	0	0	-653	30337.29	1	1	1	0.000	0.000
05/16/11 08:12:22	60.04425	0	0	0	-653	30350.2	1	1	1	-0.001	0.001

05/16/11 08:12:24	60.04297	0	0	0	-653	30350.2	1	1	1	-0.001	0.001
05/16/11 08:12:26	60.04169	0	0	0	-653	30350.07	1	1	1	-0.001	0.001
05/16/11 08:12:28	60.04233	0	0	0	-653	30350.07	1	1	1	0.001	0.001
05/16/11 08:12:30	60.04459	0	0	0	-653	30350.07	1	1	1	0.002	0.002
05/16/11 08:12:32	60.04654	0	0	0	-653	30350.07	1	1	1	0.002	0.002
05/16/11 08:12:34	60.04718	0	0	0	-653	30354.77	1	1	1	0.001	0.001
05/16/11 08:12:36	60.0462	0	0	0	-653	30354.77	1	1	1	-0.001	0.001
05/16/11 08:12:38	60.04425	0	0	0	-653	30354.77	1	1	1	-0.002	0.002
05/16/11 08:12:40	60.04492	0	0	0	-653	30354.77	1	1	1	0.001	0.001
05/16/11 08:12:42	60.04523	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:44	60.04523	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:46	60.04556	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:48	60.0462	0	0	0	-653	30372.38	1	1	1	0.001	0.001
05/16/11 08:12:50	60.04654	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:52	60.04654	0	0	0	-653	30372.38	1	1	1	0.000	0.000
05/16/11 08:12:54	60.04523	0	0	0	-653	30349.1	1	1	1	-0.001	0.001
05/16/11 08:12:56	60.04361	0	0	0	-653	30349.1	1	1	1	-0.002	0.002
05/16/11 08:12:58	60.04199	0	0	0	-653	30349.1	1	1	1	-0.002	0.002
05/16/11 08:13:00	60.04071	0	0	0	-653	30349.1	1	1	1	-0.001	0.001
05/16/11 08:13:02	60.03876	0	0	0	-653	30363.65	1	1	1	-0.002	0.002
05/16/11 08:13:04	60.03586	0	0	0	-653	30363.65	1	1	1	-0.003	0.003
05/16/11 08:13:06	60.03394	0	0	0	-653	30363.88	1	1	1	-0.002	0.002
05/16/11 08:13:08	60.0336	0	0	0	-653	30363.88	1	1	1	0.000	0.000
05/16/11 08:13:10	60.03262	0	0	0	-653	30363.88	1	1	1	-0.001	0.001
05/16/11 08:13:12	60.03006	0	0	0	-653	30363.88	1	1	1	-0.003	0.003
05/16/11 08:13:14	60.02747	0	0	0	-653	30364.77	1	1	1	-0.003	0.003
05/16/11 08:13:16	60.02682	0	0	0	-653	30364.77	1	1	1	-0.001	0.001
05/16/11 08:13:18	60.02585	0	0	0	-653	30364.77	1	1	1	-0.001	0.001
05/16/11 08:13:20	60.02359	0	0	0	-653	30364.77	1	1	1	-0.002	0.002
05/16/11 08:13:22	60.02197	0	0	0	-653	30374.33	1	1	1	-0.002	0.002
05/16/11 08:13:24	60.02164	0	0	0	-653	30374.33	1	1	1	0.000	0.000
05/16/11 08:13:26	60.02231	0	0	0	-653	30364.67	1	1	1	0.001	0.001
05/16/11 08:13:28	60.02133	0	0	0	-653	30364.67	1	1	1	-0.001	0.001
05/16/11 08:13:30	60.02133	0	0	0	-653	30364.67	1	1	1	0.000	0.000
05/16/11 08:13:32	60.02002	0	0	0	-653	30364.67	1	1	1	-0.001	0.001
05/16/11 08:13:34	60.01776	0	0	0	-653	30361.56	1	1	1	-0.002	0.002
05/16/11 08:13:36	60.01584	0	0	0	-653	30361.56	1	1	1	-0.002	0.002
05/16/11 08:13:38	60.01291	0	0	0	-653	30361.56	1	1	1	-0.003	0.003
05/16/11 08:13:40	60.01132	0	0	0	-653	30361.56	1	1	1	-0.002	0.002
05/16/11 08:13:42	60.01001	0	0	0	-653	30350.69	1	1	1	-0.001	0.001
05/16/11 08:13:44	60.00937	0	0	0	-653	30350.69	1	1	1	-0.001	0.001
05/16/11 08:13:46	60.00775	0	0	0	-653	30344.52	1	1	1	-0.002	0.002
05/16/11 08:13:48	60.00516	0	0	0	-653	30344.52	1	1	1	-0.003	0.003
05/16/11 08:13:50	60.00452	0	0	0	-653	30344.52	1	1	1	-0.001	0.001
05/16/11 08:13:52	60.00613	0	0	0	-653	30344.52	1	1	1	0.002	0.002
05/16/11 08:13:54	60.00613	0	0	0	-653	30354.37	1	1	1	0.000	0.000
05/16/11 08:13:56	60.00549	0	0	0	-653	30354.37	1	1	1	-0.001	0.001
05/16/11 08:13:58	60.00516	0	0	0	-653	30354.37	1	1	1	0.000	0.000
05/16/11 08:14:00	60.00388	0	0	0	-653	30354.37	1	1	1	-0.001	0.001

05/16/11 08:14:02	60.00259	0	0	0	-653	30373.31	1	1	1	-0.001	0.001
05/16/11 08:14:04	60.00128	0	0	0	-653	30373.31	1	1	1	-0.001	0.001
05/16/11 08:14:06	60.00128	0	0	0	-653	30373.78	1	1	1	0.000	0.000
05/16/11 08:14:08	60.00064	0	0	0	-653	30373.78	1	1	1	-0.001	0.001
05/16/11 08:14:10	60.00034	0	0	0	-653	30373.78	1	1	1	0.000	0.000
05/16/11 08:14:12	60.00226	0	0	0	-653	30373.78	1	1	1	0.002	0.002
05/16/11 08:14:14	60.00421	0	0	0	-653	30366.33	1	1	1	0.002	0.002
05/16/11 08:14:16	60.00677	0	0	0	-653	30366.33	1	1	1	0.003	0.003
05/16/11 08:14:18	60.00903	0	0	0	-653	30366.33	1	1	1	0.002	0.002
05/16/11 08:14:20	60.01291	0	0	0	-653	30366.33	1	1	1	0.004	0.004
05/16/11 08:14:22	60.01486	0	0	0	-653	30373.85	1	1	1	0.002	0.002
05/16/11 08:14:24	60.01453	0	0	0	-653	30373.85	1	1	1	0.000	0.000
05/16/11 08:14:26	60.01422	0	0	0	-653	30373.05	1	1	1	0.000	0.000
05/16/11 08:14:28	60.0152	0	0	0	-653	30373.05	1	1	1	0.001	0.001
05/16/11 08:14:30	60.01614	0	0	0	-653	30373.05	1	1	1	0.001	0.001
05/16/11 08:14:32	60.01682	0	0	0	-653	30373.05	1	1	1	0.001	0.001
05/16/11 08:14:34	60.01746	0	0	0	-653	30369.77	1	1	1	0.001	0.001
05/16/11 08:14:36	60.01712	0	0	0	-653	30369.77	1	1	1	0.000	0.000
05/16/11 08:14:38	60.01682	0	0	0	-653	30369.77	1	1	1	0.000	0.000
05/16/11 08:14:40	60.01648	0	0	0	-653	30369.77	1	1	1	0.000	0.000
05/16/11 08:14:42	60.01614	0	0	0	-653	30388.99	1	1	1	0.000	0.000
05/16/11 08:14:44	60.01746	0	0	0	-653	30388.99	1	1	1	0.001	0.001
05/16/11 08:14:46	60.01776	0	0	0	-653	30388.16	1	1	1	0.000	0.000
05/16/11 08:14:48	60.01776	0	0	0	-653	30388.16	1	1	1	0.000	0.000
05/16/11 08:14:50	60.01648	0	0	0	-653	30388.16	1	1	1	-0.001	0.001
05/16/11 08:14:52	60.01584	0	0	0	-653	30388.16	1	1	1	-0.001	0.001
05/16/11 08:14:54	60.01648	0	0	0	-653	30376.94	1	1	1	0.001	0.001
05/16/11 08:14:56	60.01584	0	0	0	-653	30376.94	1	1	1	-0.001	0.001
05/16/11 08:14:58	60.01358	0	0	0	-653	30376.94	1	1	1	-0.002	0.002
05/16/11 08:15:00	60.01163	0	0	0	-653	30376.94	1	1	1	-0.002	0.002
05/16/11 08:15:02	60.01132	0	0	0	-653	30371.85	1	1	1	0.000	0.000
05/16/11 08:15:04	60.01132	0	0	0	-653	30371.85	1	1	1	0.000	0.000
05/16/11 08:15:06	60.01099	0	0	0	-653	30362.65	1	1	1	0.000	0.000
05/16/11 08:15:08	60.01099	0	0	0	-653	30362.65	1	1	1	0.000	0.000
05/16/11 08:15:10	60.01291	0	0	0	-653	30362.65	1	1	1	0.002	0.002
05/16/11 08:15:12	60.01486	0	0	0	-653	30362.65	1	1	1	0.002	0.002
05/16/11 08:15:14	60.01776	0	0	0	-653	30395.46	1	1	1	0.003	0.003
05/16/11 08:15:16	60.01776	0	0	0	-653	30395.46	1	1	1	0.000	0.000
05/16/11 08:15:18	60.0184	0	0	0	-653	30395.46	1	1	1	0.001	0.001
05/16/11 08:15:20	60.0181	0	0	0	-653	30395.46	1	1	1	0.000	0.000
05/16/11 08:15:22	60.01746	0	0	0	-653	30397.03	1	1	1	-0.001	0.001
05/16/11 08:15:24	60.0152	0	0	0	-653	30397.03	1	1	1	-0.002	0.002
05/16/11 08:15:26	60.0152	0	0	0	-653	30396.67	1	1	1	0.000	0.000
05/16/11 08:15:28	60.01389	0	0	0	-653	30396.67	1	1	1	-0.001	0.001
05/16/11 08:15:30	60.01746	0	0	0	-653	30396.67	1	1	1	0.004	0.004
05/16/11 08:15:32	60.01907	0	0	0	-653	30396.67	1	1	1	0.002	0.002
05/16/11 08:15:34	60.01907	0	0	0	-653	30388.62	1	1	1	0.000	0.000
05/16/11 08:15:36	60.02036	0	0	0	-653	30388.62	1	1	1	0.001	0.001
05/16/11 08:15:38	60.01874	0	0	0	-653	30388.62	1	1	1	-0.002	0.002

05/16/11 08:15:40	60.01874	0	0	0	-653	30388.62	1	1	1	0.000	0.000
05/16/11 08:15:42	60.01971	0	0	0	-653	30381.78	1	1	1	0.001	0.001
05/16/11 08:15:44	60.01971	0	0	0	-653	30381.78	1	1	1	0.000	0.000
05/16/11 08:15:46	60.01971	0	0	0	-653	30382.96	1	1	1	0.000	0.000
05/16/11 08:15:48	60.0184	0	0	0	-653	30382.96	1	1	1	-0.001	0.001
05/16/11 08:15:50	60.01486	0	0	0	-653	30382.96	1	1	1	-0.004	0.004
05/16/11 08:15:52	60.01358	0	0	0	-653	30382.96	1	1	1	-0.001	0.001
05/16/11 08:15:54	60.01389	0	0	0	-653	30381.48	1	1	1	0.000	0.000
05/16/11 08:15:56	60.01227	0	0	0	-653	30381.48	1	1	1	-0.002	0.002
05/16/11 08:15:58	60.01001	0	0	0	-653	30381.48	1	1	1	-0.002	0.002
05/16/11 08:16:00	60.00583	0	0	0	-653	30381.48	1	1	1	-0.004	0.004
05/16/11 08:16:02	60.00162	0	0	0	-653	30394.03	1	1	1	-0.004	0.004
05/16/11 08:16:04	60.00162	0	0	0	-653	30394.03	1	1	1	0.000	0.000
05/16/11 08:16:06	59.99805	0	0	0	-653	30394.07	1	0	1	-0.004	0.004
05/16/11 08:16:08	59.99353	0	0	0	-653	30394.07	1	0	1	-0.005	0.005
05/16/11 08:16:10	59.99255	0	0	0	-653	30394.07	1	0	1	-0.001	0.001
05/16/11 08:16:12	59.99225	0	0	0	-653	30394.07	1	0	1	0.000	0.000
05/16/11 08:16:14	59.98999	0	0	0	-653	30376.91	1	0	1	-0.002	0.002
05/16/11 08:16:16	59.98837	0	0	0	-653	30376.91	1	0	1	-0.002	0.002
05/16/11 08:16:18	59.98416	0	0	0	-653	30376.91	1	0	1	-0.004	0.004
05/16/11 08:16:20	59.9816	0	0	0	-653	30376.91	1	0	1	-0.003	0.003
05/16/11 08:16:22	59.98093	0	0	0	-653	30367.96	1	0	1	-0.001	0.001
05/16/11 08:16:24	59.98029	0	0	0	-653	30367.96	1	0	1	-0.001	0.001
05/16/11 08:16:26	59.97998	0	0	0	-653	30367.46	1	0	1	0.000	0.000
05/16/11 08:16:28	59.97836	0	0	0	-653	30367.46	1	0	1	-0.002	0.002
05/16/11 08:16:30	59.97513	0	0	0	-653	30367.46	1	0	1	-0.003	0.003
05/16/11 08:16:32	59.97287	0	0	0	-653	30367.46	1	0	1	-0.002	0.002
05/16/11 08:16:34	59.97189	0	0	0	-653	30361.18	1	0	1	-0.001	0.001
05/16/11 08:16:36	59.97156	0	0	0	-653	30361.18	1	0	1	0.000	0.000
05/16/11 08:16:38	59.97382	0	0	0	-653	30361.18	1	0	1	0.002	0.002
05/16/11 08:16:40	59.97641	0	0	0	-653	30361.18	1	0	1	0.003	0.003
05/16/11 08:16:42	59.97836	0	0	0	-653	30365.59	1	0	1	0.002	0.002
05/16/11 08:16:44	59.97705	0	0	0	-653	30365.59	1	0	1	-0.001	0.001
05/16/11 08:16:46	59.97449	0	0	0	-653	30365.19	1	0	1	-0.003	0.003
05/16/11 08:16:48	59.97125	0	0	0	-653	30365.19	1	0	1	-0.003	0.003
05/16/11 08:16:50	59.97092	0	0	0	-653	30365.19	1	0	1	0.000	0.000
05/16/11 08:16:52	59.97287	0	0	0	-653	30365.19	1	0	1	0.002	0.002
05/16/11 08:16:54	59.97449	0	0	0	-653	30375.91	1	0	1	0.002	0.002
05/16/11 08:16:56	59.97382	0	0	0	-653	30375.91	1	0	1	-0.001	0.001
05/16/11 08:16:58	59.97318	0	0	0	-653	30375.91	1	0	1	-0.001	0.001
05/16/11 08:17:00	59.97449	0	0	0	-653	30375.91	1	0	1	0.001	0.001
05/16/11 08:17:02	59.9761	0	0	0	-653	30367.4	1	0	1	0.002	0.002
05/16/11 08:17:04	59.97739	0	0	0	-653	30367.4	1	0	1	0.001	0.001
05/16/11 08:17:06	59.97836	0	0	0	-653	30367.72	1	0	1	0.001	0.001
05/16/11 08:17:08	59.97769	0	0	0	-653	30367.72	1	0	1	-0.001	0.001
05/16/11 08:17:10	59.97705	0	0	0	-653	30367.72	1	0	1	-0.001	0.001
05/16/11 08:17:12	59.97641	0	0	0	-653	30367.72	1	0	1	-0.001	0.001
05/16/11 08:17:14	59.97543	0	0	0	-653	30416.87	1	0	1	-0.001	0.001
05/16/11 08:17:16	59.97382	0	0	0	-653	30416.87	1	0	1	-0.002	0.002

05/16/11 08:17:18	59.97318	0	0	0	-653	30416.87	1	0	1	-0.001	0.001
05/16/11 08:17:20	59.97223	0	0	0	-653	30416.87	1	0	1	-0.001	0.001
05/16/11 08:17:22	59.97189	0	0	0	-653	30413.65	1	0	1	0.000	0.000
05/16/11 08:17:24	59.97092	0	0	0	-653	30413.65	1	0	1	-0.001	0.001
05/16/11 08:17:26	59.96994	0	0	0	-653	30406.3	1	0	1	-0.001	0.001
05/16/11 08:17:28	59.96832	0	0	0	-653	30406.3	1	0	1	-0.002	0.002
05/16/11 08:17:30	59.96606	0	0	0	-653	30406.3	1	0	1	-0.002	0.002
05/16/11 08:17:32	59.96542	0	0	0	-653	30406.3	1	0	1	-0.001	0.001
05/16/11 08:17:34	59.96606	0	0	0	-653	30418.59	1	0	1	0.001	0.001
05/16/11 08:17:36	59.9693	0	0	0	-653	30418.59	1	0	1	0.003	0.003
05/16/11 08:17:38	59.97253	0	0	0	-653	30418.59	1	0	1	0.003	0.003
05/16/11 08:17:40	59.97351	0	0	0	-653	30418.59	1	0	1	0.001	0.001
05/16/11 08:17:42	59.97382	0	0	0	-653	30433.31	1	0	1	0.000	0.000
05/16/11 08:17:44	59.97253	0	0	0	-653	30433.31	1	0	1	-0.001	0.001
05/16/11 08:17:46	59.97253	0	0	0	-653	30433.31	1	0	1	0.000	0.000
05/16/11 08:17:48	59.97253	0	0	0	-653	30433.31	1	0	1	0.000	0.000
05/16/11 08:17:50	59.96768	0	0	0	-653	30433.31	1	0	1	-0.005	0.005
05/16/11 08:17:52	59.97125	0	0	0	-653	30433.31	1	0	1	0.004	0.004
05/16/11 08:17:54	59.97577	0	0	0	-653	30451.3	1	0	1	0.005	0.005
05/16/11 08:17:56	59.97577	0	0	0	-653	30451.3	1	0	1	0.000	0.000
05/16/11 08:17:58	59.97577	0	0	0	-653	30451.3	1	0	1	0.000	0.000
05/16/11 08:18:00	59.98416	0	0	0	-653	30451.3	1	0	1	0.008	0.008
05/16/11 08:18:02	59.9819	0	0	0	-653	30425.74	1	0	1	-0.002	0.002
05/16/11 08:18:04	59.979	0	0	0	-653	30425.74	1	0	1	-0.003	0.003
05/16/11 08:18:06	59.97769	0	0	0	-653	30419.18	1	0	1	-0.001	0.001
05/16/11 08:18:08	59.97769	0	0	0	-653	30419.18	1	0	1	0.000	0.000
05/16/11 08:18:10	59.98126	0	0	0	-653	30419.18	1	0	1	0.004	0.004
05/16/11 08:18:12	59.9848	0	0	0	-653	30419.18	1	0	1	0.004	0.004
05/16/11 08:18:14	59.98868	0	0	0	-653	30424.29	1	0	1	0.004	0.004
05/16/11 08:18:16	59.99161	0	0	0	-653	30424.29	1	0	1	0.003	0.003
05/16/11 08:18:18	59.99353	0	0	0	-653	30424.29	1	0	1	0.002	0.002
05/16/11 08:18:20	59.99579	0	0	0	-653	30424.29	1	0	1	0.002	0.002
05/16/11 08:18:22	59.99677	0	0	0	-653	30440.82	1	0	1	0.001	0.001
05/16/11 08:18:24	59.99774	0	0	0	-653	30440.82	1	0	1	0.001	0.001
05/16/11 08:18:26	59.99838	0	0	0	-653	30431.58	1	0	1	0.001	0.001
05/16/11 08:18:28	59.99774	0	0	0	-653	30431.58	1	0	1	-0.001	0.001
05/16/11 08:18:30	59.9971	0	0	0	-653	30431.58	1	0	1	-0.001	0.001
05/16/11 08:18:32	59.99741	0	0	0	-653	30431.58	1	0	1	0.000	0.000
05/16/11 08:18:34	59.99741	0	0	0	-653	30444.25	1	0	1	0.000	0.000
05/16/11 08:18:36	59.99741	0	0	0	-653	30444.25	1	0	1	0.000	0.000
05/16/11 08:18:38	60.00064	0	0	0	-653	30444.25	1	1	1	0.003	0.003
05/16/11 08:18:40	60.00323	0	0	0	-653	30444.25	1	1	1	0.003	0.003
05/16/11 08:18:42	60.00354	0	0	0	-653	30465.11	1	1	1	0.000	0.000
05/16/11 08:18:44	60.00259	0	0	0	-653	30465.11	1	1	1	-0.001	0.001
05/16/11 08:18:46	60.00098	0	0	0	-653	30465.3	1	1	1	-0.002	0.002
05/16/11 08:18:48	59.99936	0	0	0	-653	30465.3	1	1	1	-0.002	0.002
05/16/11 08:18:50	59.99741	0	0	0	-653	30465.3	1	0	1	-0.002	0.002
05/16/11 08:18:52	59.99677	0	0	0	-653	30465.3	1	0	1	-0.001	0.001
05/16/11 08:18:54	59.99677	0	0	0	-653	30478.25	1	0	1	0.000	0.000

05/16/11 08:18:56	59.9971	0	0	0	-653	30478.25	1	0	1	0.000	0.000
05/16/11 08:18:58	59.99774	0	0	0	-653	30478.25	1	0	1	0.001	0.001
05/16/11 08:19:00	59.99872	0	0	0	-653	30478.25	1	1	1	0.001	0.001
05/16/11 08:19:02	59.99966	0	0	0	-653	30473.86	1	1	1	0.001	0.001
05/16/11 08:19:04	60	0	0	0	-653	30473.86	1	1	1	0.000	0.000
05/16/11 08:19:06	60.00034	0	0	0	-653	30468.84	1	1	1	0.000	0.000
05/16/11 08:19:08	60.00098	0	0	0	-653	30468.84	1	1	1	0.001	0.001
05/16/11 08:19:10	60.00226	0	0	0	-653	30468.84	1	1	1	0.001	0.001
05/16/11 08:19:12	60.0029	0	0	0	-653	30468.84	1	1	1	0.001	0.001
05/16/11 08:19:14	60.00259	0	0	0	-653	30469.63	1	1	1	0.000	0.000
05/16/11 08:19:16	60.00226	0	0	0	-653	30469.63	1	1	1	0.000	0.000
05/16/11 08:19:18	60.00226	0	0	0	-653	30469.63	1	1	1	0.000	0.000
05/16/11 08:19:20	60.00323	0	0	0	-653	30469.63	1	1	1	0.001	0.001
05/16/11 08:19:22	60.00421	0	0	0	-653	30488.41	1	1	1	0.001	0.001
05/16/11 08:19:24	60.00485	0	0	0	-653	30488.41	1	1	1	0.001	0.001
05/16/11 08:19:26	60.00452	0	0	0	-653	30480.29	1	1	1	0.000	0.000
05/16/11 08:19:28	60.00354	0	0	0	-653	30480.29	1	1	1	-0.001	0.001
05/16/11 08:19:30	60.00354	0	0	0	-653	30480.29	1	1	1	0.000	0.000
05/16/11 08:19:32	60.00354	0	0	0	-653	30480.29	1	1	1	0.000	0.000
05/16/11 08:19:34	60.00354	0	0	0	-653	30477.13	1	1	1	0.000	0.000
05/16/11 08:19:36	60.00354	0	0	0	-653	30477.13	1	1	1	0.000	0.000
05/16/11 08:19:38	60.00354	0	0	0	-653	30477.13	1	1	1	0.000	0.000
05/16/11 08:19:40	60.00354	0	0	0	-653	30477.13	1	1	1	0.000	0.000
05/16/11 08:19:42	60.00613	0	0	0	-653	30487.82	1	1	1	0.003	0.003
05/16/11 08:19:44	60.00485	0	0	0	-653	30487.82	1	1	1	-0.001	0.001
05/16/11 08:19:46	60.00452	0	0	0	-653	30489.73	1	1	1	0.000	0.000
05/16/11 08:19:48	60.00452	0	0	0	-653	30489.73	1	1	1	0.000	0.000
05/16/11 08:19:50	60.00354	0	0	0	-653	30489.73	1	1	1	-0.001	0.001
05/16/11 08:19:52	60.0029	0	0	0	-653	30489.73	1	1	1	-0.001	0.001
05/16/11 08:19:54	60.00162	0	0	0	-653	30480.09	1	1	1	-0.001	0.001
05/16/11 08:19:56	60.00162	0	0	0	-653	30480.09	1	1	1	0.000	0.000
05/16/11 08:19:58	60.00421	0	0	0	-653	30480.09	1	1	1	0.003	0.003
05/16/11 08:20:00	60.00421	0	0	0	-653	30480.09	1	1	1	0.000	0.000
05/16/11 08:20:02	60.0029	0	0	0	-653	30480.91	1	1	1	-0.001	0.001
05/16/11 08:20:04	60.00034	0	0	0	-653	30480.91	1	1	1	-0.003	0.003
05/16/11 08:20:06	59.99805	0	0	0	-653	30480.84	1	0	1	-0.002	0.002
05/16/11 08:20:08	59.99646	0	0	0	-653	30480.84	1	0	1	-0.002	0.002
05/16/11 08:20:10	59.99515	0	0	0	-653	30480.84	1	0	1	-0.001	0.001
05/16/11 08:20:12	59.99387	0	0	0	-653	30480.84	1	0	1	-0.001	0.001
05/16/11 08:20:14	59.99289	0	0	0	-653	30476.09	1	0	1	-0.001	0.001
05/16/11 08:20:16	59.99255	0	0	0	-653	30476.09	1	0	1	0.000	0.000
05/16/11 08:20:18	59.99225	0	0	0	-653	30476.09	1	0	1	0.000	0.000
05/16/11 08:20:20	59.98965	0	0	0	-653	30476.09	1	0	1	-0.003	0.003
05/16/11 08:20:22	59.98514	0	0	0	-653	30456.76	1	0	1	-0.005	0.005
05/16/11 08:20:24	59.98254	0	0	0	-653	30456.76	1	0	1	-0.003	0.003
05/16/11 08:20:26	59.97836	0	0	0	-653	30457.12	1	0	1	-0.004	0.004
05/16/11 08:20:28	59.97641	0	0	0	-653	30457.12	1	0	1	-0.002	0.002
05/16/11 08:20:30	59.97705	0	0	0	-653	30457.12	1	0	1	0.001	0.001
05/16/11 08:20:32	59.97705	0	0	0	-653	30457.12	1	0	1	0.000	0.000

05/16/11 08:20:34	59.97705	0	0	0	-653	30446.98	1	0	1	0.000	0.000
05/16/11 08:20:36	59.97803	0	0	0	-653	30446.98	1	0	1	0.001	0.001
05/16/11 08:20:38	59.97964	0	0	0	-653	30446.98	1	0	1	0.002	0.002
05/16/11 08:20:40	59.9816	0	0	0	-653	30446.98	1	0	1	0.002	0.002
05/16/11 08:20:42	59.98126	0	0	0	-653	30461.02	1	0	1	0.000	0.000
05/16/11 08:20:44	59.97931	0	0	0	-653	30461.02	1	0	1	-0.002	0.002
05/16/11 08:20:46	59.9761	0	0	0	-653	30460.94	1	0	1	-0.003	0.003
05/16/11 08:20:48	59.97543	0	0	0	-653	30460.94	1	0	1	-0.001	0.001
05/16/11 08:20:50	59.97577	0	0	0	-653	30460.94	1	0	1	0.000	0.000
05/16/11 08:20:52	59.97675	0	0	0	-653	30460.94	1	0	1	0.001	0.001
05/16/11 08:20:54	59.97803	0	0	0	-653	30469.23	1	0	1	0.001	0.001
05/16/11 08:20:56	59.979	0	0	0	-653	30469.23	1	0	1	0.001	0.001
05/16/11 08:20:58	59.97964	0	0	0	-653	30469.23	1	0	1	0.001	0.001
05/16/11 08:21:00	59.98062	0	0	0	-653	30469.23	1	0	1	0.001	0.001
05/16/11 08:21:02	59.9819	0	0	0	-653	30481.49	1	0	1	0.001	0.001
05/16/11 08:21:04	59.98224	0	0	0	-653	30481.49	1	0	1	0.000	0.000
05/16/11 08:21:06	59.98254	0	0	0	-653	30480.29	1	0	1	0.000	0.000
05/16/11 08:21:08	59.98288	0	0	0	-653	30480.29	1	0	1	0.000	0.000
05/16/11 08:21:10	59.98254	0	0	0	-653	30480.29	1	0	1	0.000	0.000
05/16/11 08:21:12	59.98254	0	0	0	-653	30480.29	1	0	1	0.000	0.000
05/16/11 08:21:14	59.98288	0	0	0	-653	30473.15	1	0	1	0.000	0.000
05/16/11 08:21:16	59.98611	0	0	0	-653	30473.15	1	0	1	0.003	0.003
05/16/11 08:21:18	59.99387	0	0	0	-653	30473.15	1	0	1	0.008	0.008
05/16/11 08:21:20	60.00226	0	0	0	-653	30473.15	1	1	1	0.008	0.008
05/16/11 08:21:22	60.01099	0	0	0	-653	30470.66	1	1	1	0.009	0.009
05/16/11 08:21:24	60.01712	0	0	0	-653	30470.66	1	1	1	0.006	0.006
05/16/11 08:21:26	60.02069	0	0	0	-653	30470.6	1	1	1	0.004	0.004
05/16/11 08:21:28	60.02133	0	0	0	-653	30470.6	1	1	1	0.001	0.001
05/16/11 08:21:30	60.02133	0	0	0	-653	30470.6	1	1	1	0.000	0.000
05/16/11 08:21:32	60.02133	0	0	0	-653	30470.6	1	1	1	0.000	0.000
05/16/11 08:21:34	60.02325	0	0	0	-653	30461.28	1	1	1	0.002	0.002
05/16/11 08:21:36	60.02551	0	0	0	-653	30461.28	1	1	1	0.002	0.002
05/16/11 08:21:38	60.02682	0	0	0	-653	30461.28	1	1	1	0.001	0.001
05/16/11 08:21:40	60.02844	0	0	0	-653	30461.28	1	1	1	0.002	0.002
05/16/11 08:21:42	60.02972	0	0	0	-653	30450.44	1	1	1	0.001	0.001
05/16/11 08:21:44	60.03101	0	0	0	-653	30450.44	1	1	1	0.001	0.001
05/16/11 08:21:46	60.03198	0	0	0	-653	30451.91	1	1	1	0.001	0.001
05/16/11 08:21:48	60.03296	0	0	0	-653	30451.91	1	1	1	0.001	0.001
05/16/11 08:21:50	60.03458	0	0	0	-653	30451.91	1	1	1	0.002	0.002
05/16/11 08:21:52	60.03488	0	0	0	-653	30451.91	1	1	1	0.000	0.000
05/16/11 08:21:54	60.03488	0	0	0	-653	30446.52	1	1	1	0.000	0.000
05/16/11 08:21:56	60.03424	0	0	0	-653	30446.52	1	1	1	-0.001	0.001
05/16/11 08:21:58	60.03458	0	0	0	-653	30446.52	1	1	1	0.000	0.000
05/16/11 08:22:00	60.03458	0	0	0	-653	30446.52	1	1	1	0.000	0.000
05/16/11 08:22:02	60.03555	0	0	0	-653	30452.43	1	1	1	0.001	0.001
05/16/11 08:22:04	60.03586	0	0	0	-653	30452.43	1	1	1	0.000	0.000
05/16/11 08:22:06	60.03683	0	0	0	-653	30452.43	1	1	1	0.001	0.001
05/16/11 08:22:08	60.03748	0	0	0	-653	30452.43	1	1	1	0.001	0.001
05/16/11 08:22:10	60.03748	0	0	0	-653	30452.43	1	1	1	0.000	0.000

05/16/11 08:22:12	60.03717	0	0	0	-653	30452.43	1	1	1	0.000	0.000
05/16/11 08:22:14	60.03781	0	0	0	-653	30473.21	1	1	1	0.001	0.001
05/16/11 08:22:16	60.03781	0	0	0	-653	30473.21	1	1	1	0.000	0.000
05/16/11 08:22:18	60.03748	0	0	0	-653	30473.21	1	1	1	0.000	0.000
05/16/11 08:22:20	60.0365	0	0	0	-653	30473.21	1	1	1	-0.001	0.001
05/16/11 08:22:22	60.03683	0	0	0	-653	30476.61	1	1	1	0.000	0.000
05/16/11 08:22:24	60.03748	0	0	0	-653	30476.61	1	1	1	0.001	0.001
05/16/11 08:22:26	60.03748	0	0	0	-653	30476.55	1	1	1	0.000	0.000
05/16/11 08:22:28	60.03812	0	0	0	-653	30476.55	1	1	1	0.001	0.001
05/16/11 08:22:30	60.03876	0	0	0	-653	30476.55	1	1	1	0.001	0.001
05/16/11 08:22:32	60.04007	0	0	0	-653	30476.55	1	1	1	0.001	0.001
05/16/11 08:22:34	60.04169	0	0	0	-653	30473.8	1	1	1	0.002	0.002
05/16/11 08:22:36	60.04361	0	0	0	-653	30473.8	1	1	1	0.002	0.002
05/16/11 08:22:38	60.04523	0	0	0	-653	30473.8	1	1	1	0.002	0.002
05/16/11 08:22:40	60.04492	0	0	0	-653	30473.8	1	1	1	0.000	0.000
05/16/11 08:22:42	60.04459	0	0	0	-653	30471	1	1	1	0.000	0.000
05/16/11 08:22:44	60.04395	0	0	0	-653	30471	1	1	1	-0.001	0.001
05/16/11 08:22:46	60.04199	0	0	0	-653	30471.97	1	1	1	-0.002	0.002
05/16/11 08:22:48	60.03717	0	0	0	-653	30471.97	1	1	1	-0.005	0.005
05/16/11 08:22:50	60.03296	0	0	0	-653	30471.97	1	1	1	-0.004	0.004
05/16/11 08:22:52	60.03101	0	0	0	-653	30471.97	1	1	1	-0.002	0.002
05/16/11 08:22:54	60.03134	0	0	0	-653	30485.47	1	1	1	0.000	0.000
05/16/11 08:22:56	60.03168	0	0	0	-653	30485.47	1	1	1	0.000	0.000
05/16/11 08:22:58	60.03101	0	0	0	-653	30485.47	1	1	1	-0.001	0.001
05/16/11 08:23:00	60.03101	0	0	0	-653	30485.47	1	1	1	0.000	0.000
05/16/11 08:23:02	60.03232	0	0	0	-653	30505.49	1	1	1	0.001	0.001
05/16/11 08:23:04	60.03326	0	0	0	-653	30505.49	1	1	1	0.001	0.001
05/16/11 08:23:06	60.03326	0	0	0	-653	30505.26	1	1	1	0.000	0.000
05/16/11 08:23:08	60.03394	0	0	0	-653	30505.26	1	1	1	0.001	0.001
05/16/11 08:23:10	60.03296	0	0	0	-653	30505.26	1	1	1	-0.001	0.001
05/16/11 08:23:12	60.03232	0	0	0	-653	30505.26	1	1	1	-0.001	0.001
05/16/11 08:23:14	60.03168	0	0	0	-653	30515.6	1	1	1	-0.001	0.001
05/16/11 08:23:16	60.03168	0	0	0	-653	30515.6	1	1	1	0.000	0.000
05/16/11 08:23:18	60.03232	0	0	0	-653	30515.6	1	1	1	0.001	0.001
05/16/11 08:23:20	60.03232	0	0	0	-653	30515.6	1	1	1	0.000	0.000
05/16/11 08:23:22	60.03168	0	0	0	-653	30505.28	1	1	1	-0.001	0.001
05/16/11 08:23:24	60.03168	0	0	0	-653	30505.28	1	1	1	0.000	0.000
05/16/11 08:23:26	60.03134	0	0	0	-653	30506.12	1	1	1	0.000	0.000
05/16/11 08:23:28	60.03101	0	0	0	-653	30506.12	1	1	1	0.000	0.000
05/16/11 08:23:30	60.03036	0	0	0	-653	30506.12	1	1	1	-0.001	0.001
05/16/11 08:23:32	60.03036	0	0	0	-653	30506.12	1	1	1	0.000	0.000
05/16/11 08:23:34	60.02972	0	0	0	-653	30493.68	1	1	1	-0.001	0.001
05/16/11 08:23:36	60.02875	0	0	0	-653	30493.68	1	1	1	-0.001	0.001
05/16/11 08:23:38	60.03006	0	0	0	-653	30493.68	1	1	1	0.001	0.001
05/16/11 08:23:40	60.03198	0	0	0	-653	30493.68	1	1	1	0.002	0.002
05/16/11 08:23:42	60.03326	0	0	0	-653	30529.28	1	1	1	0.001	0.001
05/16/11 08:23:44	60.03458	0	0	0	-653	30529.28	1	1	1	0.001	0.001
05/16/11 08:23:46	60.03488	0	0	0	-653	30529.08	1	1	1	0.000	0.000
05/16/11 08:23:48	60.0336	0	0	0	-653	30529.08	1	1	1	-0.001	0.001

05/16/11 08:23:50	60.03326	0	0	0	-653	30529.08	1	1	1	0.000	0.000
05/16/11 08:23:52	60.03232	0	0	0	-653	30529.08	1	1	1	-0.001	0.001
05/16/11 08:23:54	60.03134	0	0	0	-653	30529.52	1	1	1	-0.001	0.001
05/16/11 08:23:56	60.03168	0	0	0	-653	30529.52	1	1	1	0.000	0.000
05/16/11 08:23:58	60.03326	0	0	0	-653	30529.52	1	1	1	0.002	0.002
05/16/11 08:24:00	60.03458	0	0	0	-653	30529.52	1	1	1	0.001	0.001
05/16/11 08:24:02	60.03586	0	0	0	-653	30535.57	1	1	1	0.001	0.001
05/16/11 08:24:04	60.0365	0	0	0	-653	30535.57	1	1	1	0.001	0.001
05/16/11 08:24:06	60.03748	0	0	0	-653	30533.89	1	1	1	0.001	0.001
05/16/11 08:24:08	60.03683	0	0	0	-653	30533.89	1	1	1	-0.001	0.001
05/16/11 08:24:10	60.03619	0	0	0	-653	30533.89	1	1	1	-0.001	0.001
05/16/11 08:24:12	60.03522	0	0	0	-653	30533.89	1	1	1	-0.001	0.001
05/16/11 08:24:14	60.03424	0	0	0	-653	30521.82	1	1	1	-0.001	0.001
05/16/11 08:24:16	60.03296	0	0	0	-653	30521.82	1	1	1	-0.001	0.001
05/16/11 08:24:18	60.03198	0	0	0	-653	30521.82	1	1	1	-0.001	0.001
05/16/11 08:24:20	60.03134	0	0	0	-653	30521.82	1	1	1	-0.001	0.001
05/16/11 08:24:22	60.03168	0	0	0	-653	30533.64	1	1	1	0.000	0.000
05/16/11 08:24:24	60.03134	0	0	0	-653	30533.64	1	1	1	0.000	0.000
05/16/11 08:24:26	60.03101	0	0	0	-653	30532.32	1	1	1	0.000	0.000
05/16/11 08:24:28	60.03036	0	0	0	-653	30532.32	1	1	1	-0.001	0.001
05/16/11 08:24:30	60.02972	0	0	0	-653	30532.32	1	1	1	-0.001	0.001
05/16/11 08:24:32	60.03006	0	0	0	-653	30532.32	1	1	1	0.000	0.000
05/16/11 08:24:34	60.0307	0	0	0	-653	30551.2	1	1	1	0.001	0.001
05/16/11 08:24:36	60.03168	0	0	0	-653	30551.2	1	1	1	0.001	0.001
05/16/11 08:24:38	60.0336	0	0	0	-653	30551.2	1	1	1	0.002	0.002
05/16/11 08:24:40	60.03488	0	0	0	-653	30551.2	1	1	1	0.001	0.001
05/16/11 08:24:42	60.03522	0	0	0	-653	30548.06	1	1	1	0.000	0.000
05/16/11 08:24:44	60.03586	0	0	0	-653	30548.06	1	1	1	0.001	0.001
05/16/11 08:24:46	60.03717	0	0	0	-653	30543.69	1	1	1	0.001	0.001
05/16/11 08:24:48	60.03812	0	0	0	-653	30543.69	1	1	1	0.001	0.001
05/16/11 08:24:50	60.03717	0	0	0	-653	30543.69	1	1	1	-0.001	0.001
05/16/11 08:24:52	60.03748	0	0	0	-653	30543.69	1	1	1	0.000	0.000
05/16/11 08:24:54	60.03845	0	0	0	-653	30546.32	1	1	1	0.001	0.001
05/16/11 08:24:56	60.03876	0	0	0	-653	30546.32	1	1	1	0.000	0.000
05/16/11 08:24:58	60.03781	0	0	0	-653	30546.32	1	1	1	-0.001	0.001
05/16/11 08:25:00	60.03619	0	0	0	-653	30546.32	1	1	1	-0.002	0.002
05/16/11 08:25:02	60.03488	0	0	0	-653	30546.28	1	1	1	-0.001	0.001
05/16/11 08:25:04	60.03394	0	0	0	-653	30546.28	1	1	1	-0.001	0.001
05/16/11 08:25:06	60.0336	0	0	0	-653	30546.38	1	1	1	0.000	0.000
05/16/11 08:25:08	60.0336	0	0	0	-653	30546.38	1	1	1	0.000	0.000
05/16/11 08:25:10	60.03458	0	0	0	-653	30546.38	1	1	1	0.001	0.001
05/16/11 08:25:12	60.0365	0	0	0	-653	30546.38	1	1	1	0.002	0.002
05/16/11 08:25:14	60.03748	0	0	0	-653	30556.84	1	1	1	0.001	0.001
05/16/11 08:25:16	60.03781	0	0	0	-653	30556.84	1	1	1	0.000	0.000
05/16/11 08:25:18	60.03748	0	0	0	-653	30556.84	1	1	1	0.000	0.000
05/16/11 08:25:20	60.0365	0	0	0	-653	30556.84	1	1	1	-0.001	0.001
05/16/11 08:25:22	60.03488	0	0	0	-653	30557.42	1	1	1	-0.002	0.002
05/16/11 08:25:24	60.0336	0	0	0	-653	30557.42	1	1	1	-0.001	0.001
05/16/11 08:25:26	60.03232	0	0	0	-653	30557.43	1	1	1	-0.001	0.001

05/16/11 08:25:28	60.03134	0	0	0	-653	30557.43	1	1	1	-0.001	0.001
05/16/11 08:25:30	60.03101	0	0	0	-653	30557.43	1	1	1	0.000	0.000
05/16/11 08:25:32	60.03101	0	0	0	-653	30557.43	1	1	1	0.000	0.000
05/16/11 08:25:34	60.0307	0	0	0	-653	30566.39	1	1	1	0.000	0.000
05/16/11 08:25:36	60.02972	0	0	0	-653	30566.39	1	1	1	-0.001	0.001
05/16/11 08:25:38	60.02908	0	0	0	-653	30566.39	1	1	1	-0.001	0.001
05/16/11 08:25:40	60.02811	0	0	0	-653	30566.39	1	1	1	-0.001	0.001
05/16/11 08:25:42	60.02649	0	0	0	-653	30567.26	1	1	1	-0.002	0.002
05/16/11 08:25:44	60.02521	0	0	0	-653	30567.26	1	1	1	-0.001	0.001
05/16/11 08:25:46	60.02359	0	0	0	-653	30562.43	1	1	1	-0.002	0.002
05/16/11 08:25:48	60.02133	0	0	0	-653	30562.43	1	1	1	-0.002	0.002
05/16/11 08:25:50	60.02002	0	0	0	-653	30562.43	1	1	1	-0.001	0.001
05/16/11 08:25:52	60.02002	0	0	0	-653	30562.43	1	1	1	0.000	0.000
05/16/11 08:25:54	60.02069	0	0	0	-653	30573.32	1	1	1	0.001	0.001
05/16/11 08:25:56	60.02133	0	0	0	-653	30573.32	1	1	1	0.001	0.001
05/16/11 08:25:58	60.021	0	0	0	-653	30573.32	1	1	1	0.000	0.000
05/16/11 08:26:00	60.02036	0	0	0	-653	30573.32	1	1	1	-0.001	0.001
05/16/11 08:26:02	60.01938	0	0	0	-653	30567	1	1	1	-0.001	0.001
05/16/11 08:26:04	60.01938	0	0	0	-653	30567	1	1	1	0.000	0.000
05/16/11 08:26:06	60.01938	0	0	0	-653	30567.04	1	1	1	0.000	0.000
05/16/11 08:26:08	60.01971	0	0	0	-653	30567.04	1	1	1	0.000	0.000
05/16/11 08:26:10	60.01971	0	0	0	-653	30567.04	1	1	1	0.000	0.000
05/16/11 08:26:12	60.01907	0	0	0	-653	30567.04	1	1	1	-0.001	0.001
05/16/11 08:26:14	60.01938	0	0	0	-653	30556.49	1	1	1	0.000	0.000
05/16/11 08:26:16	60.02036	0	0	0	-653	30556.49	1	1	1	0.001	0.001
05/16/11 08:26:18	60.02036	0	0	0	-653	30556.49	1	1	1	0.000	0.000
05/16/11 08:26:20	60.01907	0	0	0	-653	30556.49	1	1	1	-0.001	0.001
05/16/11 08:26:22	60.01712	0	0	0	-653	30530.19	1	1	1	-0.002	0.002
05/16/11 08:26:24	60.01584	0	0	0	-653	30530.19	1	1	1	-0.001	0.001
05/16/11 08:26:26	60.0152	0	0	0	-653	30530.04	1	1	1	-0.001	0.001
05/16/11 08:26:28	60.0155	0	0	0	-653	30530.04	1	1	1	0.000	0.000
05/16/11 08:26:30	60.01614	0	0	0	-653	30530.04	1	1	1	0.001	0.001
05/16/11 08:26:32	60.01746	0	0	0	-653	30530.04	1	1	1	0.001	0.001
05/16/11 08:26:34	60.0181	0	0	0	-653	30542.27	1	1	1	0.001	0.001
05/16/11 08:26:36	60.01746	0	0	0	-653	30542.27	1	1	1	-0.001	0.001
05/16/11 08:26:38	60.01712	0	0	0	-653	30542.27	1	1	1	0.000	0.000
05/16/11 08:26:40	60.01648	0	0	0	-653	30542.27	1	1	1	-0.001	0.001
05/16/11 08:26:42	60.01486	0	0	0	-653	30559.64	1	1	1	-0.002	0.002
05/16/11 08:26:44	60.01227	0	0	0	-653	30559.64	1	1	1	-0.003	0.003
05/16/11 08:26:46	60.01035	0	0	0	-653	30559.67	1	1	1	-0.002	0.002
05/16/11 08:26:48	60.00937	0	0	0	-653	30559.67	1	1	1	-0.001	0.001
05/16/11 08:26:50	60.00903	0	0	0	-653	30559.67	1	1	1	0.000	0.000
05/16/11 08:26:52	60.00937	0	0	0	-653	30559.67	1	1	1	0.000	0.000
05/16/11 08:26:54	60.01065	0	0	0	-653	30552.02	1	1	1	0.001	0.001
05/16/11 08:26:56	60.01163	0	0	0	-653	30552.02	1	1	1	0.001	0.001
05/16/11 08:26:58	60.01227	0	0	0	-653	30552.02	1	1	1	0.001	0.001
05/16/11 08:27:00	60.01163	0	0	0	-653	30552.02	1	1	1	-0.001	0.001
05/16/11 08:27:02	60.00873	0	0	0	-653	30556.78	1	1	1	-0.003	0.003
05/16/11 08:27:04	60.00647	0	0	0	-653	30556.78	1	1	1	-0.002	0.002

05/16/11 08:27:06	60.00583	0	0	0	-653	30550.7	1	1	1	-0.001	0.001
05/16/11 08:27:08	60.00613	0	0	0	-653	30550.7	1	1	1	0.000	0.000
05/16/11 08:27:10	60.00613	0	0	0	-653	30550.7	1	1	1	0.000	0.000
05/16/11 08:27:12	60.00711	0	0	0	-653	30550.7	1	1	1	0.001	0.001
05/16/11 08:27:14	60.00903	0	0	0	-653	30559.76	1	1	1	0.002	0.002
05/16/11 08:27:16	60.01099	0	0	0	-653	30559.76	1	1	1	0.002	0.002
05/16/11 08:27:18	60.01099	0	0	0	-653	30559.76	1	1	1	0.000	0.000
05/16/11 08:27:20	60.01035	0	0	0	-653	30559.76	1	1	1	-0.001	0.001
05/16/11 08:27:22	60.0097	0	0	0	-653	30563.61	1	1	1	-0.001	0.001
05/16/11 08:27:24	60.00873	0	0	0	-653	30563.61	1	1	1	-0.001	0.001
05/16/11 08:27:26	60.00711	0	0	0	-653	30556.57	1	1	1	-0.002	0.002
05/16/11 08:27:28	60.00613	0	0	0	-653	30556.57	1	1	1	-0.001	0.001
05/16/11 08:27:30	60.00583	0	0	0	-653	30556.57	1	1	1	0.000	0.000
05/16/11 08:27:32	60.00711	0	0	0	-653	30556.57	1	1	1	0.001	0.001
05/16/11 08:27:34	60.00809	0	0	0	-653	30556.7	1	1	1	0.001	0.001
05/16/11 08:27:36	60.00839	0	0	0	-653	30556.7	1	1	1	0.000	0.000
05/16/11 08:27:38	60.00809	0	0	0	-653	30556.7	1	1	1	0.000	0.000
05/16/11 08:27:40	60.00711	0	0	0	-653	30556.7	1	1	1	-0.001	0.001
05/16/11 08:27:42	60.00677	0	0	0	-653	30544.52	1	1	1	0.000	0.000
05/16/11 08:27:44	60.00775	0	0	0	-653	30544.52	1	1	1	0.001	0.001
05/16/11 08:27:46	60.00711	0	0	0	-653	30543.34	1	1	1	-0.001	0.001
05/16/11 08:27:48	60.00647	0	0	0	-653	30543.34	1	1	1	-0.001	0.001
05/16/11 08:27:50	60.00388	0	0	0	-653	30543.34	1	1	1	-0.003	0.003
05/16/11 08:27:52	60.00128	0	0	0	-653	30543.34	1	1	1	-0.003	0.003
05/16/11 08:27:54	59.99936	0	0	0	-653	30554.42	1	1	1	-0.002	0.002
05/16/11 08:27:56	59.99805	0	0	0	-653	30554.42	1	0	1	-0.001	0.001
05/16/11 08:27:58	59.99741	0	0	0	-653	30554.42	1	0	1	-0.001	0.001
05/16/11 08:28:00	59.9971	0	0	0	-653	30554.42	1	0	1	0.000	0.000
05/16/11 08:28:02	59.99677	0	0	0	-653	30534.33	1	0	1	0.000	0.000
05/16/11 08:28:04	59.9971	0	0	0	-653	30534.33	1	0	1	0.000	0.000
05/16/11 08:28:06	59.99646	0	0	0	-653	30533.84	1	0	1	-0.001	0.001
05/16/11 08:28:08	59.99579	0	0	0	-653	30533.84	1	0	1	-0.001	0.001
05/16/11 08:28:10	59.99451	0	0	0	-653	30533.84	1	0	1	-0.001	0.001
05/16/11 08:28:12	59.99353	0	0	0	-653	30533.84	1	0	1	-0.001	0.001
05/16/11 08:28:14	59.99289	0	0	0	-653	30557.2	1	0	1	-0.001	0.001
05/16/11 08:28:16	59.99191	0	0	0	-653	30557.2	1	0	1	-0.001	0.001
05/16/11 08:28:18	59.98901	0	0	0	-653	30557.2	1	0	1	-0.003	0.003
05/16/11 08:28:20	59.98611	0	0	0	-653	30557.2	1	0	1	-0.003	0.003
05/16/11 08:28:22	59.9845	0	0	0	-653	30560.91	1	0	1	-0.002	0.002
05/16/11 08:28:24	59.98318	0	0	0	-653	30560.91	1	0	1	-0.001	0.001
05/16/11 08:28:26	59.9819	0	0	0	-653	30560.56	1	0	1	-0.001	0.001
05/16/11 08:28:28	59.98093	0	0	0	-653	30560.56	1	0	1	-0.001	0.001
05/16/11 08:28:30	59.97964	0	0	0	-653	30560.56	1	0	1	-0.001	0.001
05/16/11 08:28:32	59.97867	0	0	0	-653	30560.56	1	0	1	-0.001	0.001
05/16/11 08:28:34	59.97964	0	0	0	-653	30560.08	1	0	1	0.001	0.001
05/16/11 08:28:36	59.97998	0	0	0	-653	30560.08	1	0	1	0.000	0.000
05/16/11 08:28:38	59.98062	0	0	0	-653	30560.08	1	0	1	0.001	0.001
05/16/11 08:28:40	59.98029	0	0	0	-653	30560.08	1	0	1	0.000	0.000
05/16/11 08:28:42	59.979	0	0	0	-653	30558.72	1	0	1	-0.001	0.001

05/16/11 08:28:44	59.97739	0	0	0	-653	30558.72	1	0	1	-0.002	0.002
05/16/11 08:28:46	59.97513	0	0	0	-653	30553.46	1	0	1	-0.002	0.002
05/16/11 08:28:48	59.97351	0	0	0	-653	30553.46	1	0	1	-0.002	0.002
05/16/11 08:28:50	59.97253	0	0	0	-653	30553.46	1	0	1	-0.001	0.001
05/16/11 08:28:52	59.97189	0	0	0	-653	30553.46	1	0	1	-0.001	0.001
05/16/11 08:28:54	59.97318	0	0	0	-653	30562.63	1	0	1	0.001	0.001
05/16/11 08:28:56	59.97415	0	0	0	-653	30562.63	1	0	1	0.001	0.001
05/16/11 08:28:58	59.97449	0	0	0	-653	30562.63	1	0	1	0.000	0.000
05/16/11 08:29:00	59.97513	0	0	0	-653	30562.63	1	0	1	0.001	0.001
05/16/11 08:29:02	59.97577	0	0	0	-653	30578.05	1	0	1	0.001	0.001
05/16/11 08:29:04	59.97641	0	0	0	-653	30578.05	1	0	1	0.001	0.001
05/16/11 08:29:06	59.97705	0	0	0	-653	30570.97	1	0	1	0.001	0.001
05/16/11 08:29:08	59.97675	0	0	0	-653	30570.97	1	0	1	0.000	0.000
05/16/11 08:29:10	59.97675	0	0	0	-653	30570.97	1	0	1	0.000	0.000
05/16/11 08:29:12	59.97675	0	0	0	-653	30570.97	1	0	1	0.000	0.000
05/16/11 08:29:14	59.9761	0	0	0	-653	30593.17	1	0	1	-0.001	0.001
05/16/11 08:29:16	59.9761	0	0	0	-653	30593.17	1	0	1	0.000	0.000
05/16/11 08:29:18	59.97641	0	0	0	-653	30593.17	1	0	1	0.000	0.000
05/16/11 08:29:20	59.97705	0	0	0	-653	30593.17	1	0	1	0.001	0.001
05/16/11 08:29:22	59.97803	0	0	0	-653	30575.07	1	0	1	0.001	0.001
05/16/11 08:29:24	59.98029	0	0	0	-653	30575.07	1	0	1	0.002	0.002
05/16/11 08:29:26	59.98318	0	0	0	-653	30575.07	1	0	1	0.003	0.003
05/16/11 08:29:28	59.98547	0	0	0	-653	30575.07	1	0	1	0.002	0.002
05/16/11 08:29:30	59.98709	0	0	0	-653	30575.07	1	0	1	0.002	0.002
05/16/11 08:29:32	59.98965	0	0	0	-653	30575.07	1	0	1	0.003	0.003
05/16/11 08:29:34	59.99225	0	0	0	-653	30575.72	1	0	1	0.003	0.003
05/16/11 08:29:36	59.99484	0	0	0	-653	30575.72	1	0	1	0.003	0.003
05/16/11 08:29:38	59.99646	0	0	0	-653	30575.72	1	0	1	0.002	0.002
05/16/11 08:29:40	59.99774	0	0	0	-653	30575.72	1	0	1	0.001	0.001
05/16/11 08:29:42	59.99966	0	0	0	-653	30583.84	1	1	1	0.002	0.002
05/16/11 08:29:44	60.00034	0	0	0	-653	30583.84	1	1	1	0.001	0.001
05/16/11 08:29:46	60.00128	0	0	0	-653	30586.4	1	1	1	0.001	0.001
05/16/11 08:29:48	60.00195	0	0	0	-653	30586.4	1	1	1	0.001	0.001
05/16/11 08:29:50	60.00226	0	0	0	-653	30586.4	1	1	1	0.000	0.000
05/16/11 08:29:52	60.0029	0	0	0	-653	30586.4	1	1	1	0.001	0.001
05/16/11 08:29:54	60.00354	0	0	0	-653	30589.72	1	1	1	0.001	0.001
05/16/11 08:29:56	60.00421	0	0	0	-653	30589.72	1	1	1	0.001	0.001
05/16/11 08:29:58	60.00452	0	0	0	-653	30589.72	1	1	1	0.000	0.000
05/16/11 08:30:00	60.00388	0	0	0	-653	30589.72	1	1	1	-0.001	0.001
05/16/11 08:30:02	60.00388	0	0	0	-653	30590.3	1	1	1	0.000	0.000
05/16/11 08:30:04	60.00421	0	0	0	-653	30590.3	1	1	1	0.000	0.000
05/16/11 08:30:06	60.00421	0	0	0	-653	30590.22	1	1	1	0.000	0.000
05/16/11 08:30:08	60.00388	0	0	0	-653	30590.22	1	1	1	0.000	0.000
05/16/11 08:30:10	60.00195	0	0	0	-653	30590.22	1	1	1	-0.002	0.002
05/16/11 08:30:12	59.99966	0	0	0	-653	30590.22	1	1	1	-0.002	0.002
05/16/11 08:30:14	59.99387	0	0	0	-653	30600.12	1	0	1	-0.006	0.006
05/16/11 08:30:16	59.99387	0	0	0	-653	30600.12	1	0	1	0.000	0.000
05/16/11 08:30:18	59.98999	0	0	0	-653	30600.12	1	0	1	-0.004	0.004
05/16/11 08:30:20	59.98868	0	0	0	-653	30600.12	1	0	1	-0.001	0.001

05/16/11 08:30:22	59.98709	0	0	0	-653	30603.38	1	0	1	-0.002	0.002
05/16/11 08:30:24	59.98578	0	0	0	-653	30603.38	1	0	1	-0.001	0.001
05/16/11 08:30:26	59.98578	0	0	0	-653	30597.09	1	0	1	0.000	0.000
05/16/11 08:30:28	59.98288	0	0	0	-653	30597.09	1	0	1	-0.003	0.003
05/16/11 08:30:30	59.97964	0	0	0	-653	30597.09	1	0	1	-0.003	0.003
05/16/11 08:30:32	59.97675	0	0	0	-653	30597.09	1	0	1	-0.003	0.003
05/16/11 08:30:34	59.97479	0	0	0	-653	30603.96	1	0	1	-0.002	0.002
05/16/11 08:30:36	59.97479	0	0	0	-653	30603.96	1	0	1	0.000	0.000
05/16/11 08:30:38	59.97641	0	0	0	-653	30603.96	1	0	1	0.002	0.002
05/16/11 08:30:40	59.97641	0	0	0	-653	30603.96	1	0	1	0.000	0.000
05/16/11 08:30:42	59.97543	0	0	0	-653	30607.96	1	0	1	-0.001	0.001
05/16/11 08:30:44	59.97351	0	0	0	-653	30607.96	1	0	1	-0.002	0.002
05/16/11 08:30:46	59.97318	0	0	0	-653	30601.98	1	0	1	0.000	0.000
05/16/11 08:30:48	59.97513	0	0	0	-653	30601.98	1	0	1	0.002	0.002
05/16/11 08:30:50	59.97641	0	0	0	-653	30597.09	1	0	1	0.001	0.001
05/16/11 08:30:52	59.97705	0	0	0	-653	30597.09	1	0	1	0.001	0.001
05/16/11 08:30:54	59.97867	0	0	0	-653	30607.96	1	0	1	0.002	0.002
05/16/11 08:30:56	59.97836	0	0	0	-653	30607.96	1	0	1	0.000	0.000
05/16/11 08:30:58	59.97803	0	0	0	-653	30607.96	1	0	1	0.000	0.000
05/16/11 08:31:00	59.97543	0	0	0	-653	30607.96	1	0	1	-0.003	0.003
05/16/11 08:31:02	59.97415	0	0	0	-653	30607.96	1	0	1	-0.001	0.001
05/16/11 08:31:04	59.97415	0	0	0	-653	30601.98	1	0	1	0.000	0.000
05/16/11 08:31:06	59.97479	0	0	0	-653	30601.98	1	0	1	0.001	0.001
05/16/11 08:31:08	59.97415	0	0	0	-653	30601.98	1	0	1	-0.001	0.001
05/16/11 08:31:10	59.97351	0	0	0	-653	30601.98	1	0	1	-0.001	0.001
05/16/11 08:31:12	59.97351	0	0	0	-653	30601.98	1	0	1	0.000	0.000
05/16/11 08:31:14	59.97543	0	0	0	-653	30632.79	1	0	1	0.002	0.002
05/16/11 08:31:16	59.97769	0	0	0	-653	30632.79	1	0	1	0.002	0.002
05/16/11 08:31:18	59.98062	0	0	0	-653	30632.79	1	0	1	0.003	0.003
05/16/11 08:31:20	59.98514	0	0	0	-653	30632.79	1	0	1	0.005	0.005
05/16/11 08:31:22	59.98773	0	0	0	-653	30632.79	1	0	1	0.003	0.003
05/16/11 08:31:24	59.98965	0	0	0	-653	30633.18	1	0	1	0.002	0.002
05/16/11 08:31:26	59.99097	0	0	0	-653	30633.18	1	0	1	0.001	0.001
05/16/11 08:31:28	59.99225	0	0	0	-653	30633.18	1	0	1	0.001	0.001
05/16/11 08:31:30	59.99323	0	0	0	-653	30633.18	1	0	1	0.001	0.001
05/16/11 08:31:32	59.99612	0	0	0	-653	30633.18	1	0	1	0.003	0.003
05/16/11 08:31:34	60.00034	0	0	0	-653	30620.6	1	1	1	0.004	0.004
05/16/11 08:31:36	60.00452	0	0	0	-653	30620.6	1	1	1	0.004	0.004
05/16/11 08:31:38	60.00809	0	0	0	-653	30620.6	1	1	1	0.004	0.004
05/16/11 08:31:40	60.01099	0	0	0	-653	30620.6	1	1	1	0.003	0.003
05/16/11 08:31:42	60.01389	0	0	0	-653	30620.6	1	1	1	0.003	0.003
05/16/11 08:31:44	60.01776	0	0	0	-653	30620.91	1	1	1	0.004	0.004
05/16/11 08:31:46	60.02069	0	0	0	-653	30620.91	1	1	1	0.003	0.003
05/16/11 08:31:48	60.02164	0	0	0	-653	30620.91	1	1	1	0.001	0.001
05/16/11 08:31:50	60.021	0	0	0	-653	30620.91	1	1	1	-0.001	0.001
05/16/11 08:31:52	60.01907	0	0	0	-653	30620.91	1	1	1	-0.002	0.002
05/16/11 08:31:54	60.0181	0	0	0	-653	30661.87	1	1	1	-0.001	0.001
05/16/11 08:31:56	60.0184	0	0	0	-653	30661.87	1	1	1	0.000	0.000
05/16/11 08:31:58	60.02069	0	0	0	-653	30661.87	1	1	1	0.002	0.002

05/16/11 08:32:00	60.0239	0	0	0	-653	30661.87	1	1	1	0.003	0.003
05/16/11 08:32:02	60.02618	0	0	0	-653	30661.87	1	1	1	0.002	0.002
05/16/11 08:32:04	60.02682	0	0	0	-653	30663.73	1	1	1	0.001	0.001
05/16/11 08:32:06	60.02649	0	0	0	-653	30663.73	1	1	1	0.000	0.000
05/16/11 08:32:08	60.02585	0	0	0	-653	30663.73	1	1	1	-0.001	0.001
05/16/11 08:32:10	60.02359	0	0	0	-653	30663.73	1	1	1	-0.002	0.002
05/16/11 08:32:12	60.02359	0	0	0	-653	30663.73	1	1	1	0.000	0.000
05/16/11 08:32:14	60.02164	0	0	0	-653	30659.84	1	1	1	-0.002	0.002
05/16/11 08:32:16	60.02231	0	0	0	-653	30659.84	1	1	1	0.001	0.001
05/16/11 08:32:18	60.02325	0	0	0	-653	30659.84	1	1	1	0.001	0.001
05/16/11 08:32:20	60.02359	0	0	0	-653	30659.84	1	1	1	0.000	0.000
05/16/11 08:32:22	60.02295	0	0	0	-653	30659.84	1	1	1	-0.001	0.001
05/16/11 08:32:24	60.02133	0	0	0	-653	30653.46	1	1	1	-0.002	0.002
05/16/11 08:32:26	60.021	0	0	0	-653	30653.46	1	1	1	0.000	0.000
05/16/11 08:32:28	60.021	0	0	0	-653	30653.46	1	1	1	0.000	0.000
05/16/11 08:32:30	60.02133	0	0	0	-653	30653.46	1	1	1	0.000	0.000
05/16/11 08:32:32	60.021	0	0	0	-653	30653.46	1	1	1	0.000	0.000
05/16/11 08:32:34	60.02036	0	0	0	-653	30661.6	1	1	1	-0.001	0.001
05/16/11 08:32:36	60.02002	0	0	0	-653	30661.6	1	1	1	0.000	0.000
05/16/11 08:32:38	60.01938	0	0	0	-653	30661.6	1	1	1	-0.001	0.001
05/16/11 08:32:40	60.0184	0	0	0	-653	30661.6	1	1	1	-0.001	0.001
05/16/11 08:32:42	60.01712	0	0	0	-653	30661.6	1	1	1	-0.001	0.001
05/16/11 08:32:44	60.01584	0	0	0	-653	30655.51	1	1	1	-0.001	0.001
05/16/11 08:32:46	60.01486	0	0	0	-653	30655.51	1	1	1	-0.001	0.001
05/16/11 08:32:48	60.01453	0	0	0	-653	30655.51	1	1	1	0.000	0.000
05/16/11 08:32:50	60.01486	0	0	0	-653	30655.51	1	1	1	0.000	0.000
05/16/11 08:32:52	60.01453	0	0	0	-653	30655.51	1	1	1	0.000	0.000
05/16/11 08:32:54	60.01486	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:32:56	60.0152	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:32:58	60.01486	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:33:00	60.0152	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:33:02	60.0152	0	0	0	-653	30648.14	1	1	1	0.000	0.000
05/16/11 08:33:04	60.01648	0	0	0	-653	30648.29	1	1	1	0.001	0.001
05/16/11 08:33:06	60.01614	0	0	0	-653	30648.29	1	1	1	0.000	0.000
05/16/11 08:33:08	60.0152	0	0	0	-653	30648.29	1	1	1	-0.001	0.001
05/16/11 08:33:10	60.01486	0	0	0	-653	30648.29	1	1	1	0.000	0.000
05/16/11 08:33:12	60.01453	0	0	0	-653	30648.29	1	1	1	0.000	0.000
05/16/11 08:33:14	60.01291	0	0	0	-653	30652.04	1	1	1	-0.002	0.002
05/16/11 08:33:16	60.01099	0	0	0	-653	30652.04	1	1	1	-0.002	0.002
05/16/11 08:33:18	60.00775	0	0	0	-653	30652.04	1	1	1	-0.003	0.003
05/16/11 08:33:20	60.00421	0	0	0	-653	30652.04	1	1	1	-0.004	0.004
05/16/11 08:33:22	60.00162	0	0	0	-653	30652.04	1	1	1	-0.003	0.003
05/16/11 08:33:24	60	0	0	0	-653	30651.84	1	1	1	-0.002	0.002
05/16/11 08:33:26	59.99774	0	0	0	-653	30651.84	1	0	1	-0.002	0.002
05/16/11 08:33:28	59.99515	0	0	0	-653	30651.84	1	0	1	-0.003	0.003
05/16/11 08:33:30	59.99255	0	0	0	-653	30651.84	1	0	1	-0.003	0.003
05/16/11 08:33:32	59.9903	0	0	0	-653	30651.84	1	0	1	-0.002	0.002
05/16/11 08:33:34	59.98676	0	0	0	-653	30633.8	1	0	1	-0.004	0.004
05/16/11 08:33:36	59.98352	0	0	0	-653	30633.8	1	0	1	-0.003	0.003

05/16/11 08:33:38	59.98062	0	0	0	-653	30633.8	1	0	1	-0.003	0.003
05/16/11 08:33:40	59.97964	0	0	0	-653	30633.8	1	0	1	-0.001	0.001
05/16/11 08:33:42	59.97867	0	0	0	-653	30633.8	1	0	1	-0.001	0.001
05/16/11 08:33:44	59.97705	0	0	0	-653	30627.71	1	0	1	-0.002	0.002
05/16/11 08:33:46	59.97641	0	0	0	-653	30627.71	1	0	1	-0.001	0.001
05/16/11 08:33:48	59.97675	0	0	0	-653	30627.71	1	0	1	0.000	0.000
05/16/11 08:33:50	59.97641	0	0	0	-653	30627.71	1	0	1	0.000	0.000
05/16/11 08:33:52	59.97577	0	0	0	-653	30627.71	1	0	1	-0.001	0.001
05/16/11 08:33:54	59.97479	0	0	0	-653	30634.13	1	0	1	-0.001	0.001
05/16/11 08:33:56	59.97415	0	0	0	-653	30634.13	1	0	1	-0.001	0.001
05/16/11 08:33:58	59.97287	0	0	0	-653	30634.13	1	0	1	-0.001	0.001
05/16/11 08:34:00	59.97125	0	0	0	-653	30634.13	1	0	1	-0.002	0.002
05/16/11 08:34:02	59.97092	0	0	0	-653	30634.13	1	0	1	0.000	0.000
05/16/11 08:34:04	59.97125	0	0	0	-653	30627.05	1	0	1	0.000	0.000
05/16/11 08:34:06	59.97061	0	0	0	-653	30627.05	1	0	1	-0.001	0.001
05/16/11 08:34:08	59.97092	0	0	0	-653	30627.05	1	0	1	0.000	0.000
05/16/11 08:34:10	59.97125	0	0	0	-653	30627.05	1	0	1	0.000	0.000
05/16/11 08:34:12	59.97156	0	0	0	-653	30627.05	1	0	1	0.000	0.000
05/16/11 08:34:14	59.97253	0	0	0	-653	30662.72	1	0	1	0.001	0.001
05/16/11 08:34:16	59.97449	0	0	0	-653	30662.72	1	0	1	0.002	0.002
05/16/11 08:34:18	59.97577	0	0	0	-653	30662.72	1	0	1	0.001	0.001
05/16/11 08:34:20	59.97641	0	0	0	-653	30662.72	1	0	1	0.001	0.001
05/16/11 08:34:22	59.97641	0	0	0	-653	30662.72	1	0	1	0.000	0.000
05/16/11 08:34:24	59.97513	0	0	0	-653	30656.52	1	0	1	-0.001	0.001
05/16/11 08:34:26	59.9761	0	0	0	-653	30656.52	1	0	1	0.001	0.001
05/16/11 08:34:28	59.979	0	0	0	-653	30656.52	1	0	1	0.003	0.003
05/16/11 08:34:30	59.98126	0	0	0	-653	30656.52	1	0	1	0.002	0.002
05/16/11 08:34:32	59.98224	0	0	0	-653	30656.52	1	0	1	0.001	0.001
05/16/11 08:34:34	59.98254	0	0	0	-653	30642.25	1	0	1	0.000	0.000
05/16/11 08:34:36	59.98254	0	0	0	-653	30642.25	1	0	1	0.000	0.000
05/16/11 08:34:38	59.9816	0	0	0	-653	30642.25	1	0	1	-0.001	0.001
05/16/11 08:34:40	59.98029	0	0	0	-653	30642.25	1	0	1	-0.001	0.001
05/16/11 08:34:42	59.97964	0	0	0	-653	30642.25	1	0	1	-0.001	0.001
05/16/11 08:34:44	59.98062	0	0	0	-653	30642.49	1	0	1	0.001	0.001
05/16/11 08:34:46	59.98093	0	0	0	-653	30642.49	1	0	1	0.000	0.000
05/16/11 08:34:48	59.98029	0	0	0	-653	30642.49	1	0	1	-0.001	0.001
05/16/11 08:34:50	59.97931	0	0	0	-653	30642.49	1	0	1	-0.001	0.001
05/16/11 08:34:52	59.97836	0	0	0	-653	30642.49	1	0	1	-0.001	0.001
05/16/11 08:34:54	59.97803	0	0	0	-653	30645.72	1	0	1	0.000	0.000
05/16/11 08:34:56	59.97803	0	0	0	-653	30645.72	1	0	1	0.000	0.000
05/16/11 08:34:58	59.97867	0	0	0	-653	30645.72	1	0	1	0.001	0.001
05/16/11 08:35:00	59.97964	0	0	0	-653	30645.72	1	0	1	0.001	0.001
05/16/11 08:35:02	59.98062	0	0	0	-653	30645.72	1	0	1	0.001	0.001
05/16/11 08:35:04	59.98126	0	0	0	-653	30648.55	1	0	1	0.001	0.001
05/16/11 08:35:06	59.98224	0	0	0	-653	30648.55	1	0	1	0.001	0.001
05/16/11 08:35:08	59.98416	0	0	0	-653	30648.55	1	0	1	0.002	0.002
05/16/11 08:35:10	59.98547	0	0	0	-653	30648.55	1	0	1	0.001	0.001
05/16/11 08:35:12	59.98578	0	0	0	-653	30648.55	1	0	1	0.000	0.000
05/16/11 08:35:14	59.98578	0	0	0	-653	30661.06	1	0	1	0.000	0.000

05/16/11 08:35:16	59.98676	0	0	0	-653	30661.06	1	0	1	0.001	0.001
05/16/11 08:35:18	59.99063	0	0	0	-653	30661.06	1	0	1	0.004	0.004
05/16/11 08:35:20	59.99417	0	0	0	-653	30661.06	1	0	1	0.004	0.004
05/16/11 08:35:22	59.99805	0	0	0	-653	30661.06	1	0	1	0.004	0.004
05/16/11 08:35:24	59.99966	0	0	0	-653	30661.06	1	1	1	0.002	0.002
05/16/11 08:35:26	60.00226	0	0	0	-653	30661.06	1	1	1	0.003	0.003
05/16/11 08:35:28	60.00195	0	0	0	-653	30661.06	1	1	1	0.000	0.000
05/16/11 08:35:30	60.00098	0	0	0	-653	30661.06	1	1	1	-0.001	0.001
05/16/11 08:35:32	59.99936	0	0	0	-653	30661.06	1	1	1	-0.002	0.002
05/16/11 08:35:34	59.99872	0	0	0	-653	30684.31	1	1	1	-0.001	0.001
05/16/11 08:35:36	59.99774	0	0	0	-653	30684.31	1	0	1	-0.001	0.001
05/16/11 08:35:38	59.99741	0	0	0	-653	30684.31	1	0	1	0.000	0.000
05/16/11 08:35:40	59.99741	0	0	0	-653	30684.31	1	0	1	0.000	0.000
05/16/11 08:35:42	59.99838	0	0	0	-653	30684.31	1	0	1	0.001	0.001
05/16/11 08:35:44	59.99966	0	0	0	-653	30686.83	1	1	1	0.001	0.001
05/16/11 08:35:46	60.00064	0	0	0	-653	30686.83	1	1	1	0.001	0.001
05/16/11 08:35:48	60.00098	0	0	0	-653	30686.83	1	1	1	0.000	0.000
05/16/11 08:35:50	60.00064	0	0	0	-653	30686.83	1	1	1	0.000	0.000
05/16/11 08:35:52	60	0	0	0	-653	30686.83	1	1	1	-0.001	0.001
05/16/11 08:35:54	59.99936	0	0	0	-653	30678.05	1	1	1	-0.001	0.001
05/16/11 08:35:56	59.99741	0	0	0	-653	30678.05	1	0	1	-0.002	0.002
05/16/11 08:35:58	59.99484	0	0	0		30678.05	1	0	1	-0.003	0.003
05/16/11 08:36:00	59.99289	0	0	0		30678.05	1	0	1	-0.002	0.002
05/16/11 08:36:02	59.99097	0	0	0		30678.05	1	0	1	-0.002	0.002
05/16/11 08:36:04	59.98965	0	0	0		30679.19	1	0	1	-0.001	0.001
05/16/11 08:36:06	59.98804	0	0	0		30679.19	1	0	1	-0.002	0.002
05/16/11 08:36:08	59.98773	0	0	0		30679.19	1	0	1	0.000	0.000
05/16/11 08:36:10	59.98804	0	0	0		30679.19	1	0	1	0.000	0.000
05/16/11 08:36:12	59.98901	0	0	0		30679.19	1	0	1	0.001	0.001
05/16/11 08:36:14	59.99063	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:16	59.99255	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:18	59.99484	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:20	59.99677	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:22	59.99838	0	0	0		30684.85	1	0	1	0.002	0.002
05/16/11 08:36:24	59.99872	0	0	0		30684.99	1	1	1	0.000	0.000
05/16/11 08:36:26	59.99872	0	0	0		30684.99	1	1	1	0.000	0.000
05/16/11 08:36:28	59.99936	0	0	0		30684.99	1	1	1	0.001	0.001
05/16/11 08:36:30	60.00195	0	0	0		30684.99	1	1	1	0.003	0.003
05/16/11 08:36:32	60.00485	0	0	0		30684.99	1	1	1	0.003	0.003
05/16/11 08:36:34	60.00809	0	0	0		30687.29	1	1	1	0.003	0.003
05/16/11 08:36:36	60.01099	0	0	0		30687.29	1	1	1	0.003	0.003
05/16/11 08:36:38	60.01324	0	0	0		30687.29	1	1	1	0.002	0.002
05/16/11 08:36:40	60.01422	0	0	0		30687.29	1	1	1	0.001	0.001
05/16/11 08:36:42	60.01486	0	0	0		30687.29	1	1	1	0.001	0.001
05/16/11 08:36:44	60.01453	0	0	0		30687.59	1	1	1	0.000	0.000
05/16/11 08:36:46	60.01227	0	0	0		30687.59	1	1	1	-0.002	0.002
05/16/11 08:36:48	60.01099	0	0	0		30687.59	1	1	1	-0.001	0.001
05/16/11 08:36:50	60.01099	0	0	0		30687.59	1	1	1	0.000	0.000
05/16/11 08:36:52	60.01227	0	0	0		30687.59	1	1	1	0.001	0.001

05/16/11 08:36:54	60.01227	0	0	0	30726.76	1	1	1	0.000	0.000
05/16/11 08:36:56	60.01163	0	0	0	30726.76	1	1	1	-0.001	0.001
05/16/11 08:36:58	60.01132	0	0	0	30726.76	1	1	1	0.000	0.000
05/16/11 08:37:00	60.01132	0	0	0	30726.76	1	1	1	0.000	0.000
05/16/11 08:37:02	60.01065	0	0	0	30726.76	1	1	1	-0.001	0.001
05/16/11 08:37:04	60.00903	0	0	0	30726.82	1	1	1	-0.002	0.002
05/16/11 08:37:06	60.00839	0	0	0	30726.82	1	1	1	-0.001	0.001
05/16/11 08:37:08	60.00809	0	0	0	30726.82	1	1	1	0.000	0.000
05/16/11 08:37:10	60.00809	0	0	0	30726.82	1	1	1	0.000	0.000
05/16/11 08:37:12	60.00937	0	0	0	30726.82	1	1	1	0.001	0.001
05/16/11 08:37:14	60.01099	0	0	0	30720.93	1	1	1	0.002	0.002
05/16/11 08:37:16	60.01227	0	0	0	30720.93	1	1	1	0.001	0.001
05/16/11 08:37:18	60.01291	0	0	0	30720.93	1	1	1	0.001	0.001
05/16/11 08:37:20	60.0126	0	0	0	30720.93	1	1	1	0.000	0.000
05/16/11 08:37:22	60.01132	0	0	0	30720.93	1	1	1	-0.001	0.001
05/16/11 08:37:24	60.0097	0	0	0	30720.53	1	1	1	-0.002	0.002
05/16/11 08:37:26	60.00613	0	0	0	30720.53	1	1	1	-0.004	0.004
05/16/11 08:37:28	60.00259	0	0	0	30720.53	1	1	1	-0.004	0.004
05/16/11 08:37:30	59.99936	0	0	0	30720.53	1	1	1	-0.003	0.003
05/16/11 08:37:32	59.99902	0	0	0	30720.53	1	1	1	0.000	0.000
05/16/11 08:37:34	60.00034	0	0	0	30720.62	1	1	1	0.001	0.001
05/16/11 08:37:36	60.00064	0	0	0	30720.62	1	1	1	0.000	0.000
05/16/11 08:37:38	59.99936	0	0	0	30720.62	1	1	1	-0.001	0.001
05/16/11 08:37:40	59.99741	0	0	0	30720.62	1	0	1	-0.002	0.002
05/16/11 08:37:42	59.99579	0	0	0	30720.62	1	0	1	-0.002	0.002
05/16/11 08:37:44	59.99387	0	0	0	30721.15	1	0	1	-0.002	0.002
05/16/11 08:37:46	59.99255	0	0	0	30721.15	1	0	1	-0.001	0.001
05/16/11 08:37:48	59.99191	0	0	0	30721.15	1	0	1	-0.001	0.001
05/16/11 08:37:50	59.99255	0	0	0	30721.15	1	0	1	0.001	0.001
05/16/11 08:37:52	59.99548	0	0	0	30721.15	1	0	1	0.003	0.003
05/16/11 08:37:54	60	0	0	0	30726.87	1	1	1	0.005	0.005
05/16/11 08:37:56	60.00323	0	0	0	30726.87	1	1	1	0.003	0.003
05/16/11 08:37:58	60.00516	0	0	0	30726.87	1	1	1	0.002	0.002
05/16/11 08:38:00	60.00485	0	0	0	30726.87	1	1	1	0.000	0.000
05/16/11 08:38:02	60.00354	0	0	0	30726.87	1	1	1	-0.001	0.001
05/16/11 08:38:04	60.00226	0	0	0	30734.84	1	1	1	-0.001	0.001
05/16/11 08:38:06	60.00098	0	0	0	30734.84	1	1	1	-0.001	0.001
05/16/11 08:38:08	60	0	0	0	30734.84	1	1	1	-0.001	0.001
05/16/11 08:38:10	59.99966	0	0	0	30734.84	1	1	1	0.000	0.000
05/16/11 08:38:12	59.99966	0	0	0	30734.84	1	1	1	0.000	0.000
05/16/11 08:38:14	59.99774	0	0	0	30757.45	1	0	1	-0.002	0.002
05/16/11 08:38:16	59.9971	0	0	0	30757.45	1	0	1	-0.001	0.001
05/16/11 08:38:18	59.99741	0	0	0	30757.45	1	0	1	0.000	0.000
05/16/11 08:38:20	59.99805	0	0	0	30757.45	1	0	1	0.001	0.001
05/16/11 08:38:22	59.99872	0	0	0	30757.45	1	1	1	0.001	0.001
05/16/11 08:38:24	59.99936	0	0	0	30757.92	1	1	1	0.001	0.001
05/16/11 08:38:26	60	0	0	0	30757.92	1	1	1	0.001	0.001
05/16/11 08:38:28	60.00162	0	0	0	30757.92	1	1	1	0.002	0.002
05/16/11 08:38:30	60.00323	0	0	0	30757.92	1	1	1	0.002	0.002

05/16/11 08:38:32	60.00388	0	0	0	30757.92	1	1	1	0.001	0.001
05/16/11 08:38:34	60.00485	0	0	0	30752.27	1	1	1	0.001	0.001
05/16/11 08:38:36	60.00549	0	0	0	30752.27	1	1	1	0.001	0.001
05/16/11 08:38:38	60.00613	0	0	0	30752.27	1	1	1	0.001	0.001
05/16/11 08:38:40	60.00647	0	0	0	30752.27	1	1	1	0.000	0.000
05/16/11 08:38:42	60.00677	0	0	0	30752.27	1	1	1	0.000	0.000
05/16/11 08:38:44	60.00677	0	0	0	30752.33	1	1	1	0.000	0.000
05/16/11 08:38:46	60.00613	0	0	0	30752.33	1	1	1	-0.001	0.001
05/16/11 08:38:48	60.00549	0	0	0	30752.33	1	1	1	-0.001	0.001
05/16/11 08:38:50	60.00485	0	0	0	30752.33	1	1	1	-0.001	0.001
05/16/11 08:38:52	60.00485	0	0	0	30752.33	1	1	1	0.000	0.000
05/16/11 08:38:54	60.00613	0	0	0	30755.63	1	1	1	0.001	0.001
05/16/11 08:38:56	60.01001	0	0	0	30755.63	1	1	1	0.004	0.004
05/16/11 08:38:58	60.01324	0	0	0	30755.63	1	1	1	0.003	0.003
05/16/11 08:39:00	60.01614	0	0	0	30755.63	1	1	1	0.003	0.003
05/16/11 08:39:02	60.0184	0	0	0	30755.63	1	1	1	0.002	0.002
05/16/11 08:39:04	60.01971	0	0	0	30755.66	1	1	1	0.001	0.001
05/16/11 08:39:06	60.021	0	0	0	30755.66	1	1	1	0.001	0.001
05/16/11 08:39:08	60.02133	0	0	0	30755.66	1	1	1	0.000	0.000
05/16/11 08:39:10	60.02197	0	0	0	30755.66	1	1	1	0.001	0.001
05/16/11 08:39:12	60.02359	0	0	0	30755.66	1	1	1	0.002	0.002
05/16/11 08:39:14	60.02682	0	0	0	30784.89	1	1	1	0.003	0.003
05/16/11 08:39:16	60.0307	0	0	0	30784.89	1	1	1	0.004	0.004
05/16/11 08:39:18	60.0336	0	0	0	30784.89	1	1	1	0.003	0.003
05/16/11 08:39:20	60.03424	0	0	0	30784.89	1	1	1	0.001	0.001
05/16/11 08:39:22	60.03326	0	0	0	30784.89	1	1	1	-0.001	0.001
05/16/11 08:39:24	60.0307	0	0	0	30786.98	1	1	1	-0.003	0.003
05/16/11 08:39:26	60.02875	0	0	0	30786.98	1	1	1	-0.002	0.002
05/16/11 08:39:28	60.02875	0	0	0	30786.98	1	1	1	0.000	0.000
05/16/11 08:39:30	60.02939	0	0	0	30786.98	1	1	1	0.001	0.001
05/16/11 08:39:32	60.02908	0	0	0	30786.98	1	1	1	0.000	0.000
05/16/11 08:39:34	60.02844	0	0	0	30796.28	1	1	1	-0.001	0.001
05/16/11 08:39:36	60.02777	0	0	0	30796.28	1	1	1	-0.001	0.001
05/16/11 08:39:38	60.02811	0	0	0	30796.28	1	1	1	0.000	0.000
05/16/11 08:39:40	60.02777	0	0	0	30796.28	1	1	1	0.000	0.000
05/16/11 08:39:42	60.02777	0	0	0	30796.28	1	1	1	0.000	0.000
05/16/11 08:39:44	60.02777	0	0	0	30792.94	1	1	1	0.000	0.000
05/16/11 08:39:46	60.02747	0	0	0	30792.94	1	1	1	0.000	0.000
05/16/11 08:39:48	60.02713	0	0	0	30792.94	1	1	1	0.000	0.000
05/16/11 08:39:50	60.02618	0	0	0	30792.94	1	1	1	-0.001	0.001
05/16/11 08:39:52	60.02521	0	0	0	30792.94	1	1	1	-0.001	0.001
05/16/11 08:39:54	60.02457	0	0	0	30803.58	1	1	1	-0.001	0.001
05/16/11 08:39:56	60.02487	0	0	0	30803.58	1	1	1	0.000	0.000
05/16/11 08:39:58	60.02551	0	0	0	30803.58	1	1	1	0.001	0.001
05/16/11 08:40:00	60.02618	0	0	0	30803.58	1	1	1	0.001	0.001

Balancing Authority Name: MyBA

MyBA_110516_0806_FRS_Form2.9.xlsm

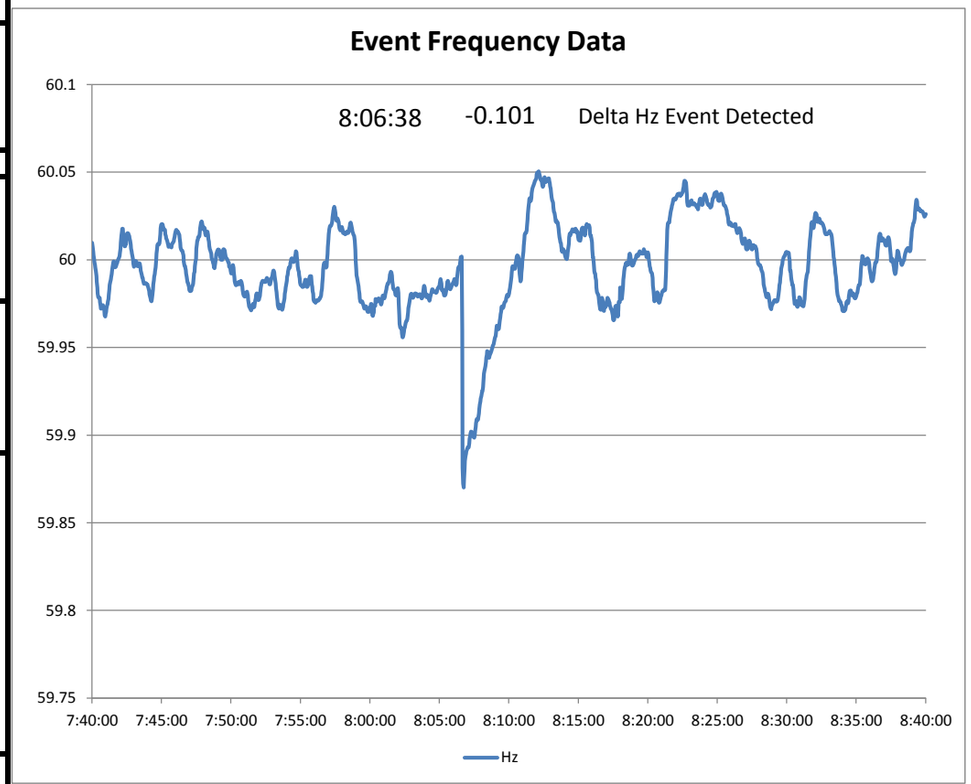
Interconnection Prevailing UFLS First Step Relay trip point 59.300 Hz

Interconnection High Relay trip point 60.700 Hz

Note: See "Instruction" tab for more detailed instructions.

	Auto	**Event Detection**
8:06:38	1245	Manually selected row number of the Event Starting Time.
8:10:30	1442	Manually selected row number of the Event Ending Time.

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



11/05/16 Date yymmdd

8:06 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_110516_0806_FRS_Form2.9.xlsm

Auto
Manual

Date:	Monday, May 16, 2011		Balancing Authority	MyBA		A Point	8:06:36
Time of T(0)	8:06:38		Grid Nominal Frequency	60.000	Hz	FPointA	60.00195313
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30					A Value	59.99862671
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999	Hz	Droop Setting	5.00%	3.00000 Hz	C Value	59.87011337
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897	Hz	Deadband Setting	0.000	Hz	Delta FC	
Pre to Post Perturbation Delta Frequency Actual	-0.101	Hz	Hz Span	3.00000	Hz		
Value A Pre-Perturbation Average Contingent MW [T(-2) to T(-16)]	471.09	MW					
Value B Post-Perturbation Average Contingent MW [T(+20 to T(+52)]	0.00	MW					
Pre to Post Perturbation Contingent Delta MW Actual	-471.09	MW					
Initial Performance Ramp Magnitude Adjustment	-0.06	MW					
EPFR Pre-Perturbation Average	8.97	MW					
EPFR Post-Perturbation Average	671.54	MW					
EPFR Delta	662.57	MW	TC (frequency response filter constant)	0.350	Time Constant for delayed delivery of PFR during Sustained Measure		

			Low Hz	Delta Hz Event
			0.00	Actual Interchange MW Average during frequency recovery period
			617.52	Target Interchange MW Average during frequency recovery period
EPFR = Expected Primary Frequency Response	EPFR(Final)	662.51 MW	226.52	Interchange Average Ramp MW during frequency recovery period
MW Response in right direction for frequency delta		Yes	470.90	Actual MW @ T(-4)
			-494.59	Starting and Ending Difference in Interchange MW during frequency recovery period (indicates r
			0:03:52	Event Duration (h:mm:ss)
			No	Target MW Average minus MW @ T(-4) less than zero
			641.21	Interchange Target Relative Average Change - MW (Low Frequency Event)
			23.69	Interchange Actual Relative Average Change - MW (Low Frequency Event)
			Yes	Interchange Actual Average minus MW @ T(-4) less than zero
			No	Interchange Average MW minus MW @ T(-4) greater than zero
			Yes	Interchange Target MW Average minus MW @ T(-4) greater than zero
			146.62	Interchange Target Relative Average Change - MW (High Frequency Event)
			-470.90	Interchange Actual Relative Average Change - MW (High Frequency Event)
			Down	Ramp Direction during frequency recovery period

Initial Response P.U. Performance					0.711	P.U.							0.738	P.U.	Sustianed Response P.U. Performance		
	T	Frequency Hz	Contingent Resource Lost MW	Value B 20 to 52 sec Average Frequency	Average MW		Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW		
T-72 sec	8:05:26	59.98029	471.000				19590	128.735	45.057								
T-70 sec	8:05:28	59.98224	471.000				19590	115.981	69.880								
T-68 sec	8:05:30	59.98352	471.000				19590	107.611	83.086								
T-66 sec	8:05:32	59.98578	471.000				19590	92.864	86.509								
T-64 sec	8:05:34	59.9874	471.000				19590	82.303	85.036								
T-62 sec	8:05:36	59.98804	471.000				19590	78.118	82.615								

T-60 sec	8:05:38	59.9874	471.000			19590	82.303	82.506			2.947	471.000							
T-58 sec	8:05:40	59.98611	471.000			19590	90.672	85.364			2.947	476.805							
T-56 sec	8:05:42	59.9848	471.000			19590	99.241	90.221			2.947	484.609							
T-54 sec	8:05:44	59.98352	471.000			19590	107.611	96.308			2.947	493.643							
T-52 sec	8:05:46	59.98318	471.000			19590	109.803	101.031			2.947	501.313							
T-50 sec	8:05:48	59.98352	471.000			19590	107.611	103.334			2.947	506.563							
T-48 sec	8:05:50	59.98416	471.300			19590	103.426	103.366			2.947	509.542							
T-46 sec	8:05:52	59.98514	471.300			19590	97.049	101.155			2.947	510.278							
T-44 sec	8:05:54	59.98547	471.300			19590	94.857	98.951			2.947	511.020							
T-42 sec	8:05:56	59.98642	471.300			19590	88.680	95.356			2.947	510.372							
T-40 sec	8:05:58	59.98676	471.900			19590	86.487	92.252			2.947	510.215							
T-38 sec	8:06:00	59.9874	471.900			19590	82.303	88.770			2.947	509.680							
T-36 sec	8:06:02	59.98773	471.900			19590	80.110	85.739			2.947	509.596							
T-34 sec	8:06:04	59.98901	471.900			19590	71.741	80.840			2.947	507.643							
T-32 sec	8:06:06	59.98901	471.900			19590	71.741	77.655			2.947	507.406							
T-30 sec	8:06:08	59.98804	471.400			19590	78.118	77.817			2.947	510.515							
T-28 sec	8:06:10	59.98642	471.400			19590	88.680	81.619			2.947	517.263							
T-26 sec	8:06:12	59.98547	471.400			19590	94.857	86.252			2.947	524.844							
T-24 sec	8:06:14	59.98642	471.400			19590	88.680	87.102			2.947	528.640							
T-22 sec	8:06:16	59.98935	471.400			19590	69.549	80.958			2.947	525.443							
T-20 sec	8:06:18	59.99225	471.400			19590	50.617	70.339			2.947	517.771							
T-18 sec	8:06:20	59.99515	471.400			19590	31.685	56.810			2.947	507.189							
T-16 sec	8:06:22	59.99579	471.400	59.999	471.09	19590	27.501	46.552			2.947	499.878							
T-14 sec	8:06:24	59.99515	471.400	59.999	471.09	19590	31.685	41.349			2.947	497.621							
T-12 sec	8:06:26	59.99548	471.400	59.999	471.09	19590	29.493	37.199			2.947	496.419							
T-10 sec	8:06:28	59.99741	470.900	59.999	471.09	19590	16.939	30.108			2.947	492.275							
T-08 sec	8:06:30	60	470.900	59.999	471.09	19590	0.000	19.570			2.947	484.684							
T-06 sec	8:06:32	60.00162	470.900	59.999	471.09	19590	-10.562	9.024			2.947	477.084							
T-04 sec	8:06:34	60.00162	470.900	59.999	471.09	19590	-10.562	2.169			2.947	473.176							
T-02 sec	8:06:36	60.00195	470.900	59.999	471.09	19590	-12.754	-3.054			2.947	470.900							
T+0 sec	8:06:38	59.95963	0.000			19590	263.647	90.291			0.000	564.245							
T+02 sec	8:06:40	59.88144	0.000			19590	774.227	329.669			-4.264	799.359	0.000	681.802	471.678	471.678			
T+04 sec	8:06:42	59.87237	0.000			19590	833.413	505.979			-4.264	971.406	0.000	778.337	467.414	469.546			
T+06 sec	8:06:44	59.87011	0.000			19590	848.160	625.742			-4.264	1086.905	0.000	855.479	463.151	467.414			
T+08 sec	8:06:46	59.87011	0.000			19590	848.160	703.588			-4.264	1160.488	0.000	916.481	458.887	465.282			
T+10 sec	8:06:48	59.87432	0.000			19590	820.659	744.563			-4.264	1197.199	0.000	963.267	454.623	463.151			
T+12 sec	8:06:50	59.88076	0.000			19590	778.611	756.480			-4.264	1204.852	0.000	997.779	450.360	461.019			
T+14 sec	8:06:52	59.88531	0.000			19590	748.918	753.833			-4.264	1197.942	0.000	1022.800	446.096	458.887			
T+16 sec	8:06:54	59.88787	0.000			19590	732.179	746.254			-4.264	1186.099	0.000	1040.944	441.832	456.755			
T+18 sec	8:06:56	59.88949	0.000			19590	721.617	737.631			-4.264	1173.212	0.000	1054.171	437.568	454.623			
T+20 sec	8:06:58	59.8908	0.000	59.897	0.00	19590	713.048	729.027	653.00		-4.264	1160.344	0.000	1063.823	433.305	452.491			
T+22 sec	8:07:00	59.89175	0.000	59.897	0.00	19590	706.870	721.272	653.00		-4.264	1148.326	0.000	1070.865	429.041	450.360			
T+24 sec	8:07:02	59.89242	0.000	59.897	0.00	19590	702.486	714.697	653.00		-4.264	1137.487	0.000	1075.990	424.777	448.228			
T+26 sec	8:07:04	59.89306	0.000	59.897	0.00	19590	698.301	708.959	653.00		-4.264	1127.485	0.000	1079.668	420.514	446.096			
T+28 sec	8:07:06	59.89306	0.000	59.897	0.00	19590	698.301	705.229	653.00		-4.264	1119.491	0.000	1082.323	416.250	443.964			
T+30 sec	8:07:08	59.89306	0.000	59.897	0.00	19590	698.301	702.804	653.00		-4.264	1112.803	0.000	1084.228	411.986	441.832			
T+32 sec	8:07:10	59.89532	0.000	59.897	0.00	19590	683.555	696.067	653.00		-4.264	1101.802	0.000	1085.261	407.723	439.700			
T+34 sec	8:07:12	59.89788	0.000	59.897	0.00	19590	666.815	685.829	653.00		-4.264	1087.300	0.000	1085.375	403.459	437.568			
T+36 sec	8:07:14	59.8995	0.000	59.897	0.00	19590	656.253	675.477	653.00		-4.264	1072.685	0.000	1084.707	399.195	435.437			

T+38 sec	8:07:16	59.90081	0.000	59.897	0.00	19590	647.684	665.750	653.00	-4.264	1058.694	0.000	1083.406	394.932	433.305
T+40 sec	8:07:18	59.9021	0.000	59.897	0.00	19590	639.314	656.497	653.00	-4.264	1045.178	0.000	1081.586	390.668	431.173
T+42 sec	8:07:20	59.90179	0.000	59.897	0.00	19590	641.307	651.181	653.00	-4.264	1035.598	0.000	1079.495	386.404	429.041
T+44 sec	8:07:22	59.90081	0.000	59.897	0.00	19590	647.684	649.957	653.00	-4.264	1030.110	0.000	1077.348	382.141	426.909
T+46 sec	8:07:24	59.90081	0.000	59.897	0.00	19590	647.684	649.162	653.00	-4.264	1025.051	0.000	1075.169	377.877	424.777
T+48 sec	8:07:26	59.90048	0.000	59.897	0.00	19590	649.876	649.412	653.00	-4.264	1021.037	0.000	1073.004	373.613	422.646
T+50 sec	8:07:28	59.8992	0.000	59.897	0.00	19590	658.246	652.504	653.00	-4.264	1019.866	0.000	1070.960	369.350	420.514
T+52 sec	8:07:30	59.89886	0.000	59.897	0.00	19590	660.438	655.281	653.00	-4.264	1018.379	0.000	1069.013	365.086	418.382
T+54 sec	8:07:32	59.89856	0.000			19590	662.431	657.783		-4.264	1016.618	0.000	1067.141	360.822	416.250
T+56 sec	8:07:34	59.90017	0.000			19590	651.869	655.713		-4.264	1010.284	0.000	1065.181	356.559	414.118
T+58 sec	8:07:36	59.90243	0.000			19590	637.122	649.207		-4.264	999.514	0.000	1062.992	352.295	411.986
T+60 sec	8:07:38	59.90469	0.000			19590	622.376	639.816		-4.264	985.859	0.000	1060.504	348.031	409.855
T+62 sec	8:07:40	59.90695	0.000			19590	607.629	628.550		-4.264	970.330	0.000	1057.686	343.768	407.723
T+64 sec	8:07:42	59.90887	0.000			19590	595.074	616.834		-4.264	954.350	0.000	1054.555	339.504	405.591
T+66 sec	8:07:44	59.90921	0.000			19590	592.882	608.451		-4.264	941.703	0.000	1051.235	335.240	403.459
T+68 sec	8:07:46	59.90857	0.000			19590	597.067	604.466		-4.264	933.456	0.000	1047.870	330.977	401.327
T+70 sec	8:07:48	59.90887	0.000			19590	595.074	601.179		-4.264	925.905	0.000	1044.482	326.713	399.195
T+72 sec	8:07:50	59.91018	0.000			19590	586.505	596.043		-4.264	916.505	0.000	1041.023	322.449	397.064
T+74 sec	8:07:52	59.91244	0.000			19590	571.759	587.544		-4.264	903.742	0.000	1037.411	318.186	394.932
T+76 sec	8:07:54	59.9147	0.000			19590	557.012	576.858		-4.264	888.792	0.000	1033.600	313.922	392.800
T+78 sec	8:07:56	59.9176	0.000			19590	538.080	563.286		-4.264	870.956	0.000	1029.534	309.658	390.668
T+80 sec	8:07:58	59.91922	0.000			19590	527.519	550.767		-4.264	854.174	0.000	1025.257	305.395	388.536
T+82 sec	8:08:00	59.92083	0.000			19590	516.957	538.933		-4.264	838.077	0.000	1020.800	301.131	386.404
T+84 sec	8:08:02	59.92215	0.000			19590	508.388	528.242		-4.264	823.122	0.000	1016.203	296.867	384.273
T+86 sec	8:08:04	59.92309	0.000			19590	502.210	519.131		-4.264	809.747	0.000	1011.511	292.603	382.141
T+88 sec	8:08:06	59.92505	0.000			19590	489.456	508.745		-4.264	795.097	0.000	1006.702	288.340	380.009
T+90 sec	8:08:08	59.92505	0.000			19590	489.456	501.994		-4.264	784.082	0.000	1001.862	284.076	377.877
T+92 sec	8:08:10	59.9273	0.000			19590	474.709	492.444		-4.264	770.269	0.000	996.935	279.812	375.745
T+94 sec	8:08:12	59.93246	0.000			19590	441.031	474.450		-4.264	748.011	0.000	991.749	275.549	373.613
T+96 sec	8:08:14	59.93505	0.000			19590	424.092	456.825		-4.264	726.122	0.000	986.328	271.285	371.481
T+98 sec	8:08:16	59.93701	0.000			19590	411.338	440.904		-4.264	705.938	0.000	980.720	267.021	369.350
T+100 sec	8:08:18	59.93765	0.000			19590	407.129	429.083		-4.264	689.853	0.000	975.017	262.758	367.218
T+102 sec	8:08:20	59.93927	0.000			19590	396.567	417.702		-4.264	674.209	0.000	969.232	258.494	365.086
T+104 sec	8:08:22	59.94183	0.000			19590	379.827	404.446		-4.264	656.689	0.000	963.335	254.230	362.954
T+106 sec	8:08:24	59.94409	0.000			19590	365.081	390.668		-4.264	638.647	0.000	957.322	249.967	360.822
T+108 sec	8:08:26	59.94571	0.000			19590	354.519	378.016		-4.264	621.731	0.000	951.220	245.703	358.690
T+110 sec	8:08:28	59.94797	0.000			19590	339.772	364.630		-4.264	604.082	0.000	945.022	241.439	356.559
T+112 sec	8:08:30	59.94766	0.000			19590	341.765	356.628		-4.264	591.816	0.000	938.825	237.176	354.427
T+114 sec	8:08:32	59.9454	0.000			19590	356.512	356.587		-4.264	587.511	0.000	932.768	232.912	352.295
T+116 sec	8:08:34	59.94443	0.000			19590	362.888	358.792		-4.264	585.453	0.000	926.881	228.648	350.163
T+118 sec	8:08:36	59.94409	0.000			19590	365.081	360.993		-4.264	583.390	0.000	921.156	224.385	348.031
T+120 sec	8:08:38	59.94507	0.000			19590	358.704	360.192		-4.264	578.325	0.000	915.536	220.121	345.899
T+122 sec	8:08:40	59.94604	0.000			19590	352.327	357.439		-4.264	571.309	0.000	909.984	215.857	343.768
T+124 sec	8:08:42	59.94638	0.000			19590	350.135	354.883		-4.264	564.489	0.000	904.500	211.594	341.636
T+126 sec	8:08:44	59.94733	0.000			19590	343.957	351.059		-4.264	556.401	0.000	899.061	207.330	339.504
T+128 sec	8:08:46	59.9483	0.000			19590	337.580	346.341		-4.264	547.420	0.000	893.651	203.066	337.372
T+130 sec	8:08:48	59.94894	0.000			19590	333.395	341.810		-4.264	538.625	0.000	888.272	198.803	335.240
T+132 sec	8:08:50	59.94992	0.000			19590	327.018	336.633		-4.264	529.184	0.000	882.912	194.539	333.108
T+134 sec	8:08:52	59.9509	0.000			19590	320.641	331.036		-4.264	519.323	0.000	877.566	190.275	330.977

T+136 sec	8:08:54	59.95154	0.000	19590	316.456	325.933	-4.264	509.957	0.000	872.238	186.012	328.845
T+138 sec	8:08:56	59.95187	0.000	19590	314.264	321.849	-4.264	501.609	0.000	866.943	181.748	326.713
T+140 sec	8:08:58	59.95346	0.000	19590	303.902	315.567	-4.264	491.064	0.000	861.649	177.484	324.581
T+142 sec	8:09:00	59.95508	0.000	19590	293.340	307.788	-4.264	479.021	0.000	856.335	173.221	322.449
T+144 sec	8:09:02	59.95575	0.000	19590	288.956	301.197	-4.264	468.166	0.000	851.017	168.957	320.317
T+146 sec	8:09:04	59.95639	0.000	19590	284.771	295.448	-4.264	458.153	0.000	845.708	164.693	318.186
T+148 sec	8:09:06	59.95801	0.000	19590	274.209	288.014	-4.264	446.456	0.000	840.385	160.430	316.054
T+150 sec	8:09:08	59.96124	0.000	19590	253.085	275.789	-4.264	429.967	0.000	834.985	156.166	313.922
T+152 sec	8:09:10	59.96252	0.000	19590	244.716	264.913	-4.264	414.828	0.000	829.528	151.902	311.790
T+154 sec	8:09:12	59.96188	0.000	19590	248.900	259.309	-4.264	404.960	0.000	824.085	147.638	309.658
T+156 sec	8:09:14	59.96124	0.000	19590	253.085	257.131	-4.264	398.518	0.000	818.698	143.375	307.526
T+158 sec	8:09:16	59.96027	0.000	19590	259.462	257.947	-4.264	395.070	0.000	813.403	139.111	305.395
T+160 sec	8:09:18	59.96057	0.000	19590	257.469	257.780	-4.264	390.640	0.000	808.184	134.847	303.263
T+162 sec	8:09:20	59.96219	0.000	19590	246.908	253.974	-4.264	382.571	0.000	802.993	130.584	301.131
T+164 sec	8:09:22	59.96512	0.000	19590	227.777	244.805	-4.264	369.138	0.000	797.766	126.320	298.999
T+166 sec	8:09:24	59.96738	0.000	19590	213.030	233.684	-4.264	353.753	0.000	792.480	122.056	296.867
T+168 sec	8:09:26	59.96899	0.000	19590	202.468	222.758	-4.264	338.564	0.000	787.140	117.793	294.735
T+170 sec	8:09:28	59.97061	0.000	19590	191.906	211.960	-4.264	323.502	0.000	781.749	113.529	292.603
T+172 sec	8:09:30	59.97318	0.000	19590	175.167	199.083	-4.264	306.360	0.000	776.284	109.265	290.472
T+174 sec	8:09:32	59.97351	0.000	19590	172.975	189.945	-4.264	292.959	0.000	770.792	105.002	288.340
T+176 sec	8:09:34	59.97287	0.000	19590	177.160	185.470	-4.264	284.221	0.000	765.325	100.738	286.208
T+178 sec	8:09:36	59.97253	0.000	19590	179.352	183.329	-4.264	277.815	0.000	759.908	96.474	284.076
T+180 sec	8:09:38	59.97318	0.000	19590	175.167	180.472	-4.264	270.695	0.000	754.532	92.211	281.944
	8:09:40	59.97415	0.000	19590	168.790	176.383	-4.264	262.343	0.000	749.182	87.947	279.812
	8:09:42	59.97543	0.000	19590	160.420	170.796	-4.264	252.492	0.000	743.842	83.683	277.681
	8:09:44	59.97577	0.000	19590	158.228	166.397	-4.264	243.830	0.000	738.522	79.420	275.549
	8:09:46	59.9761	0.000	19590	156.036	162.771	-4.264	235.939	0.000	733.232	75.156	273.417
	8:09:48	59.97675	0.000	19590	151.851	158.949	-4.264	227.854	0.000	727.968	70.892	271.285
	8:09:50	59.97803	0.000	19590	143.481	153.535	-4.264	218.176	0.000	722.712	66.629	269.153
	8:09:52	59.97931	0.000	19590	135.112	147.087	-4.264	207.464	0.000	717.454	62.365	267.021
	8:09:54	59.97998	0.000	19590	130.728	141.361	-4.264	197.475	0.000	712.202	58.101	264.890
	8:09:56	59.97964	0.000	19590	132.920	138.407	-4.264	190.257	0.000	706.983	53.838	262.758
	8:09:58	59.979	0.000	19590	137.104	137.951	-4.264	185.537	0.000	701.820	49.574	260.626
	8:10:00	59.97964	0.000	19590	132.920	136.190	-4.264	179.513	0.000	696.699	45.310	258.494
	8:10:02	59.98093	0.000	19590	124.550	132.116	-4.264	171.175	0.000	691.597	41.047	256.362
	8:10:04	59.98224	0.000	19590	115.981	126.469	-4.264	161.264	0.000	686.498	36.783	254.230
	8:10:06	59.98386	0.000	19590	105.419	119.101	-4.264	149.633	0.000	681.385	32.519	252.099
	8:10:08	59.98514	0.000	19590	97.049	111.383	-4.264	137.651	0.000	676.255	28.256	249.967
	8:10:10	59.98773	0.000	19590	80.110	100.438	-4.264	122.442	0.000	671.079	23.992	247.835
	8:10:12	59.9903	0.000	19590	63.371	87.464	-4.264	105.205	0.000	665.840	19.728	245.703
	8:10:14	59.99289	0.000	19590	46.432	73.103	-4.264	86.580	0.000	660.525	15.465	243.571
	8:10:16	59.99579	0.000	19590	27.501	57.142	-4.264	66.355	0.000	655.124	11.201	241.439
	8:10:18	59.99646	0.000	19590	23.116	45.233	-4.264	50.183	0.000	649.674	6.937	239.308
	8:10:20	59.99579	0.000	19590	27.501	39.027	-4.264	39.713	0.000	644.228	2.673	237.176
	8:10:22	59.99612	0.000	19590	25.309	34.225	-4.264	30.648	0.000	638.798	-1.590	235.044
	8:10:24	59.99579	0.000	19590	27.501	31.872	-4.264	24.030	0.000	633.405	-5.854	232.912
	8:10:26	59.99484	0.000	19590	33.678	32.504	-4.264	20.399	0.000	628.075	-10.118	230.780
	8:10:28	59.99484	0.000	19590	33.678	32.915	-4.264	16.546	0.000	622.803	-14.381	228.648
	8:10:30	59.99805	0.000	19590	12.754	25.859	-4.264	5.226	0.000	617.525	-18.645	226.516

8:10:32	59.99872	0.000	19590	8.370	19.738	0.000	-0.895	0.000	612.284	-18.645	224.421
8:10:34	60.00034	0.000	19590	-2.192	12.062	0.000	-8.570	0.000	607.066	-18.645	222.361
8:10:36	60.00195	0.000	19590	-12.754	3.377	0.000	-17.256	0.000	601.864	-18.645	220.336
8:10:38	60.00259	0.000	19590	-16.939	-3.734	0.000	-24.366	0.000	596.688	-18.645	218.344
8:10:40	60.00226	0.000	19590	-14.747	-7.588	0.000	-28.221	0.000	591.566	-18.645	216.386
8:10:42	60.00195	0.000	19590	-12.754	-9.396	0.000	-30.029	0.000	586.512	-18.645	214.459
8:10:44	60.00064	0.000	19590	-4.185	-7.572	0.000	-28.205	0.000	581.555	-18.645	212.564
8:10:46	59.99646	0.000	19590	23.116	3.169	0.000	-17.464	0.000	576.763	-18.645	210.700
8:10:48	59.99191	0.000	19590	52.809	20.543	0.000	-0.090	0.000	572.185	-18.645	208.865
8:10:50	59.98901	0.000	19590	71.741	38.462	0.000	17.830	0.000	567.820	-18.645	207.059
8:10:52	59.98773	0.000	19590	80.110	53.039	0.000	32.407	0.000	563.637	-18.645	205.282
8:10:54	59.98901	0.000	19590	71.741	59.585	0.000	38.952	0.000	559.570	-18.645	203.533
8:10:56	59.99255	0.000	19590	48.624	55.749	0.000	35.116	0.000	555.535	-18.645	201.810
8:10:58	59.99579	0.000	19590	27.501	45.862	0.000	25.229	0.000	551.487	-18.645	200.114
8:11:00	59.99902	0.000	19590	6.377	32.042	0.000	11.410	0.000	547.396	-18.645	198.445
8:11:02	60.00195	0.000	19590	-12.754	16.363	0.000	-4.269	0.000	543.248	-18.645	196.800
8:11:04	60.00485	0.000	19590	-31.685	-0.454	0.000	-21.086	0.000	539.036	-18.645	195.180
8:11:06	60.00809	0.000	19590	-52.809	-18.778	0.000	-39.411	0.000	534.752	-18.645	193.584
8:11:08	60.01163	0.000	19590	-75.926	-38.780	0.000	-59.412	0.000	530.383	-18.645	192.012
8:11:10	60.01422	0.000	19590	-92.864	-57.709	0.000	-78.342	0.000	525.939	-18.645	190.463
8:11:12	60.0152	0.000	19590	-99.241	-72.246	0.000	-92.878	0.000	521.455	-18.645	188.937
8:11:14	60.0155	0.000	19590	-101.234	-82.392	0.000	-103.024	0.000	516.963	-18.645	187.433
8:11:16	60.0155	0.000	19590	-101.234	-88.986	0.000	-109.619	0.000	512.487	-18.645	185.950
8:11:18	60.01682	0.000	19590	-109.803	-96.272	0.000	-116.905	0.000	508.023	-18.645	184.489
8:11:20	60.01907	0.000	19590	-124.550	-106.169	0.000	-126.802	0.000	503.553	-18.645	183.048
8:11:22	60.02295	0.000	19590	-149.858	-121.461	0.000	-142.093	0.000	499.038	-18.645	181.628
8:11:24	60.02618	0.000	19590	-170.982	-138.793	0.000	-159.426	0.000	494.465	-18.645	180.227
8:11:26	60.02972	0.000	19590	-194.099	-158.150	0.000	-178.782	0.000	489.822	-18.645	178.846
8:11:28	60.03262	0.000	19590	-213.030	-177.358	0.000	-197.990	0.000	485.111	-18.645	177.484
8:11:30	60.03458	0.000	19590	-225.784	-194.307	0.000	-214.940	0.000	480.349	-18.645	176.141
8:11:32	60.03522	0.000	19590	-229.969	-206.789	0.000	-227.421	0.000	475.566	-18.645	174.816
8:11:34	60.03424	0.000	19590	-223.592	-212.670	0.000	-233.302	0.000	470.809	-18.645	173.509
8:11:36	60.0336	0.000	19590	-219.407	-215.028	0.000	-235.660	0.000	466.099	-18.645	172.219
8:11:38	60.03522	0.000	19590	-229.969	-220.257	0.000	-240.890	0.000	461.417	-18.645	170.947
8:11:40	60.03812	0.000	19590	-248.900	-230.282	0.000	-250.915	0.000	456.731	-18.645	169.691
8:11:42	60.04037	0.000	19590	-263.647	-241.960	0.000	-262.592	0.000	452.029	-18.645	168.452
8:11:44	60.04105	0.000	19590	-268.031	-251.085	0.000	-271.717	0.000	447.330	-18.645	167.229
8:11:46	60.04199	0.000	19590	-274.209	-259.178	0.000	-279.811	0.000	442.638	-18.645	166.022
8:11:48	60.04233	0.000	19590	-276.401	-265.206	0.000	-285.839	0.000	437.969	-18.645	164.831
8:11:50	60.0433	0.000	19590	-282.778	-271.356	0.000	-291.989	0.000	433.319	-18.645	163.655
8:11:52	60.04425	0.000	19590	-288.956	-277.516	0.000	-298.149	0.000	428.690	-18.645	162.493
8:11:54	60.04492	0.000	19590	-293.340	-283.054	0.000	-303.687	0.000	424.083	-18.645	161.347
8:11:56	60.04556	0.000	19590	-297.525	-288.119	0.000	-308.751	0.000	419.503	-18.645	160.215
8:11:58	60.04587	0.000	19590	-299.518	-292.109	0.000	-312.741	0.000	414.955	-18.645	159.097
8:12:00	60.04654	0.000	19590	-303.902	-296.236	0.000	-316.869	0.000	410.438	-18.645	157.993
8:12:02	60.0488	0.000	19590	-318.648	-304.080	0.000	-324.713	0.000	405.928	-18.645	156.903
8:12:04	60.04974	0.000	19590	-324.826	-311.341	0.000	-331.974	0.000	401.428	-18.645	155.826
8:12:06	60.0491	0.000	19590	-320.641	-314.596	0.000	-335.229	0.000	396.964	-18.645	154.762
8:12:08	60.0491	0.000	19590	-320.641	-316.712	0.000	-337.344	0.000	392.540	-18.645	153.711

8:12:10	60.05042	0.000	19590	-329.210	-321.086	0.000	-341.719	0.000	388.143	-18.645	152.673
8:12:12	60.04974	0.000	19590	-324.826	-322.395	0.000	-343.028	0.000	383.791	-18.645	151.647
8:12:14	60.04846	0.000	19590	-316.456	-320.317	0.000	-340.949	0.000	379.503	-18.645	150.633
8:12:16	60.04718	0.000	19590	-308.087	-316.036	0.000	-336.669	0.000	375.290	-18.645	149.632
8:12:18	60.04587	0.000	19590	-299.518	-310.255	0.000	-330.887	0.000	371.160	-18.645	148.642
8:12:20	60.04587	0.000	19590	-299.518	-306.497	0.000	-327.129	0.000	367.100	-18.645	147.663
8:12:22	60.04556	0.000	19590	-297.525	-303.356	0.000	-323.989	0.000	363.106	-18.645	146.697
8:12:24	60.04425	0.000	19590	-288.956	-298.316	0.000	-318.949	0.000	359.186	-18.645	145.741
8:12:26	60.04297	0.000	19590	-280.586	-292.111	0.000	-312.743	0.000	355.346	-18.645	144.796
8:12:28	60.04169	0.000	19590	-272.216	-285.148	0.000	-305.780	0.000	351.590	-18.645	143.862
8:12:30	60.04233	0.000	19590	-276.401	-282.086	0.000	-302.719	0.000	347.893	-18.645	142.939
8:12:32	60.04459	0.000	19590	-291.148	-285.258	0.000	-305.890	0.000	344.220	-18.645	142.026
8:12:34	60.04654	0.000	19590	-303.902	-291.783	0.000	-312.416	0.000	340.552	-18.645	141.123
8:12:36	60.04718	0.000	19590	-308.087	-297.489	0.000	-318.122	0.000	336.893	-18.645	140.231
8:12:38	60.0462	0.000	19590	-301.710	-298.966	0.000	-319.599	0.000	333.266	-18.645	139.348
8:12:40	60.04425	0.000	19590	-288.956	-295.463	0.000	-316.095	0.000	329.698	-18.645	138.475
8:12:42	60.04492	0.000	19590	-293.340	-294.720	0.000	-315.352	0.000	326.173	-18.645	137.612
8:12:44	60.04523	0.000	19590	-295.333	-294.934	0.000	-315.567	0.000	322.685	-18.645	136.758
8:12:46	60.04523	0.000	19590	-295.333	-295.074	0.000	-315.706	0.000	319.234	-18.645	135.913
8:12:48	60.04556	0.000	19590	-297.525	-295.932	0.000	-316.564	0.000	315.816	-18.645	135.078
8:12:50	60.0462	0.000	19590	-301.710	-297.954	0.000	-318.586	0.000	312.423	-18.645	134.251
8:12:52	60.04654	0.000	19590	-303.902	-300.036	0.000	-320.668	0.000	309.056	-18.645	133.434
8:12:54	60.04654	0.000	19590	-303.902	-301.389	0.000	-322.021	0.000	305.717	-18.645	132.625
8:12:56	60.04523	0.000	19590	-295.333	-299.269	0.000	-319.902	0.000	302.424	-18.645	131.825
8:12:58	60.04361	0.000	19590	-284.771	-294.195	0.000	-314.827	0.000	299.193	-18.645	131.033
8:13:00	60.04199	0.000	19590	-274.209	-287.200	0.000	-307.832	0.000	296.031	-18.645	130.249
8:13:02	60.04071	0.000	19590	-265.839	-279.724	0.000	-300.356	0.000	292.941	-18.645	129.473
8:13:04	60.03876	0.000	19590	-253.085	-270.400	0.000	-291.033	0.000	289.931	-18.645	128.706
8:13:06	60.03586	0.000	19590	-234.154	-257.714	0.000	-278.346	0.000	287.016	-18.645	127.946
8:13:08	60.03394	0.000	19590	-221.599	-245.074	0.000	-265.706	0.000	284.196	-18.645	127.195
8:13:10	60.0336	0.000	19590	-219.407	-236.090	0.000	-256.723	0.000	281.451	-18.645	126.451
8:13:12	60.03262	0.000	19590	-213.030	-228.019	0.000	-248.652	0.000	278.773	-18.645	125.714
8:13:14	60.03006	0.000	19590	-196.291	-216.914	0.000	-237.547	0.000	276.179	-18.645	124.985
8:13:16	60.02747	0.000	19590	-179.352	-203.767	0.000	-224.400	0.000	273.676	-18.645	124.263
8:13:18	60.02682	0.000	19590	-175.167	-193.757	0.000	-214.390	0.000	271.248	-18.645	123.549
8:13:20	60.02585	0.000	19590	-168.790	-185.019	0.000	-205.651	0.000	268.887	-18.645	122.841
8:13:22	60.02359	0.000	19590	-154.043	-174.177	0.000	-194.810	0.000	266.603	-18.645	122.141
8:13:24	60.02197	0.000	19590	-143.481	-163.434	0.000	-184.066	0.000	264.393	-18.645	121.447
8:13:26	60.02164	0.000	19590	-141.289	-155.683	0.000	-176.316	0.000	262.244	-18.645	120.761
8:13:28	60.02231	0.000	19590	-145.674	-152.180	0.000	-172.812	0.000	260.132	-18.645	120.081
8:13:30	60.02133	0.000	19590	-139.297	-147.671	0.000	-168.303	0.000	258.062	-18.645	119.407
8:13:32	60.02133	0.000	19590	-139.297	-144.740	0.000	-165.372	0.000	256.026	-18.645	118.740
8:13:34	60.02002	0.000	19590	-130.728	-139.835	0.000	-160.468	0.000	254.033	-18.645	118.080
8:13:36	60.01776	0.000	19590	-115.981	-131.486	0.000	-152.119	0.000	252.099	-18.645	117.426
8:13:38	60.01584	0.000	19590	-103.426	-121.665	0.000	-142.298	0.000	250.230	-18.645	116.778
8:13:40	60.01291	0.000	19590	-84.295	-108.586	0.000	-129.218	0.000	248.440	-18.645	116.136
8:13:42	60.01132	0.000	19590	-73.933	-96.457	0.000	-117.090	0.000	246.724	-18.645	115.500
8:13:44	60.01001	0.000	19590	-65.364	-85.575	0.000	-106.207	0.000	245.075	-18.645	114.870
8:13:46	60.00937	0.000	19590	-61.179	-77.036	0.000	-97.669	0.000	243.481	-18.645	114.246

8:13:48	60.00775	0.000	19590	-50.617	-67.789	0.000	-88.422	0.000	241.944	-18.645	113.628
8:13:50	60.00516	0.000	19590	-33.678	-55.851	0.000	-76.483	0.000	240.477	-18.645	113.016
8:13:52	60.00452	0.000	19590	-29.493	-46.626	0.000	-67.258	0.000	239.065	-18.645	112.409
8:13:54	60.00613	0.000	19590	-40.055	-44.326	0.000	-64.958	0.000	237.677	-18.645	111.808
8:13:56	60.00613	0.000	19590	-40.055	-42.831	0.000	-63.464	0.000	236.308	-18.645	111.212
8:13:58	60.00549	0.000	19590	-35.870	-40.395	0.000	-61.027	0.000	234.963	-18.645	110.622
8:14:00	60.00516	0.000	19590	-33.678	-38.044	0.000	-58.677	0.000	233.640	-18.645	110.037
8:14:02	60.00388	0.000	19590	-25.309	-33.587	0.000	-54.219	0.000	232.349	-18.645	109.457
8:14:04	60.00259	0.000	19590	-16.939	-27.760	0.000	-48.392	0.000	231.096	-18.645	108.883
8:14:06	60.00128	0.000	19590	-8.370	-20.973	0.000	-41.606	0.000	229.884	-18.645	108.314
8:14:08	60.00128	0.000	19590	-8.370	-16.562	0.000	-37.195	0.000	228.702	-18.645	107.749
8:14:10	60.00064	0.000	19590	-4.185	-12.230	0.000	-32.863	0.000	227.550	-18.645	107.190
8:14:12	60.00034	0.000	19590	-2.192	-8.717	0.000	-29.349	0.000	226.423	-18.645	106.636
8:14:14	60.00226	0.000	19590	-14.747	-10.827	0.000	-31.460	0.000	225.297	-18.645	106.086
8:14:16	60.00421	0.000	19590	-27.501	-16.663	0.000	-37.295	0.000	224.155	-18.645	105.542
8:14:18	60.00677	0.000	19590	-44.240	-26.315	0.000	-46.947	0.000	222.982	-18.645	105.002
8:14:20	60.00903	0.000	19590	-58.987	-37.750	0.000	-58.383	0.000	221.769	-18.645	104.466
8:14:22	60.01291	0.000	19590	-84.295	-54.041	0.000	-74.673	0.000	220.497	-18.645	103.936
8:14:24	60.01486	0.000	19590	-97.049	-69.094	0.000	-89.726	0.000	219.171	-18.645	103.410
8:14:26	60.01453	0.000	19590	-94.857	-78.111	0.000	-98.743	0.000	217.818	-18.645	102.888
8:14:28	60.01422	0.000	19590	-92.864	-83.275	0.000	-103.907	0.000	216.455	-18.645	102.371
8:14:30	60.0152	0.000	19590	-99.241	-88.863	0.000	-109.495	0.000	215.080	-18.645	101.858
8:14:32	60.01614	0.000	19590	-105.419	-94.658	0.000	-115.290	0.000	213.691	-18.645	101.350
8:14:34	60.01682	0.000	19590	-109.803	-99.959	0.000	-120.591	0.000	212.293	-18.645	100.846
8:14:36	60.01746	0.000	19590	-113.988	-104.869	0.000	-125.501	0.000	210.885	-18.645	100.346
8:14:38	60.01712	0.000	19590	-111.796	-107.293	0.000	-127.926	0.000	209.479	-18.645	99.850
8:14:40	60.01682	0.000	19590	-109.803	-108.172	0.000	-128.804	0.000	208.082	-18.645	99.358
8:14:42	60.01648	0.000	19590	-107.611	-107.976	0.000	-128.608	0.000	206.696	-18.645	98.870
8:14:44	60.01614	0.000	19590	-105.419	-107.081	0.000	-127.713	0.000	205.325	-18.645	98.387
8:14:46	60.01746	0.000	19590	-113.988	-109.498	0.000	-130.131	0.000	203.956	-18.645	97.907
8:14:48	60.01776	0.000	19590	-115.981	-111.767	0.000	-132.400	0.000	202.589	-18.645	97.432
8:14:50	60.01776	0.000	19590	-115.981	-113.242	0.000	-133.874	0.000	201.227	-18.645	96.960
8:14:52	60.01648	0.000	19590	-107.611	-111.271	0.000	-131.904	0.000	199.883	-18.645	96.492
8:14:54	60.01584	0.000	19590	-103.426	-108.525	0.000	-129.158	0.000	198.562	-18.645	96.027
8:14:56	60.01648	0.000	19590	-107.611	-108.205	0.000	-128.838	0.000	197.252	-18.645	95.567
8:14:58	60.01584	0.000	19590	-103.426	-106.533	0.000	-127.165	0.000	195.960	-18.645	95.110
8:15:00	60.01358	0.000	19590	-88.680	-100.284	0.000	-120.917	0.000	194.703	-18.645	94.657
8:15:02	60.01163	0.000	19590	-75.926	-91.759	0.000	-112.391	0.000	193.489	-18.645	94.207
8:15:04	60.01132	0.000	19590	-73.933	-85.520	0.000	-106.152	0.000	192.309	-18.645	93.761
8:15:06	60.01132	0.000	19590	-73.933	-81.464	0.000	-102.097	0.000	191.154	-18.645	93.319
8:15:08	60.01099	0.000	19590	-71.741	-78.061	0.000	-98.693	0.000	190.022	-18.645	92.879
8:15:10	60.01099	0.000	19590	-71.741	-75.849	0.000	-96.481	0.000	188.907	-18.645	92.444
8:15:12	60.01291	0.000	19590	-84.295	-78.805	0.000	-99.438	0.000	187.790	-18.645	92.012
8:15:14	60.01486	0.000	19590	-97.049	-85.191	0.000	-105.823	0.000	186.656	-18.645	91.583
8:15:16	60.01776	0.000	19590	-115.981	-95.967	0.000	-116.600	0.000	185.490	-18.645	91.157
8:15:18	60.01776	0.000	19590	-115.981	-102.972	0.000	-123.604	0.000	184.306	-18.645	90.735
8:15:20	60.0184	0.000	19590	-120.166	-108.990	0.000	-129.622	0.000	183.107	-18.645	90.316
8:15:22	60.0181	0.000	19590	-118.173	-112.204	0.000	-132.836	0.000	181.906	-18.645	89.900
8:15:24	60.01746	0.000	19590	-113.988	-112.828	0.000	-133.461	0.000	180.711	-18.645	89.487

8:15:26	60.0152	0.000	19590	-99.241	-108.073	0.000	-128.705	0.000	179.544	-18.645	89.078
8:15:28	60.0152	0.000	19590	-99.241	-104.982	0.000	-125.614	0.000	178.397	-18.645	88.671
8:15:30	60.01389	0.000	19590	-90.672	-99.974	0.000	-120.606	0.000	177.277	-18.645	88.268
8:15:32	60.01746	0.000	19590	-113.988	-104.879	0.000	-125.511	0.000	176.147	-18.645	87.867
8:15:34	60.01907	0.000	19590	-124.550	-111.764	0.000	-132.396	0.000	175.000	-18.645	87.470
8:15:36	60.01907	0.000	19590	-124.550	-116.239	0.000	-136.871	0.000	173.845	-18.645	87.075
8:15:38	60.02036	0.000	19590	-132.920	-122.077	0.000	-142.710	0.000	172.677	-18.645	86.684
8:15:40	60.01874	0.000	19590	-122.358	-122.175	0.000	-142.808	0.000	171.517	-18.645	86.295
8:15:42	60.01874	0.000	19590	-122.358	-122.239	0.000	-142.872	0.000	170.365	-18.645	85.909
8:15:44	60.01971	0.000	19590	-128.735	-124.513	0.000	-145.145	0.000	169.214	-18.645	85.526
8:15:46	60.01971	0.000	19590	-128.735	-125.990	0.000	-146.623	0.000	168.065	-18.645	85.146
8:15:48	60.01971	0.000	19590	-128.735	-126.951	0.000	-147.583	0.000	166.922	-18.645	84.769
8:15:50	60.0184	0.000	19590	-120.166	-124.576	0.000	-145.209	0.000	165.795	-18.645	84.394
8:15:52	60.01486	0.000	19590	-97.049	-114.942	0.000	-135.574	0.000	164.711	-18.645	84.022
8:15:54	60.01358	0.000	19590	-88.680	-105.750	0.000	-126.382	0.000	163.667	-18.645	83.653
8:15:56	60.01389	0.000	19590	-90.672	-100.473	0.000	-121.105	0.000	162.650	-18.645	83.286
8:15:58	60.01227	0.000	19590	-80.110	-93.346	0.000	-113.978	0.000	161.666	-18.645	82.922
8:16:00	60.01001	0.000	19590	-65.364	-83.552	0.000	-104.185	0.000	160.723	-18.645	82.561
8:16:02	60.00583	0.000	19590	-38.062	-67.631	0.000	-88.263	0.000	159.843	-18.645	82.202
8:16:04	60.00162	0.000	19590	-10.562	-47.657	0.000	-68.289	0.000	159.040	-18.645	81.845
8:16:06	60.00162	0.000	19590	-10.562	-34.673	0.000	-55.306	0.000	158.288	-18.645	81.491
8:16:08	59.99805	0.000	19590	12.754	-18.074	0.000	-38.706	0.000	157.599	-18.645	81.140
8:16:10	59.99353	0.000	19590	42.247	3.039	0.000	-17.594	0.000	156.989	-18.645	80.791
8:16:12	59.99255	0.000	19590	48.624	18.994	0.000	-1.639	0.000	156.438	-18.645	80.445
8:16:14	59.99225	0.000	19590	50.617	30.062	0.000	9.429	0.000	155.929	-18.645	80.101
8:16:16	59.98999	0.000	19590	65.364	42.417	0.000	21.785	0.000	155.467	-18.645	79.759
8:16:18	59.98837	0.000	19590	75.926	54.145	0.000	33.513	0.000	155.048	-18.645	79.420
8:16:20	59.98416	0.000	19590	103.426	71.394	0.000	50.761	0.000	154.691	-18.645	79.083
8:16:22	59.9816	0.000	19590	120.166	88.464	0.000	67.831	0.000	154.394	-18.645	78.748
8:16:24	59.98093	0.000	19590	124.550	101.094	0.000	80.462	0.000	154.143	-18.645	78.416
8:16:26	59.98029	0.000	19590	128.735	110.768	0.000	90.136	0.000	153.926	-18.645	78.085
8:16:28	59.97998	0.000	19590	130.728	117.754	0.000	97.122	0.000	153.734	-18.645	77.758
8:16:30	59.97836	0.000	19590	141.289	125.991	0.000	105.359	0.000	153.571	-18.645	77.432
8:16:32	59.97513	0.000	19590	162.413	138.739	0.000	118.107	0.000	153.452	-18.645	77.108
8:16:34	59.97287	0.000	19590	177.160	152.186	0.000	131.554	0.000	153.379	-18.645	76.787
8:16:36	59.97189	0.000	19590	183.537	163.159	0.000	142.526	0.000	153.342	-18.645	76.468
8:16:38	59.97156	0.000	19590	185.729	171.058	0.000	150.426	0.000	153.333	-18.645	76.151
8:16:40	59.97382	0.000	19590	170.982	171.032	0.000	150.399	0.000	153.323	-18.645	75.836
8:16:42	59.97641	0.000	19590	154.043	165.086	0.000	144.453	0.000	153.294	-18.645	75.523
8:16:44	59.97836	0.000	19590	141.289	156.757	0.000	136.125	0.000	153.237	-18.645	75.212
8:16:46	59.97705	0.000	19590	149.858	154.342	0.000	133.710	0.000	153.173	-18.645	74.904
8:16:48	59.97449	0.000	19590	166.598	158.632	0.000	137.999	0.000	153.124	-18.645	74.597
8:16:50	59.97125	0.000	19590	187.722	168.813	0.000	148.181	0.000	153.108	-18.645	74.292
8:16:52	59.97092	0.000	19590	189.914	176.198	0.000	155.566	0.000	153.116	-18.645	73.989
8:16:54	59.97287	0.000	19590	177.160	176.535	0.000	155.902	0.000	153.125	-18.645	73.689
8:16:56	59.97449	0.000	19590	166.598	173.057	0.000	152.424	0.000	153.122	-18.645	73.390
8:16:58	59.97382	0.000	19590	170.982	172.331	0.000	151.698	0.000	153.118	-18.645	73.093
8:17:00	59.97318	0.000	19590	175.167	173.323	0.000	152.691	0.000	153.116	-18.645	72.798
8:17:02	59.97449	0.000	19590	166.598	170.969	0.000	150.337	0.000	153.108	-18.645	72.505

8:17:04	59.9761	0.000	19590	156.036	165.743	0.000	145.110	0.000	153.082	-18.645	72.214
8:17:06	59.97739	0.000	19590	147.666	159.416	0.000	138.784	0.000	153.037	-18.645	71.924
8:17:08	59.97836	0.000	19590	141.289	153.072	0.000	132.439	0.000	152.971	-18.645	71.637
8:17:10	59.97769	0.000	19590	145.674	150.482	0.000	129.850	0.000	152.899	-18.645	71.351
8:17:12	59.97705	0.000	19590	149.858	150.264	0.000	129.632	0.000	152.825	-18.645	71.067
8:17:14	59.97641	0.000	19590	154.043	151.587	0.000	130.954	0.000	152.757	-18.645	70.785
8:17:16	59.97543	0.000	19590	160.420	154.678	0.000	134.046	0.000	152.698	-18.645	70.505
8:17:18	59.97382	0.000	19590	170.982	160.385	0.000	139.752	0.000	152.658	-18.645	70.226
8:17:20	59.97318	0.000	19590	175.167	165.558	0.000	144.926	0.000	152.634	-18.645	69.949
8:17:22	59.97223	0.000	19590	181.345	171.084	0.000	150.451	0.000	152.627	-18.645	69.674
8:17:24	59.97189	0.000	19590	183.537	175.442	0.000	154.810	0.000	152.634	-18.645	69.401
8:17:26	59.97092	0.000	19590	189.914	180.507	0.000	159.875	0.000	152.656	-18.645	69.129
8:17:28	59.96994	0.000	19590	196.291	186.031	0.000	165.399	0.000	152.695	-18.645	68.859
8:17:30	59.96832	0.000	19590	206.852	193.319	0.000	172.686	0.000	152.756	-18.645	68.590
8:17:32	59.96606	0.000	19590	221.599	203.217	0.000	182.584	0.000	152.847	-18.645	68.324
8:17:34	59.96542	0.000	19590	225.784	211.115	0.000	190.483	0.000	152.962	-18.645	68.059
8:17:36	59.96606	0.000	19590	221.599	214.785	0.000	194.152	0.000	153.087	-18.645	67.795
8:17:38	59.9693	0.000	19590	200.475	209.776	0.000	189.144	0.000	153.196	-18.645	67.533
8:17:40	59.97253	0.000	19590	179.352	199.128	0.000	178.495	0.000	153.272	-18.645	67.273
8:17:42	59.97351	0.000	19590	172.975	189.974	0.000	169.342	0.000	153.320	-18.645	67.014
8:17:44	59.97382	0.000	19590	170.982	183.327	0.000	162.695	0.000	153.348	-18.645	66.757
8:17:46	59.97253	0.000	19590	179.352	181.936	0.000	161.303	0.000	153.372	-18.645	66.501
8:17:48	59.97253	0.000	19590	179.352	181.031	0.000	160.399	0.000	153.393	-18.645	66.247
8:17:50	59.97253	0.000	19590	179.352	180.443	0.000	159.811	0.000	153.412	-18.645	65.994
8:17:52	59.96768	0.000	19590	211.037	191.151	0.000	170.519	0.000	153.462	-18.645	65.743
8:17:54	59.97125	0.000	19590	187.722	189.951	0.000	169.318	0.000	153.509	-18.645	65.493
8:17:56	59.97577	0.000	19590	158.228	178.848	0.000	158.215	0.000	153.523	-18.645	65.245
8:17:58	59.97577	0.000	19590	158.228	171.631	0.000	150.999	0.000	153.516	-18.645	64.998
8:18:00	59.97577	0.000	19590	158.228	166.940	0.000	146.308	0.000	153.495	-18.645	64.753
8:18:02	59.98416	0.000	19590	103.426	144.710	0.000	124.078	0.000	153.409	-18.645	64.509
8:18:04	59.9819	0.000	19590	118.173	135.422	0.000	114.790	0.000	153.297	-18.645	64.267
8:18:06	59.979	0.000	19590	137.104	136.011	0.000	115.379	0.000	153.187	-18.645	64.026
8:18:08	59.97769	0.000	19590	145.674	139.393	0.000	118.760	0.000	153.087	-18.645	63.786
8:18:10	59.97769	0.000	19590	145.674	141.591	0.000	120.959	0.000	152.995	-18.645	63.548
8:18:12	59.98126	0.000	19590	122.358	134.859	0.000	114.227	0.000	152.883	-18.645	63.311
8:18:14	59.9848	0.000	19590	99.241	122.393	0.000	101.761	0.000	152.737	-18.645	63.076
8:18:16	59.98868	0.000	19590	73.933	105.432	0.000	84.800	0.000	152.543	-18.645	62.841
8:18:18	59.99161	0.000	19590	54.802	87.711	0.000	67.079	0.000	152.299	-18.645	62.609
8:18:20	59.99353	0.000	19590	42.247	71.799	0.000	51.167	0.000	152.012	-18.645	62.377
8:18:22	59.99579	0.000	19590	27.501	56.295	0.000	35.662	0.000	151.682	-18.645	62.147
8:18:24	59.99677	0.000	19590	21.124	43.985	0.000	23.352	0.000	151.320	-18.645	61.918
8:18:26	59.99774	0.000	19590	14.747	33.751	0.000	13.119	0.000	150.930	-18.645	61.690
8:18:28	59.99838	0.000	19590	10.562	25.635	0.000	5.003	0.000	150.520	-18.645	61.464
8:18:30	59.99774	0.000	19590	14.747	21.824	0.000	1.192	0.000	150.102	-18.645	61.239
8:18:32	59.9971	0.000	19590	18.932	20.812	0.000	0.179	0.000	149.683	-18.645	61.015
8:18:34	59.99741	0.000	19590	16.939	19.456	0.000	-1.176	0.000	149.263	-18.645	60.793
8:18:36	59.99741	0.000	19590	16.939	18.575	0.000	-2.057	0.000	148.843	-18.645	60.572
8:18:38	59.99741	0.000	19590	16.939	18.002	0.000	-2.630	0.000	148.423	-18.645	60.352
8:18:40	60.00064	0.000	19590	-4.185	10.237	0.000	-10.396	0.000	147.984	-18.645	60.133

8:18:42	60.00323	0.000	19590	-21.124	-0.739	0.000	-21.372	0.000	147.518	-18.645	59.915
8:18:44	60.00354	0.000	19590	-23.116	-8.571	0.000	-29.204	0.000	147.032	-18.645	59.699
8:18:46	60.00259	0.000	19590	-16.939	-11.500	0.000	-32.132	0.000	146.542	-18.645	59.483
8:18:48	60.00098	0.000	19590	-6.377	-9.707	0.000	-30.339	0.000	146.058	-18.645	59.269
8:18:50	59.99936	0.000	19590	4.185	-4.845	0.000	-25.477	0.000	145.591	-18.645	59.057
8:18:52	59.99741	0.000	19590	16.939	2.779	0.000	-17.853	0.000	145.147	-18.645	58.845
8:18:54	59.99677	0.000	19590	21.124	9.200	0.000	-11.433	0.000	144.722	-18.645	58.634
8:18:56	59.99677	0.000	19590	21.124	13.373	0.000	-7.259	0.000	144.312	-18.645	58.425
8:18:58	59.9971	0.000	19590	18.932	15.319	0.000	-5.314	0.000	143.908	-18.645	58.217
8:19:00	59.99774	0.000	19590	14.747	15.118	0.000	-5.514	0.000	143.507	-18.645	58.009
8:19:02	59.99872	0.000	19590	8.370	12.756	0.000	-7.876	0.000	143.101	-18.645	57.803
8:19:04	59.99966	0.000	19590	2.192	9.059	0.000	-11.574	0.000	142.687	-18.645	57.598
8:19:06	60	0.000	19590	0.000	5.888	0.000	-14.744	0.000	142.267	-18.645	57.394
8:19:08	60.00034	0.000	19590	-2.192	3.060	0.000	-17.572	0.000	141.842	-18.645	57.192
8:19:10	60.00098	0.000	19590	-6.377	-0.243	0.000	-20.875	0.000	141.411	-18.645	56.990
8:19:12	60.00226	0.000	19590	-14.747	-5.319	0.000	-25.952	0.000	140.968	-18.645	56.789
8:19:14	60.0029	0.000	19590	-18.932	-10.084	0.000	-30.716	0.000	140.515	-18.645	56.590
8:19:16	60.00259	0.000	19590	-16.939	-12.483	0.000	-33.115	0.000	140.058	-18.645	56.391
8:19:18	60.00226	0.000	19590	-14.747	-13.275	0.000	-33.908	0.000	139.601	-18.645	56.194
8:19:20	60.00226	0.000	19590	-14.747	-13.790	0.000	-34.423	0.000	139.146	-18.645	55.997
8:19:22	60.00323	0.000	19590	-21.124	-16.357	0.000	-36.989	0.000	138.686	-18.645	55.802
8:19:24	60.00421	0.000	19590	-27.501	-20.257	0.000	-40.890	0.000	138.218	-18.645	55.608
8:19:26	60.00485	0.000	19590	-31.685	-24.257	0.000	-44.890	0.000	137.743	-18.645	55.414
8:19:28	60.00452	0.000	19590	-29.493	-26.090	0.000	-46.722	0.000	137.265	-18.645	55.222
8:19:30	60.00354	0.000	19590	-23.116	-25.049	0.000	-45.682	0.000	136.792	-18.645	55.031
8:19:32	60.00354	0.000	19590	-23.116	-24.373	0.000	-45.005	0.000	136.324	-18.645	54.840
8:19:34	60.00354	0.000	19590	-23.116	-23.933	0.000	-44.565	0.000	135.859	-18.645	54.651
8:19:36	60.00354	0.000	19590	-23.116	-23.647	0.000	-44.280	0.000	135.397	-18.645	54.462
8:19:38	60.00354	0.000	19590	-23.116	-23.461	0.000	-44.094	0.000	134.938	-18.645	54.275
8:19:40	60.00354	0.000	19590	-23.116	-23.341	0.000	-43.973	0.000	134.481	-18.645	54.088
8:19:42	60.00354	0.000	19590	-23.116	-23.262	0.000	-43.895	0.000	134.027	-18.645	53.903
8:19:44	60.00613	0.000	19590	-40.055	-29.140	0.000	-49.772	0.000	133.561	-18.645	53.718
8:19:46	60.00485	0.000	19590	-31.685	-30.031	0.000	-50.663	0.000	133.094	-18.645	53.535
8:19:48	60.00452	0.000	19590	-29.493	-29.843	0.000	-50.475	0.000	132.631	-18.645	53.352
8:19:50	60.00452	0.000	19590	-29.493	-29.720	0.000	-50.353	0.000	132.170	-18.645	53.170
8:19:52	60.00354	0.000	19590	-23.116	-27.409	0.000	-48.041	0.000	131.717	-18.645	52.989
8:19:54	60.0029	0.000	19590	-18.932	-24.442	0.000	-45.074	0.000	131.274	-18.645	52.809
8:19:56	60.00162	0.000	19590	-10.562	-19.584	0.000	-40.216	0.000	130.845	-18.645	52.630
8:19:58	60.00162	0.000	19590	-10.562	-16.426	0.000	-37.059	0.000	130.427	-18.645	52.452
8:20:00	60.00421	0.000	19590	-27.501	-20.302	0.000	-40.935	0.000	130.000	-18.645	52.275
8:20:02	60.00421	0.000	19590	-27.501	-22.822	0.000	-43.454	0.000	129.570	-18.645	52.098
8:20:04	60.0029	0.000	19590	-18.932	-21.460	0.000	-42.093	0.000	129.145	-18.645	51.923
8:20:06	60.00034	0.000	19590	-2.192	-14.716	0.000	-35.349	0.000	128.739	-18.645	51.748
8:20:08	59.99805	0.000	19590	12.754	-5.102	0.000	-25.734	0.000	128.358	-18.645	51.574
8:20:10	59.99646	0.000	19590	23.116	4.775	0.000	-15.858	0.000	128.004	-18.645	51.401
8:20:12	59.99515	0.000	19590	31.685	14.193	0.000	-6.439	0.000	127.675	-18.645	51.229
8:20:14	59.99387	0.000	19590	40.055	23.245	0.000	2.613	0.000	127.369	-18.645	51.058
8:20:16	59.99289	0.000	19590	46.432	31.361	0.000	10.728	0.000	127.084	-18.645	50.887
8:20:18	59.99255	0.000	19590	48.624	37.403	0.000	16.770	0.000	126.816	-18.645	50.718

8:20:20	59.99225	0.000	19590	50.617	42.028	0.000	21.395	0.000	126.560	-18.645	50.549
8:20:22	59.98965	0.000	19590	67.556	50.963	0.000	30.330	0.000	126.327	-18.645	50.381
8:20:24	59.98514	0.000	19590	97.049	67.093	0.000	46.461	0.000	126.134	-18.645	50.214
8:20:26	59.98254	0.000	19590	113.988	83.506	0.000	62.874	0.000	125.982	-18.645	50.048
8:20:28	59.97836	0.000	19590	141.289	103.730	0.000	83.098	0.000	125.879	-18.645	49.882
8:20:30	59.97641	0.000	19590	154.043	121.340	0.000	100.707	0.000	125.818	-18.645	49.717
8:20:32	59.97705	0.000	19590	149.858	131.321	0.000	110.689	0.000	125.782	-18.645	49.553
8:20:34	59.97705	0.000	19590	149.858	137.809	0.000	117.177	0.000	125.762	-18.645	49.390
8:20:36	59.97705	0.000	19590	149.858	142.026	0.000	121.394	0.000	125.751	-18.645	49.228
8:20:38	59.97803	0.000	19590	143.481	142.536	0.000	121.903	0.000	125.742	-18.645	49.066
8:20:40	59.97964	0.000	19590	132.920	139.170	0.000	118.538	0.000	125.725	-18.645	48.906
8:20:42	59.9816	0.000	19590	120.166	132.519	0.000	111.886	0.000	125.692	-18.645	48.745
8:20:44	59.98126	0.000	19590	122.358	128.962	0.000	108.330	0.000	125.651	-18.645	48.586
8:20:46	59.97931	0.000	19590	135.112	131.115	0.000	110.482	0.000	125.616	-18.645	48.428
8:20:48	59.9761	0.000	19590	156.036	139.837	0.000	119.205	0.000	125.600	-18.645	48.270
8:20:50	59.97543	0.000	19590	160.420	147.041	0.000	126.409	0.000	125.602	-18.645	48.113
8:20:52	59.97577	0.000	19590	158.228	150.957	0.000	130.324	0.000	125.613	-18.645	47.956
8:20:54	59.97675	0.000	19590	151.851	151.270	0.000	130.637	0.000	125.625	-18.645	47.801
8:20:56	59.97803	0.000	19590	143.481	148.544	0.000	127.911	0.000	125.630	-18.645	47.646
8:20:58	59.979	0.000	19590	137.104	144.540	0.000	123.908	0.000	125.626	-18.645	47.492
8:21:00	59.97964	0.000	19590	132.920	140.473	0.000	119.840	0.000	125.613	-18.645	47.338
8:21:02	59.98062	0.000	19590	126.543	135.597	0.000	114.965	0.000	125.588	-18.645	47.185
8:21:04	59.9819	0.000	19590	118.173	129.499	0.000	108.866	0.000	125.550	-18.645	47.033
8:21:06	59.98224	0.000	19590	115.981	124.767	0.000	104.135	0.000	125.501	-18.645	46.882
8:21:08	59.98254	0.000	19590	113.988	120.995	0.000	100.362	0.000	125.443	-18.645	46.731
8:21:10	59.98288	0.000	19590	111.796	117.775	0.000	97.143	0.000	125.378	-18.645	46.582
8:21:12	59.98254	0.000	19590	113.988	116.450	0.000	95.817	0.000	125.311	-18.645	46.432
8:21:14	59.98254	0.000	19590	113.988	115.588	0.000	94.956	0.000	125.242	-18.645	46.284
8:21:16	59.98288	0.000	19590	111.796	114.261	0.000	93.628	0.000	125.170	-18.645	46.136
8:21:18	59.98611	0.000	19590	90.672	106.005	0.000	85.372	0.000	125.080	-18.645	45.989
8:21:20	59.99387	0.000	19590	40.055	82.922	0.000	62.290	0.000	124.937	-18.645	45.842
8:21:22	60.00226	0.000	19590	-14.747	48.738	0.000	28.106	0.000	124.719	-18.645	45.696
8:21:24	60.01099	0.000	19590	-71.741	6.571	0.000	-14.062	0.000	124.406	-18.645	45.551
8:21:26	60.01712	0.000	19590	-111.796	-34.858	0.000	-55.490	0.000	124.002	-18.645	45.406
8:21:28	60.02069	0.000	19590	-135.112	-69.947	0.000	-90.579	0.000	123.521	-18.645	45.262
8:21:30	60.02133	0.000	19590	-139.297	-94.219	0.000	-114.852	0.000	122.988	-18.645	45.119
8:21:32	60.02133	0.000	19590	-139.297	-109.996	0.000	-130.629	0.000	122.422	-18.645	44.976
8:21:34	60.02133	0.000	19590	-139.297	-120.251	0.000	-140.884	0.000	121.835	-18.645	44.834
8:21:36	60.02325	0.000	19590	-151.851	-131.311	0.000	-151.944	0.000	121.227	-18.645	44.693
8:21:38	60.02551	0.000	19590	-166.598	-143.662	0.000	-164.294	0.000	120.594	-18.645	44.552

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-"

8:06:36

Time of Frequency Recovery t
Value A Pre-Perturbation Aver
Value B Post-Perturbation Avera
Pre to Post Pertur
Value A Pre-Perturbation Cor
Value B Post-Perturbation Average Con
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Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

20 to 52 second Average P

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Initial P.U.

T	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW
T-72 sec	8:05:26	59.980	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30155.67	128.735
T-70 sec	8:05:28	59.982	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30155.67	115.981
T-68 sec	8:05:30	59.984	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30155.67	107.611
T-66 sec	8:05:32	59.986	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30155.67	92.864
T-64 sec	8:05:34	59.987	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	82.303
T-62 sec	8:05:36	59.988	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	78.118

T	Frequency Hz	Contingent Resource Lost MW
T-72 sec	8:05:26	
T-70 sec	8:05:28	
T-68 sec	8:05:30	
T-66 sec	8:05:32	
T-64 sec	8:05:34	
T-62 sec	8:05:36	

T-60 sec	8:05:38	59.987	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	82.303	T-60 sec	8:05:38		
T-58 sec	8:05:40	59.986	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	90.672	T-58 sec	8:05:40		
T-56 sec	8:05:42	59.985	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30142.79	99.241	T-56 sec	8:05:42		
T-54 sec	8:05:44	59.984	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30154.67	107.611	T-54 sec	8:05:44		
T-52 sec	8:05:46	59.983	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30154.67	109.803	T-52 sec	8:05:46		
T-50 sec	8:05:48	59.984	471.00	0.00	0.00	0.00	0.00	0.00	-653.00	30154.67	107.611	T-50 sec	8:05:48		
T-48 sec	8:05:50	59.984	471.30	0.00	0.00	0.00	0.00	0.00	-653.00	30150.35	103.426	T-48 sec	8:05:50		
T-46 sec	8:05:52	59.985	471.30	0.00	0.00	0.00	0.00	0.00	-653.00	30150.35	97.049	T-46 sec	8:05:52		
T-44 sec	8:05:54	59.985	471.30	0.00	0.00	0.00	0.00	0.00	-653.00	30159.63	94.857	T-44 sec	8:05:54		
T-42 sec	8:05:56	59.986	471.30	0.00	0.00	0.00	0.00	0.00	-653.00	30159.63	88.680	T-42 sec	8:05:56		
T-40 sec	8:05:58	59.987	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30159.63	86.487	T-40 sec	8:05:58		
T-38 sec	8:06:00	59.987	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30159.63	82.303	T-38 sec	8:06:00		
T-36 sec	8:06:02	59.988	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30151.42	80.110	T-36 sec	8:06:02		
T-34 sec	8:06:04	59.989	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30151.42	71.741	T-34 sec	8:06:04		
T-32 sec	8:06:06	59.989	471.90	0.00	0.00	0.00	0.00	0.00	-653.00	30156.16	71.741	T-32 sec	8:06:06		
T-30 sec	8:06:08	59.988	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30156.16	78.118	T-30 sec	8:06:08		
T-28 sec	8:06:10	59.986	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30156.16	88.680	T-28 sec	8:06:10		
T-26 sec	8:06:12	59.985	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30156.16	94.857	T-26 sec	8:06:12		
T-24 sec	8:06:14	59.986	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30164.15	88.680	T-24 sec	8:06:14		
T-22 sec	8:06:16	59.989	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30164.15	69.549	T-22 sec	8:06:16		
T-20 sec	8:06:18	59.992	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30164.15	50.617	T-20 sec	8:06:18		
T-18 sec	8:06:20	59.995	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30164.15	31.685	T-18 sec	8:06:20		
T-16 sec	8:06:22	59.996	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30203.91	27.501	T-16 sec	8:06:22	59.999	471.09
T-14 sec	8:06:24	59.995	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30203.91	31.685	T-14 sec	8:06:24	59.999	471.09
T-12 sec	8:06:26	59.995	471.40	0.00	0.00	0.00	0.00	0.00	-653.00	30203.73	29.493	T-12 sec	8:06:26	59.999	471.09
T-10 sec	8:06:28	59.997	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30203.73	16.939	T-10 sec	8:06:28	59.999	471.09
T-08 sec	8:06:30	60.000	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30203.73	0.000	T-08 sec	8:06:30	59.999	471.09
T-06 sec	8:06:32	60.002	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30203.73	-10.562	T-06 sec	8:06:32	59.999	471.09
T-04 sec	8:06:34	60.002	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30199.61	-10.562	T-04 sec	8:06:34	59.999	471.09
T-02 sec	8:06:36	60.002	470.90	0.00	0.00	0.00	0.00	0.00	-653.00	30199.61	-12.754	T-02 sec	8:06:36	59.999	471.09
T+0 sec	8:06:38	59.960	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30199.61	263.647	T+0 sec	8:06:38		
T+02 sec	8:06:40	59.881	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30199.61	774.227	T+02 sec	8:06:40		
T+04 sec	8:06:42	59.872	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.11	833.413	T+04 sec	8:06:42		
T+06 sec	8:06:44	59.870	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.11	848.160	T+06 sec	8:06:44		
T+08 sec	8:06:46	59.870	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.11	848.160	T+08 sec	8:06:46		
T+10 sec	8:06:48	59.874	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.14	820.659	T+10 sec	8:06:48		
T+12 sec	8:06:50	59.881	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.14	778.611	T+12 sec	8:06:50		
T+14 sec	8:06:52	59.885	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.14	748.918	T+14 sec	8:06:52		
T+16 sec	8:06:54	59.888	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30086.14	732.179	T+16 sec	8:06:54		
T+18 sec	8:06:56	59.889	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30094.43	721.617	T+18 sec	8:06:56		
T+20 sec	8:06:58	59.891	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30094.43	713.048	T+20 sec	8:06:58	59.897	0.00
T+22 sec	8:07:00	59.892	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30094.43	706.870	T+22 sec	8:07:00	59.897	0.00
T+24 sec	8:07:02	59.892	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30094.43	702.486	T+24 sec	8:07:02	59.897	0.00
T+26 sec	8:07:04	59.893	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30139.49	698.301	T+26 sec	8:07:04	59.897	0.00
T+28 sec	8:07:06	59.893	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30139.49	698.301	T+28 sec	8:07:06	59.897	0.00
T+30 sec	8:07:08	59.893	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30133.38	698.301	T+30 sec	8:07:08	59.897	0.00
T+32 sec	8:07:10	59.895	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30133.38	683.555	T+32 sec	8:07:10	59.897	0.00
T+34 sec	8:07:12	59.898	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30133.38	666.815	T+34 sec	8:07:12	59.897	0.00
T+36 sec	8:07:14	59.900	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30133.38	656.253	T+36 sec	8:07:14	59.897	0.00

T+38 sec	8:07:16	59.901	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30137.26	647.684	T+38 sec	8:07:16	59.897	0.00
T+40 sec	8:07:18	59.902	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30137.26	639.314	T+40 sec	8:07:18	59.897	0.00
T+42 sec	8:07:20	59.902	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30137.26	641.307	T+42 sec	8:07:20	59.897	0.00
T+44 sec	8:07:22	59.901	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30137.26	647.684	T+44 sec	8:07:22	59.897	0.00
T+46 sec	8:07:24	59.901	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30171.38	647.684	T+46 sec	8:07:24	59.897	0.00
T+48 sec	8:07:26	59.900	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30171.38	649.876	T+48 sec	8:07:26	59.897	0.00
T+50 sec	8:07:28	59.899	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30168.76	658.246	T+50 sec	8:07:28	59.897	0.00
T+52 sec	8:07:30	59.899	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30168.76	660.438	T+52 sec	8:07:30	59.897	0.00
T+54 sec	8:07:32	59.899	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30168.76	662.431	T+54 sec	8:07:32		
T+56 sec	8:07:34	59.900	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30168.76	651.869	T+56 sec	8:07:34		
T+58 sec	8:07:36	59.902	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30208.99	637.122	T+58 sec	8:07:36		
T+60 sec	8:07:38	59.905	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30208.99	622.376	T+60 sec	8:07:38		
T+62 sec	8:07:40	59.907	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30208.99	607.629	T+62 sec	8:07:40		
T+64 sec	8:07:42	59.909	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30208.99	595.074	T+64 sec	8:07:42		
T+66 sec	8:07:44	59.909	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	592.882	T+66 sec	8:07:44		
T+68 sec	8:07:46	59.909	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	597.067	T+68 sec	8:07:46		
T+70 sec	8:07:48	59.909	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	595.074	T+70 sec	8:07:48		
T+72 sec	8:07:50	59.910	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	586.505	T+72 sec	8:07:50		
T+74 sec	8:07:52	59.912	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	571.759	T+74 sec	8:07:52		
T+76 sec	8:07:54	59.915	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30205.66	557.012	T+76 sec	8:07:54		
T+78 sec	8:07:56	59.918	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30211.75	538.080	T+78 sec	8:07:56		
T+80 sec	8:07:58	59.919	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30211.75	527.519	T+80 sec	8:07:58		
T+82 sec	8:08:00	59.921	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30211.75	516.957	T+82 sec	8:08:00		
T+84 sec	8:08:02	59.922	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30211.75	508.388	T+84 sec	8:08:02		
T+86 sec	8:08:04	59.923	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.55	502.210	T+86 sec	8:08:04		
T+88 sec	8:08:06	59.925	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.55	489.456	T+88 sec	8:08:06		
T+90 sec	8:08:08	59.925	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.57	489.456	T+90 sec	8:08:08		
T+92 sec	8:08:10	59.927	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.57	474.709	T+92 sec	8:08:10		
T+94 sec	8:08:12	59.932	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.57	441.031	T+94 sec	8:08:12		
T+96 sec	8:08:14	59.935	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.57	424.092	T+96 sec	8:08:14		
T+98 sec	8:08:16	59.937	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.59	411.338	T+98 sec	8:08:16		
T+100 sec	8:08:18	59.938	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.59	407.129	T+100 sec	8:08:18		
T+102 sec	8:08:20	59.939	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.59	396.567	T+102 sec	8:08:20		
T+104 sec	8:08:22	59.942	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30217.59	379.827	T+104 sec	8:08:22		
T+106 sec	8:08:24	59.944	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.49	365.081	T+106 sec	8:08:24		
T+108 sec	8:08:26	59.946	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.49	354.519	T+108 sec	8:08:26		
T+110 sec	8:08:28	59.948	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.26	339.772	T+110 sec	8:08:28		
T+112 sec	8:08:30	59.948	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.26	341.765	T+112 sec	8:08:30		
T+114 sec	8:08:32	59.945	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.26	356.512	T+114 sec	8:08:32		
T+116 sec	8:08:34	59.944	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30210.26	362.888	T+116 sec	8:08:34		
T+118 sec	8:08:36	59.944	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30234.59	365.081	T+118 sec	8:08:36		
T+120 sec	8:08:38	59.945	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30234.59	358.704	T+120 sec	8:08:38		
T+122 sec	8:08:40	59.946	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30234.59	352.327	T+122 sec	8:08:40		
T+124 sec	8:08:42	59.946	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30234.59	350.135	T+124 sec	8:08:42		
T+126 sec	8:08:44	59.947	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.60	343.957	T+126 sec	8:08:44		
T+128 sec	8:08:46	59.948	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.60	337.580	T+128 sec	8:08:46		
T+130 sec	8:08:48	59.949	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.73	333.395	T+130 sec	8:08:48		
T+132 sec	8:08:50	59.950	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.73	327.018	T+132 sec	8:08:50		
T+134 sec	8:08:52	59.951	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.73	320.641	T+134 sec	8:08:52		

T+136 sec	8:08:54	59.952	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30223.73	316.456	T+136 sec	8:08:54
T+138 sec	8:08:56	59.952	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	314.264	T+138 sec	8:08:56
T+140 sec	8:08:58	59.953	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	303.902	T+140 sec	8:08:58
T+142 sec	8:09:00	59.955	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	293.340	T+142 sec	8:09:00
T+144 sec	8:09:02	59.956	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	288.956	T+144 sec	8:09:02
T+146 sec	8:09:04	59.956	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.53	284.771	T+146 sec	8:09:04
T+148 sec	8:09:06	59.958	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.53	274.209	T+148 sec	8:09:06
T+150 sec	8:09:08	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	253.085	T+150 sec	8:09:08
T+152 sec	8:09:10	59.963	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	244.716	T+152 sec	8:09:10
T+154 sec	8:09:12	59.962	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	248.900	T+154 sec	8:09:12
T+156 sec	8:09:14	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	253.085	T+156 sec	8:09:14
T+158 sec	8:09:16	59.960	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	259.462	T+158 sec	8:09:16
T+160 sec	8:09:18	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	257.469	T+160 sec	8:09:18
T+162 sec	8:09:20	59.962	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	246.908	T+162 sec	8:09:20
T+164 sec	8:09:22	59.965	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	227.777	T+164 sec	8:09:22
T+166 sec	8:09:24	59.967	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.99	213.030	T+166 sec	8:09:24
T+168 sec	8:09:26	59.969	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.99	202.468	T+168 sec	8:09:26
T+170 sec	8:09:28	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	191.906	T+170 sec	8:09:28
T+172 sec	8:09:30	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	175.167	T+172 sec	8:09:30
T+174 sec	8:09:32	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	172.975	T+174 sec	8:09:32
T+176 sec	8:09:34	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	177.160	T+176 sec	8:09:34
T+178 sec	8:09:36	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	179.352	T+178 sec	8:09:36
T+180 sec	8:09:38	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	175.167	T+180 sec	8:09:38
	8:09:40	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	168.790		
	8:09:42	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	160.420		
	8:09:44	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.63	158.228		
	8:09:46	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.63	156.036		
	8:09:48	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	151.851		
	8:09:50	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	143.481		
	8:09:52	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	135.112		
	8:09:54	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	130.728		
	8:09:56	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	132.920		
	8:09:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	137.104		
	8:10:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	132.920		
	8:10:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	124.550		
	8:10:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30260.67	115.981		
	8:10:06	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30260.67	105.419		
	8:10:08	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	97.049		
	8:10:10	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	80.110		
	8:10:12	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	63.371		
	8:10:14	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	46.432		
	8:10:16	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	27.501		
	8:10:18	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	23.116		
	8:10:20	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	27.501		
	8:10:22	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	25.309		
	8:10:24	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.68	27.501		
	8:10:26	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.68	33.678		
	8:10:28	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	33.678		
	8:10:30	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	12.754		

8:10:32	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	8.370
8:10:34	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	-2.192
8:10:36	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-12.754
8:10:38	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-16.939
8:10:40	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-14.747
8:10:42	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-12.754
8:10:44	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30314.84	-4.185
8:10:46	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30314.84	23.116
8:10:48	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	52.809
8:10:50	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	71.741
8:10:52	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	80.110
8:10:54	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	71.741
8:10:56	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	48.624
8:10:58	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	27.501
8:11:00	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	6.377
8:11:02	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	-12.754
8:11:04	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.21	-31.685
8:11:06	60.008	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.21	-52.809
8:11:08	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-75.926
8:11:10	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-92.864
8:11:12	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-99.241
8:11:14	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-101.234
8:11:16	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-101.234
8:11:18	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-109.803
8:11:20	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-124.550
8:11:22	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-149.858
8:11:24	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.48	-170.982
8:11:26	60.030	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.48	-194.099
8:11:28	60.033	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-213.030
8:11:30	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-225.784
8:11:32	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-229.969
8:11:34	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-223.592
8:11:36	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-219.407
8:11:38	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-229.969
8:11:40	60.038	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-248.900
8:11:42	60.040	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-263.647
8:11:44	60.041	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.79	-268.031
8:11:46	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.79	-274.209
8:11:48	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-276.401
8:11:50	60.043	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-282.778
8:11:52	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-288.956
8:11:54	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-293.340
8:11:56	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-297.525
8:11:58	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-299.518
8:12:00	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-303.902
8:12:02	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-318.648
8:12:04	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30343.46	-324.826
8:12:06	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30343.46	-320.641
8:12:08	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-320.641

8:12:10	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-329.210
8:12:12	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-324.826
8:12:14	60.048	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-316.456
8:12:16	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-308.087
8:12:18	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-299.518
8:12:20	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-299.518
8:12:22	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-297.525
8:12:24	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.20	-288.956
8:12:26	60.043	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.20	-280.586
8:12:28	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-272.216
8:12:30	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-276.401
8:12:32	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-291.148
8:12:34	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-303.902
8:12:36	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-308.087
8:12:38	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-301.710
8:12:40	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-288.956
8:12:42	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-293.340
8:12:44	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-295.333
8:12:46	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-295.333
8:12:48	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-297.525
8:12:50	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-301.710
8:12:52	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-303.902
8:12:54	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-303.902
8:12:56	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-295.333
8:12:58	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-284.771
8:13:00	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-274.209
8:13:02	60.041	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-265.839
8:13:04	60.039	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.65	-253.085
8:13:06	60.036	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.65	-234.154
8:13:08	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-221.599
8:13:10	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-219.407
8:13:12	60.033	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-213.030
8:13:14	60.030	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-196.291
8:13:16	60.027	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-179.352
8:13:18	60.027	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-175.167
8:13:20	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-168.790
8:13:22	60.024	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-154.043
8:13:24	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.33	-143.481
8:13:26	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.33	-141.289
8:13:28	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-145.674
8:13:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-139.297
8:13:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-139.297
8:13:34	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-130.728
8:13:36	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-115.981
8:13:38	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-103.426
8:13:40	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-84.295
8:13:42	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-73.933
8:13:44	60.010	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.69	-65.364
8:13:46	60.009	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.69	-61.179

8:13:48	60.008	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-50.617
8:13:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-33.678
8:13:52	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-29.493
8:13:54	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-40.055
8:13:56	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-40.055
8:13:58	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-35.870
8:14:00	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-33.678
8:14:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-25.309
8:14:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.31	-16.939
8:14:06	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.31	-8.370
8:14:08	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-8.370
8:14:10	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-4.185
8:14:12	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-2.192
8:14:14	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-14.747
8:14:16	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-27.501
8:14:18	60.007	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-44.240
8:14:20	60.009	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-58.987
8:14:22	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-84.295
8:14:24	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.85	-97.049
8:14:26	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.85	-94.857
8:14:28	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-92.864
8:14:30	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-99.241
8:14:32	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-105.419
8:14:34	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-109.803
8:14:36	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-113.988
8:14:38	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-111.796
8:14:40	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-109.803
8:14:42	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-107.611
8:14:44	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.99	-105.419
8:14:46	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.99	-113.988
8:14:48	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-115.981
8:14:50	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-115.981
8:14:52	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-107.611
8:14:54	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-103.426
8:14:56	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-107.611
8:14:58	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-103.426
8:15:00	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-88.680
8:15:02	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-75.926
8:15:04	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30371.85	-73.933
8:15:06	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30371.85	-73.933
8:15:08	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-71.741
8:15:10	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-71.741
8:15:12	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-84.295
8:15:14	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-97.049
8:15:16	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-115.981
8:15:18	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-115.981
8:15:20	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-120.166
8:15:22	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-118.173
8:15:24	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30397.03	-113.988

8:15:26	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30397.03	-99.241
8:15:28	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-99.241
8:15:30	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-90.672
8:15:32	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-113.988
8:15:34	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-124.550
8:15:36	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-124.550
8:15:38	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-132.920
8:15:40	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-122.358
8:15:42	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-122.358
8:15:44	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.78	-128.735
8:15:46	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.78	-128.735
8:15:48	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-128.735
8:15:50	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-120.166
8:15:52	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-97.049
8:15:54	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-88.680
8:15:56	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-90.672
8:15:58	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-80.110
8:16:00	60.010	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-65.364
8:16:02	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-38.062
8:16:04	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.03	-10.562
8:16:06	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.03	-10.562
8:16:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	12.754
8:16:10	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	42.247
8:16:12	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	48.624
8:16:14	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	50.617
8:16:16	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	65.364
8:16:18	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	75.926
8:16:20	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	103.426
8:16:22	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	120.166
8:16:24	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.96	124.550
8:16:26	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.96	128.735
8:16:28	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	130.728
8:16:30	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	141.289
8:16:32	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	162.413
8:16:34	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	177.160
8:16:36	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	183.537
8:16:38	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	185.729
8:16:40	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	170.982
8:16:42	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	154.043
8:16:44	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.59	141.289
8:16:46	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.59	149.858
8:16:48	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	166.598
8:16:50	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	187.722
8:16:52	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	189.914
8:16:54	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	177.160
8:16:56	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	166.598
8:16:58	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	170.982
8:17:00	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	175.167
8:17:02	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	166.598

8:17:04	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.40	156.036
8:17:06	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.40	147.666
8:17:08	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	141.289
8:17:10	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	145.674
8:17:12	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	149.858
8:17:14	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	154.043
8:17:16	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	160.420
8:17:18	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	170.982
8:17:20	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	175.167
8:17:22	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	181.345
8:17:24	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30413.65	183.537
8:17:26	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30413.65	189.914
8:17:28	59.970	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	196.291
8:17:30	59.968	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	206.852
8:17:32	59.966	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	221.599
8:17:34	59.965	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	225.784
8:17:36	59.966	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	221.599
8:17:38	59.969	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	200.475
8:17:40	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	179.352
8:17:42	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	172.975
8:17:44	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	170.982
8:17:46	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352
8:17:48	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352
8:17:50	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352
8:17:52	59.968	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	211.037
8:17:54	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	187.722
8:17:56	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228
8:17:58	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228
8:18:00	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228
8:18:02	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	103.426
8:18:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30425.74	118.173
8:18:06	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30425.74	137.104
8:18:08	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	145.674
8:18:10	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	145.674
8:18:12	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	122.358
8:18:14	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	99.241
8:18:16	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	73.933
8:18:18	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	54.802
8:18:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	42.247
8:18:22	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	27.501
8:18:24	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30440.82	21.124
8:18:26	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30440.82	14.747
8:18:28	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	10.562
8:18:30	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	14.747
8:18:32	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	18.932
8:18:34	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	16.939
8:18:36	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	16.939
8:18:38	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	16.939
8:18:40	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	-4.185

8:18:42	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	-21.124
8:18:44	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.11	-23.116
8:18:46	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.11	-16.939
8:18:48	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	-6.377
8:18:50	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	4.185
8:18:52	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	16.939
8:18:54	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	21.124
8:18:56	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	21.124
8:18:58	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	18.932
8:19:00	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	14.747
8:19:02	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	8.370
8:19:04	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.86	2.192
8:19:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.86	0.000
8:19:08	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-2.192
8:19:10	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-6.377
8:19:12	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-14.747
8:19:14	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-18.932
8:19:16	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-16.939
8:19:18	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-14.747
8:19:20	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-14.747
8:19:22	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-21.124
8:19:24	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-27.501
8:19:26	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-31.685
8:19:28	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-29.493
8:19:30	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116
8:19:32	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116
8:19:34	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116
8:19:36	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116
8:19:38	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116
8:19:40	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116
8:19:42	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116
8:19:44	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-40.055
8:19:46	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-31.685
8:19:48	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493
8:19:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493
8:19:52	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-23.116
8:19:54	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-18.932
8:19:56	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562
8:19:58	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562
8:20:00	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501
8:20:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501
8:20:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-18.932
8:20:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-2.192
8:20:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	12.754
8:20:10	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	23.116
8:20:12	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	31.685
8:20:14	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	40.055
8:20:16	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	46.432
8:20:18	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	48.624

8:20:20	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	50.617
8:20:22	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	67.556
8:20:24	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	97.049
8:20:26	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	113.988
8:20:28	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	141.289
8:20:30	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	154.043
8:20:32	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858
8:20:34	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858
8:20:36	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	149.858
8:20:38	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	143.481
8:20:40	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	132.920
8:20:42	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	120.166
8:20:44	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	122.358
8:20:46	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	135.112
8:20:48	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	156.036
8:20:50	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	160.420
8:20:52	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	158.228
8:20:54	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	151.851
8:20:56	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	143.481
8:20:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	137.104
8:21:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	132.920
8:21:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	126.543
8:21:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	118.173
8:21:06	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	115.981
8:21:08	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988
8:21:10	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	111.796
8:21:12	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988
8:21:14	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988
8:21:16	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	111.796
8:21:18	59.986	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	90.672
8:21:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	40.055
8:21:22	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	-14.747
8:21:24	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-71.741
8:21:26	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-111.796
8:21:28	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-135.112
8:21:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297
8:21:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297
8:21:34	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297
8:21:36	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-151.851
8:21:38	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-166.598

Date:	Monday, May 16, 2011	
Time of T(0)	8:06:38	
:o 60 Hz or Pre-Perturbation Hz	8:10:30	
age Frequency [T(-2) to T(-16)]	59.999	Hz
ge Frequency [T(+20 to T(+52)]	59.897	Hz
rbation Delta Frequency Actual	-0.101	Hz
ntingency MW [T(-2) to T(-16)]	471.09	MW
tingency MW [T(+20 to T(+52)]	0.00	MW
Contingency Delta MW Actual	471.09	MW
EPFR Pre-Perturbation Average	8.97	MW
PFR Post-Perturbation Average	671.54	MW
EPFR Unadjusted	662.57	MW
EPFR Adjusted	662.57	MW
Pre Load Resources MW	0.00	MW
Pre Non-Conforming Load MW	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
f Pre Perturbation Adjustments	0.00	MW
Post Load Resources MW	0.00	MW
ost Non-Conforming Load MW	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Post Perturbation Adjustments	0.00	MW
Net Total Adjustments MW	0.00	MW

eriod Evaluation

nitial P.U. Performance for FRO	0.711	P.U.
Performance Adjusted for FRO	0.711	P.U.

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

Frequency @ T(+46)	59.901	Hz							
Frequency @ T(+76)	59.915	Hz	Actual		Load	Non-			
Frequency @ T(+106)	59.944	Hz	Primary	Un-adjusted	Resources	Conforming			
Frequency @ T(+136)	59.952	Hz	Freq Response	P.U.	Tripped	Load	Spare	Spare	Spare
Frequency @ T(+166)	59.967	Hz	MW/0.1 Hz	Performance	Adjustment	Adjustment	Adjustment	Adjustment	Adjustment
EPFR @ T(+46)	-653.00	MW/0.1 Hz	-481.62	0.738	0.00	0.00	0.00	0.00	0.00
EPFR @ T(+76)	-653.00	MW/0.1 Hz	-561.31	0.860	0.00	0.00	0.00	0.00	0.00
EPFR @ T(+106)	-653.00	MW/0.1 Hz	-863.83	1.323	0.00	0.00	0.00	0.00	0.00
EPFR @ T(+136)	-653.00	MW/0.1 Hz	-1000.43	1.532	0.00	0.00	0.00	0.00	0.00
EPFR @ T(+166)	-653.00	MW/0.1 Hz	-1507.48	2.309	0.00	0.00	0.00	0.00	0.00

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-653.00	MW/0.1 Hz
Post-Perturbation Bias Setting	-653.00	MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	8.97	MW
EPFR for Bias Setting Post-Perturbation Average	671.54	MW
EPFR for Bias Setting Delta	662.57	MW
Primary Frequency Response Delivery % of Bias	71.10%	
Pre-Perturbation BA Load	30202.7	MW
Post-Perturbation BA Load	30136.8	MW
Pre to Post Perturbation BA Load Change	-65.973	MW
Load Dampening Frequency Response	-65.020	MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	14.00%	
Average Bias Setting when Hz is greater than +/-0.036 Hz	-653.00	MW/0.1 Hz

Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected MW/0.1 Hz Response MW/0.1 Hz	Actual Average Primary Freq Response MW/0.1 Hz	Actual Primary Freq Response Beta MW/0.1 Hz
											0.0197
											0.0178
											0.0165
											0.0142
											0.0126
											0.0120

											0.0126	
											0.0139	
											0.0152	
											0.0165	
											0.0168	
											0.0165	
											0.0158	
											0.0149	
											0.0145	
											0.0136	
											0.0132	
											0.0126	
											0.0123	
											0.0110	
											0.0110	
											0.0120	
											0.0136	
											0.0145	
											0.0136	
											0.0107	
											0.0078	
											0.0049	
0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0042	
0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0049	
0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0045	
0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0026	
0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0000	
0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0016	
0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0016	
0.000	0.000	0.000	0.000	0.000	-653.00	30202.74	8.968				0.0020	
											0.0404	-653
										401.98	0.1186	-653
										373.12	0.1276	-653
										366.57	0.1299	-653
										366.57	0.1299	-653
										378.99	0.1257	-653
										399.69	0.1192	-653
										415.73	0.1147	-653
										425.35	0.1121	-653
										431.66	0.1105	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	436.91	0.1092	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	440.78	0.1082	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	443.56	0.1076	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	456.01	0.1047	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	467.62	0.1021	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	475.25	0.1005	-653

0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	488.02	0.0979	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	486.48	0.0982	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	479.97	0.0995	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	473.79	0.1008	-653
0.000	0.000	0.000	0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	472.19	0.1011	-653
										470.75	0.1014	-653
										478.49	0.0998	-653
										489.72	0.0976	-653
										501.49	0.0953	-653
										513.85	0.0931	-653
										524.85	0.0911	-653
										526.82	0.0908	-653
										523.07	0.0914	-653
										524.85	0.0911	-653
										532.64	0.0898	-653
										546.60	0.0876	-653
										561.31	0.0853	-653
										581.39	0.0824	-653
										593.23	0.0808	-653
										605.56	0.0792	-653
										615.95	0.0779	-653
										623.67	0.0769	-653
										640.22	0.0750	-653
										640.22	0.0750	-653
										660.50	0.0727	-653
										711.98	0.0675	-653
										741.03	0.0649	-653
										764.52	0.0630	-653
										772.60	0.0623	-653
										793.66	0.0607	-653
										829.48	0.0582	-653
										863.83	0.0559	-653
										890.23	0.0543	-653
										929.92	0.0520	-653
										924.35	0.0523	-653
										885.13	0.0546	-653
										869.18	0.0556	-653
										863.83	0.0559	-653
										879.58	0.0549	-653
										895.91	0.0540	-653
										901.67	0.0536	-653
										918.30	0.0527	-653
										936.12	0.0517	-653
										948.19	0.0511	-653
										967.21	0.0501	-653
										986.99	0.0491	-653

1000.43	0.0485	-653
1007.61	0.0481	-653
1043.01	0.0465	-653
1081.75	0.0449	-653
1098.69	0.0443	-653
1115.36	0.0436	-653
1159.77	0.0420	-653
1260.13	0.0388	-653
1304.87	0.0375	-653
1282.11	0.0381	-653
1260.13	0.0388	-653
1228.05	0.0397	-653
1237.90	0.0394	-653
1292.85	0.0378	-653
1405.88	0.0349	
1507.48	0.0326	
1589.76	0.0310	
1681.55	0.0294	
1850.91	0.0268	
1875.65	0.0265	
1828.98	0.0271	
1805.45	0.0275	
1850.91	0.0268	
1924.76	0.0258	
2031.13	0.0246	
2060.96	0.0242	
2091.68	0.0239	
2152.94	0.0233	
2286.90	0.0220	
2438.64	0.0207	
2526.45	0.0200	
2481.77	0.0204	
2400.71	0.0210	
2481.77	0.0204	
2661.48	0.0191	
2874.60	0.0178	
3189.38	0.0161	
3492.44	0.0149	
4323.98	0.0123	
5654.43	0.0097	
8210.95	0.0071	
16598.49	0.0042	
21741.68	0.0035	
16598.49	0.0042	
18825.12	0.0039	
16598.49	0.0042	
12448.87	0.0052	
12448.87	0.0052	
81245.24	0.0020	

	0.0013	
	0.0003	
	0.0020	
	0.0026	
	0.0023	
	0.0020	
	0.0006	
21741.68	0.0035	
7016.63	0.0081	
4900.51	0.0110	
4323.98	0.0123	
4900.51	0.0110	
7757.08	0.0074	
16598.49	0.0042	
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	0.0020	
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	0.0420	-653
	0.0423	-653
	0.0433	-653
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	0.0449	-653
	0.0456	-653
	0.0459	-653
	0.0465	-653
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	0.0497	-653
	0.0491	-653
	0.0491	-653

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0.0472	-653
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0.0456	-653
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0.0465	-653
0.0472	-653
0.0462	-653
0.0443	-653
0.0449	-653
0.0452	-653
0.0452	-653
0.0456	-653
0.0462	-653
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0.0465	-653
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0.0336	
0.0326	
0.0301	
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0.0268	
0.0258	
0.0236	
0.0220	
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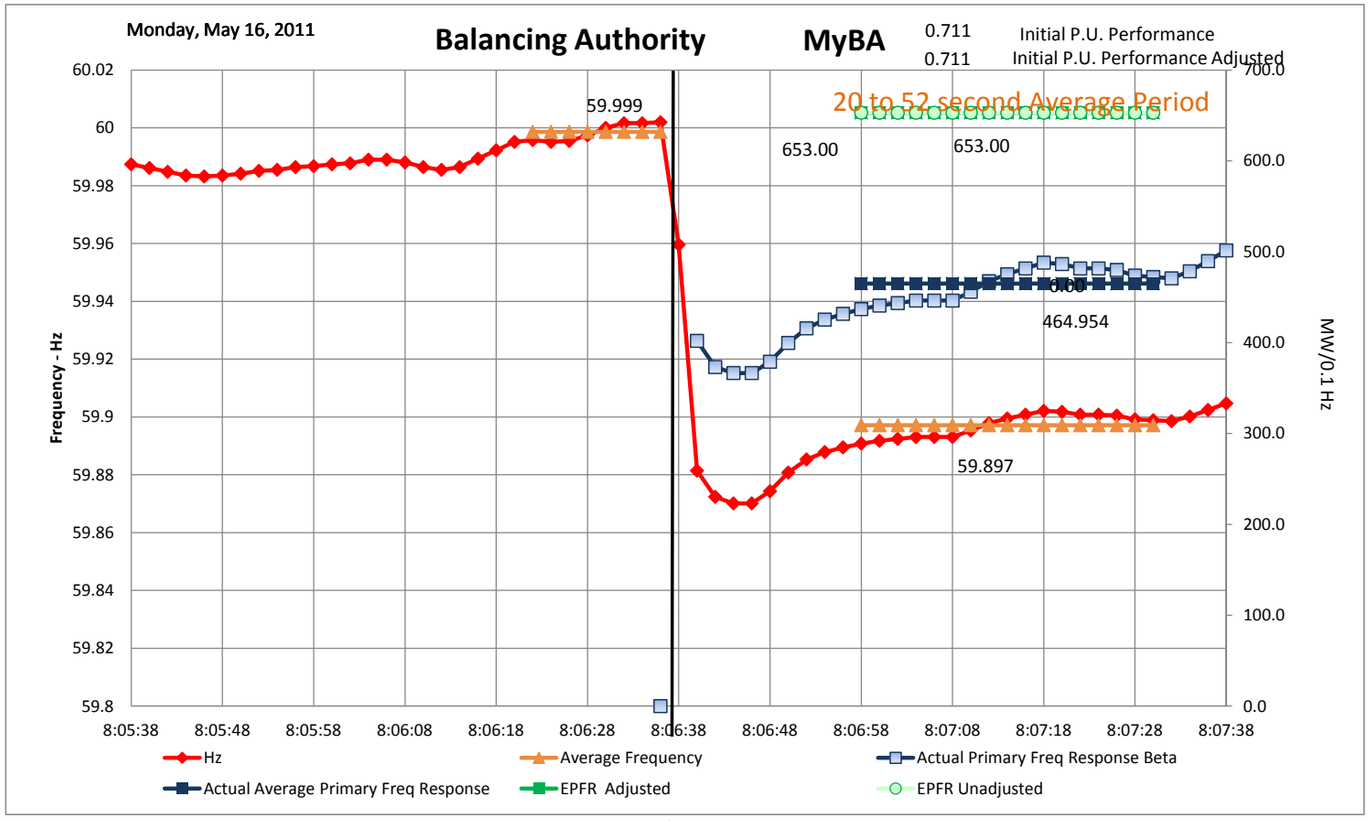
	0.0197
	0.0184
	0.0149
	0.0136
	0.0139
	0.0123
	0.0100
	0.0058
	0.0016
	0.0016
81245.24	0.0020
9243.47	0.0065
7757.08	0.0074
7385.93	0.0078
5454.63	0.0100
4594.22	0.0116
3256.67	0.0158
2766.41	0.0184
2661.48	0.0191
2568.49	0.0197
2526.45	0.0200
2324.79	0.0216
2004.75	0.0249
1828.98	0.0271
1762.17	0.0281
1740.32	0.0284
1898.72	0.0262
2120.41	0.0236
2324.79	0.0216
2183.39	0.0229
1951.53	0.0255
1720.91	0.0287
1700.07	0.0291
1828.98	0.0271
1951.53	0.0255
1898.72	0.0262
1850.91	0.0268
1951.53	0.0255

2091.68	0.0239
2217.90	0.0226
2324.79	0.0216
2250.23	0.0223
2183.39	0.0229
2120.41	0.0236
2031.13	0.0246
1898.72	0.0262
1850.91	0.0268
1784.58	0.0278
1762.17	0.0281
1700.07	0.0291
1642.19	0.0301
1554.54	0.0317
1446.73	0.0339
1418.80	0.0346
1446.73	0.0339
1606.31	0.0307
1805.45	0.0275
1875.65	0.0265
1898.72	0.0262
1805.45	0.0275
1805.45	0.0275
1805.45	0.0275
1522.35	0.0323
1720.91	0.0287
2060.96	0.0242
2060.96	0.0242
2060.96	0.0242
3256.67	0.0158
2816.90	0.0181
2400.71	0.0210
2250.23	0.0223
2250.23	0.0223
2712.93	0.0187
3407.64	0.0152
4735.15	0.0113
6711.56	0.0084
9243.47	0.0065
16598.49	0.0042
25305.89	0.0032
53229.64	0.0023
192957.44	0.0016
53229.64	0.0023
30873.19	0.0029
38591.49	0.0026
38591.49	0.0026
38591.49	0.0026
	0.0006

	0.0032
	0.0035
	0.0026
	0.0010
	0.0006
38591.49	0.0026
25305.89	0.0032
25305.89	0.0032
30873.19	0.0029
53229.64	0.0023
	0.0013
	0.0003
	0.0000
	0.0003
	0.0010
	0.0023
	0.0029
	0.0026
	0.0023
	0.0023
	0.0032
	0.0042
	0.0049
	0.0045
	0.0035
	0.0035
	0.0035
	0.0035
	0.0035
	0.0035
	0.0035
	0.0061
	0.0049
	0.0045
	0.0045
	0.0035
	0.0029
	0.0016
	0.0016
	0.0042
	0.0042
	0.0029
	0.0003
81245.24	0.0020
21741.68	0.0035
13540.87	0.0049
9895.25	0.0061
8210.95	0.0071
7757.08	0.0074

7385.93	0.0078
5250.54	0.0103
3492.44	0.0149
2929.15	0.0175
2324.79	0.0216
2120.41	0.0236
2183.39	0.0229
2183.39	0.0229
2183.39	0.0229
2286.90	0.0220
2481.77	0.0204
2766.41	0.0184
2712.93	0.0187
2438.64	0.0207
2091.68	0.0239
2031.13	0.0246
2060.96	0.0242
2152.94	0.0233
2286.90	0.0220
2400.71	0.0210
2481.77	0.0204
2616.37	0.0194
2816.90	0.0181
2874.60	0.0178
2929.15	0.0175
2991.59	0.0171
2929.15	0.0175
2929.15	0.0175
2991.59	0.0171
3765.02	0.0139
9895.25	0.0061
	0.0023
	0.0110
	0.0171
	0.0207
	0.0213
	0.0213
	0.0213
	0.0233
	0.0255

Adjusted P.U. Performance
0.738
0.860
1.323
1.532
2.309



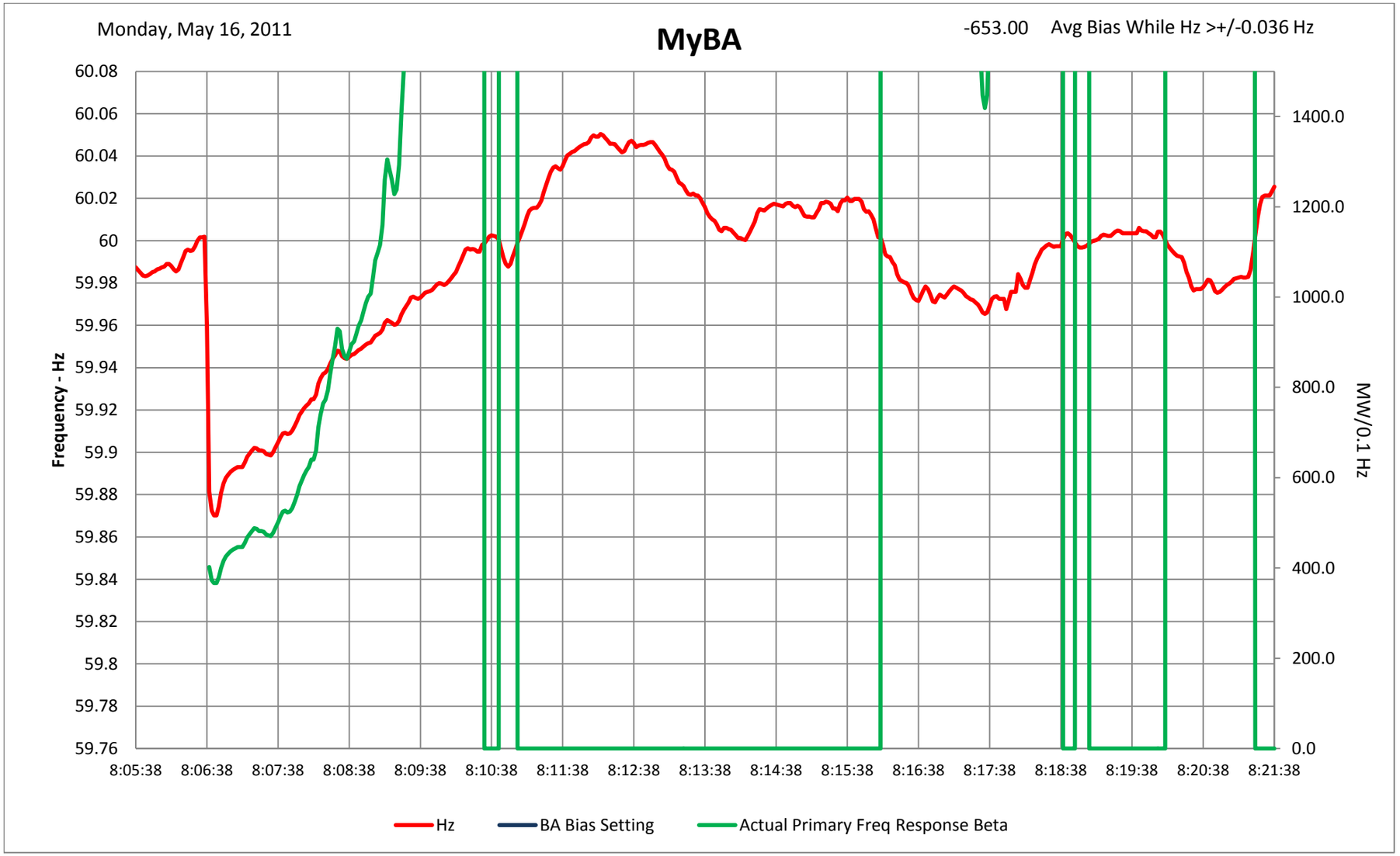
T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

"Auto" Event Detection adjustment of T(0).
# of rows to shift T(0)
1
A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.


Monday, May 16, 2011
MyBA
-653.00 Avg Bias While Hz >+/-0.036 Hz
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Bias Setting
Actual Primary Freq Response Beta

						Value A Data	BA Performance										Value B	20 to 52 s
Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW
Monday, May 16, 2011	8:06:38	60.002	59.999	8:06:38	59.870	59.999	471.09	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30202.74	8.97	59.897	0.00

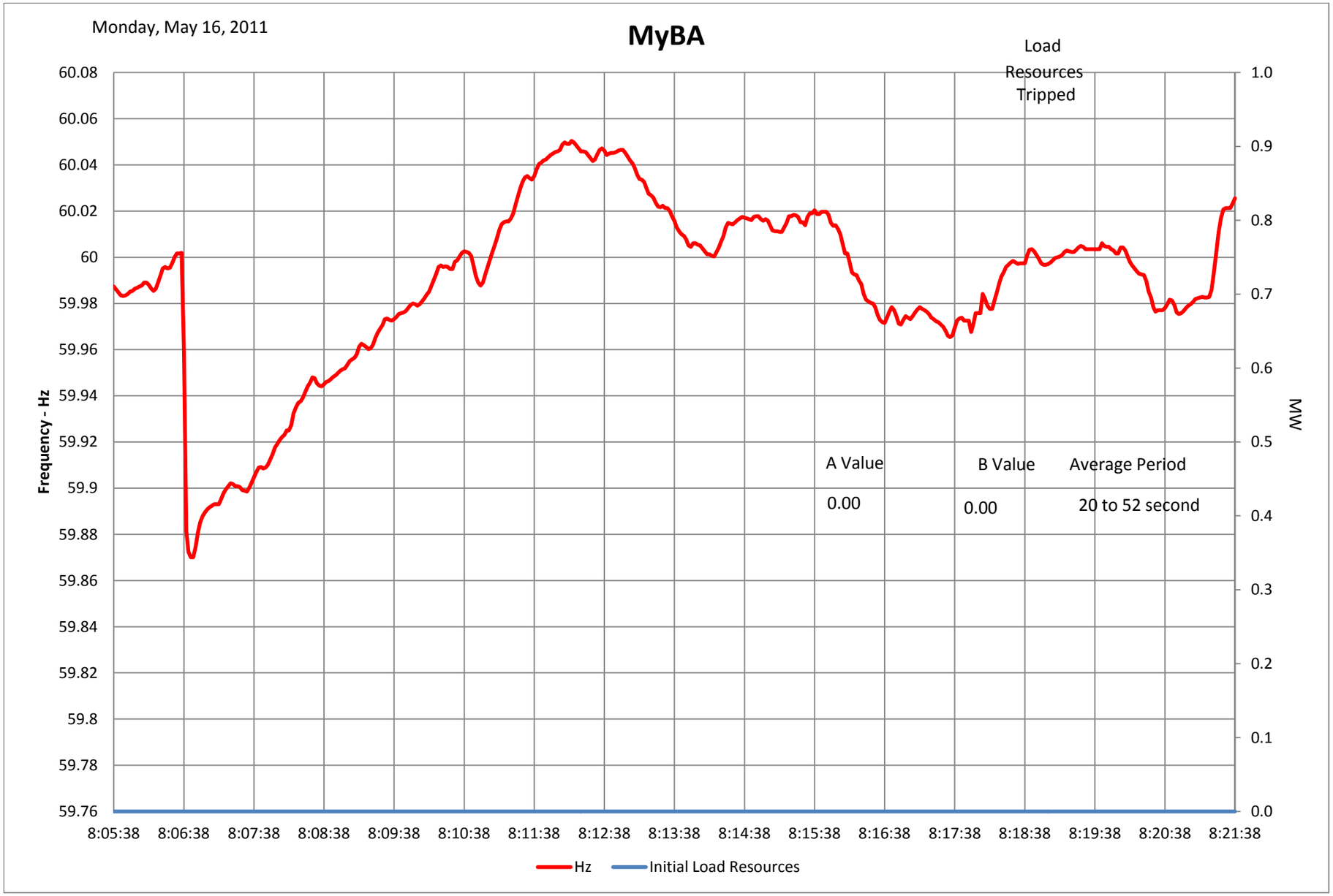
econd Average Period Evaluation

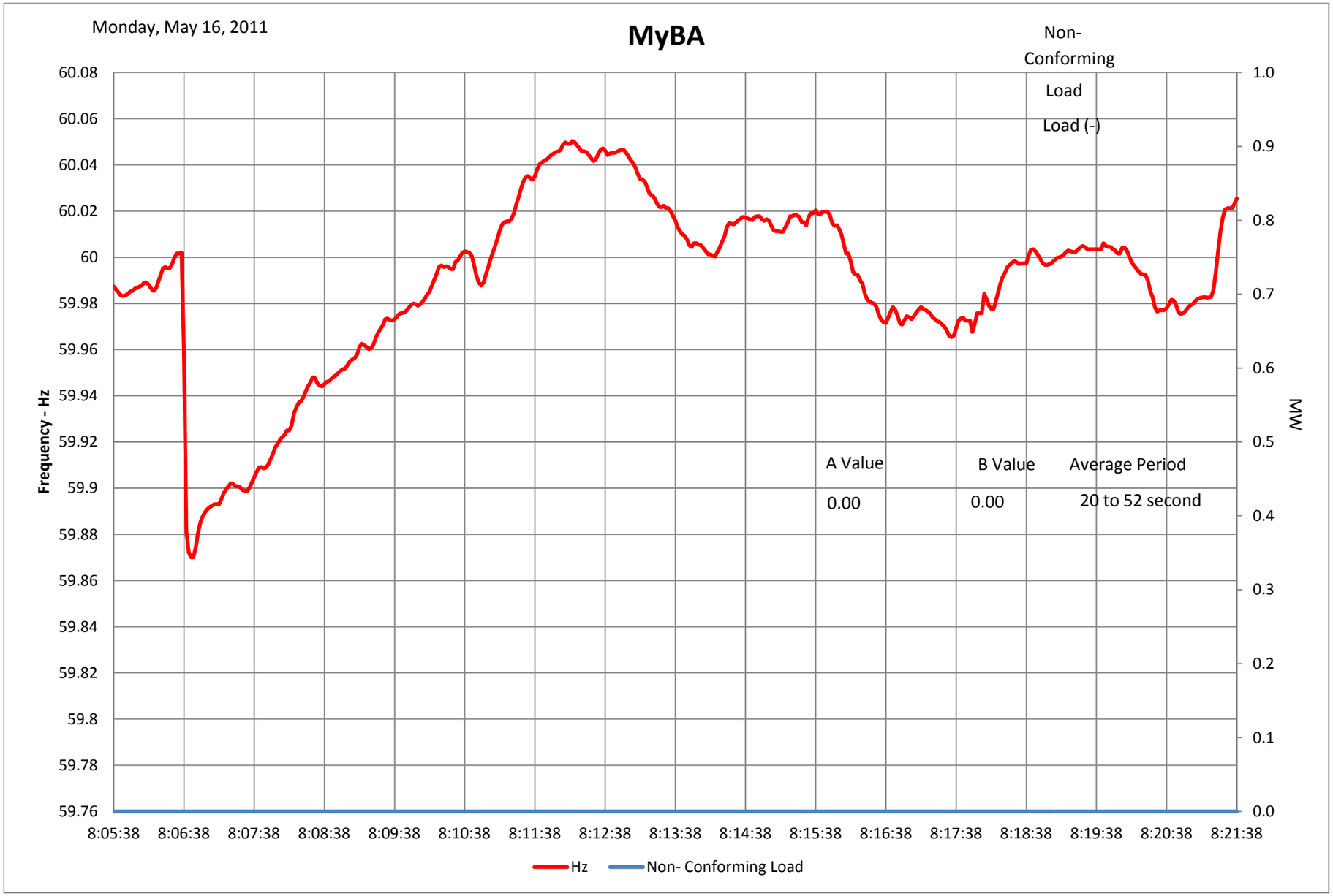
Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Frequency Response Initiative - Additional Pri: Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.
0.00	0.00	0.00	0.00	0.00	0.00	0.711	0.711	0.738	-653.00	30136.77	671.54	-653.00	0.738	0.860	1.323	1.532	2.309

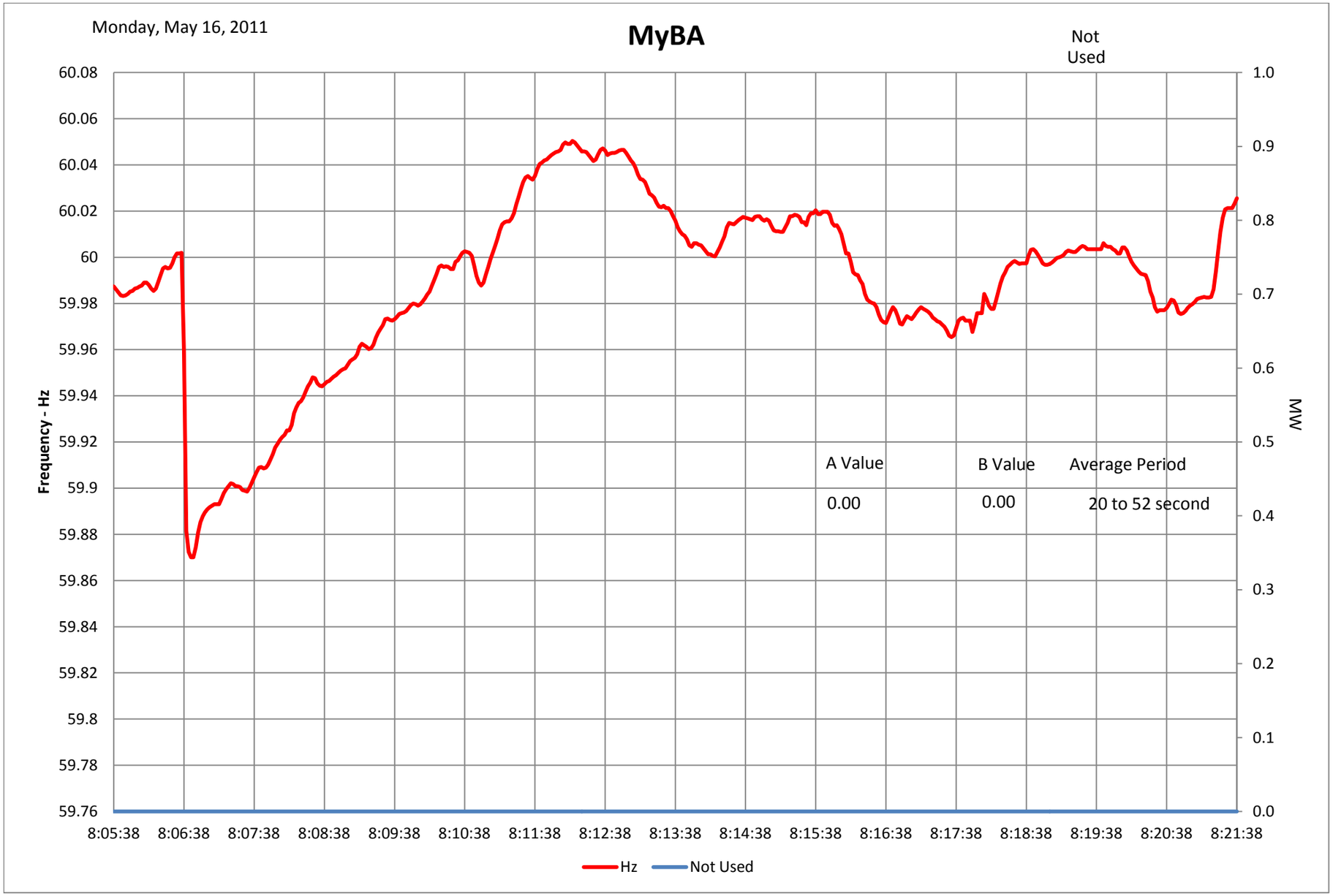
imary Frequency Response Evaluation Points						
Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
0.738	0.860	1.323	1.532	2.309	-653.00	-653.00

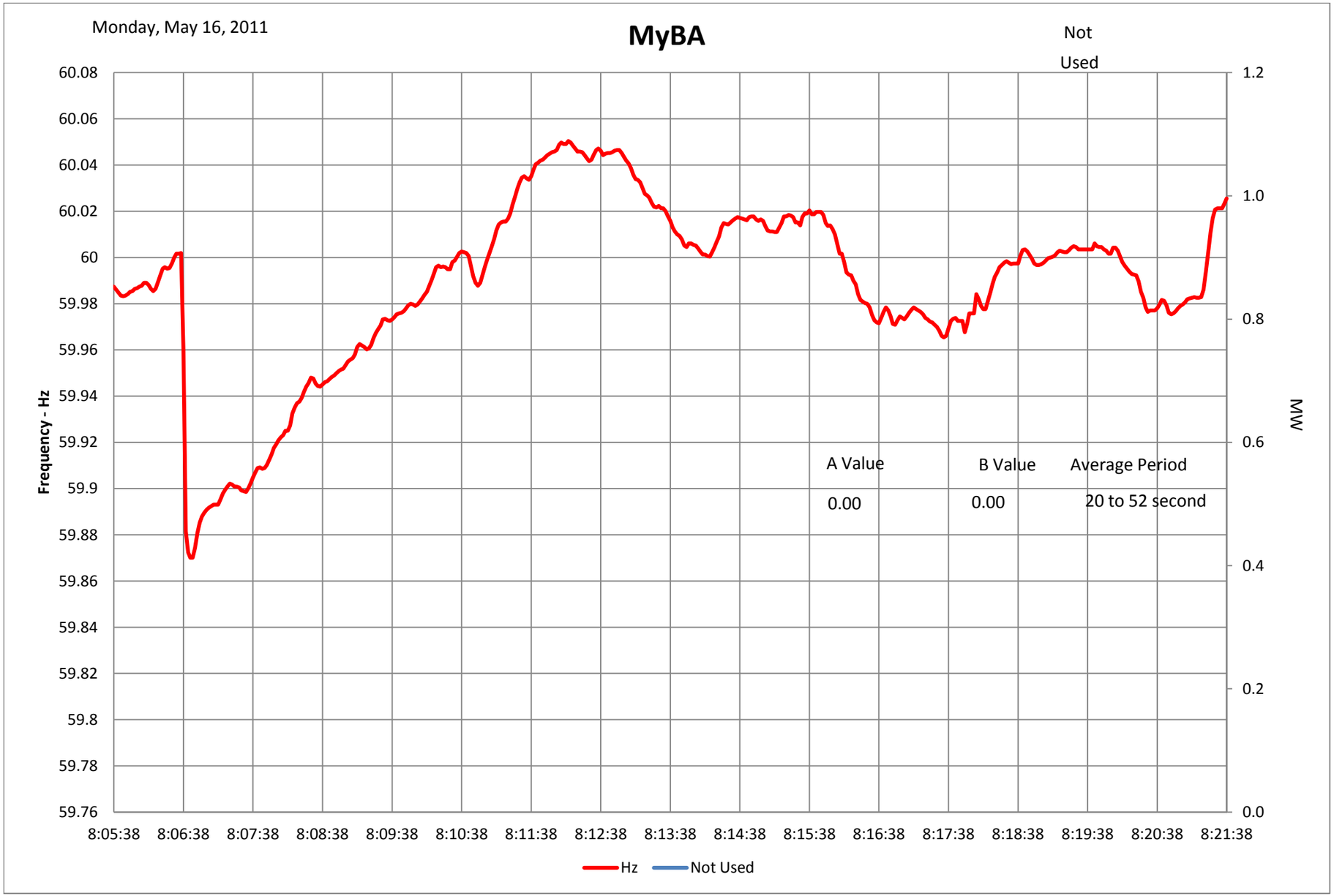
Steps	**To be completed for each event evaluated.**
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order: Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Contingent Resouce Lost MW or Lost Load Column D: Load Resources tripped during the event. Column E: Non Conforming Load Column F: Spare Column G: Not Used Column H: Spare Column I: Spare Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D & E are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data. Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time. If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary. To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events) This value controls the end of the "Sustained Frequency Response" evaluation period. Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

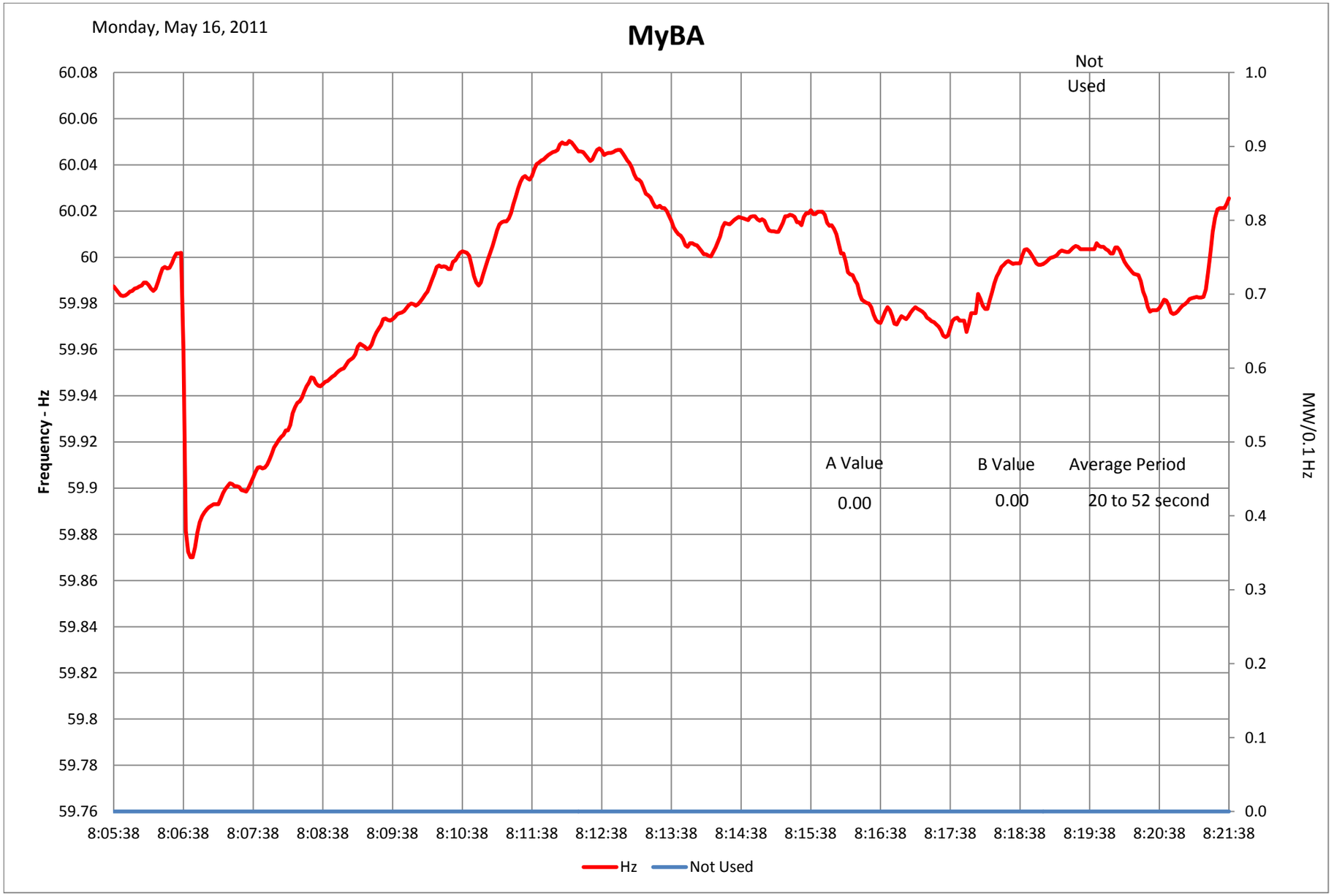
Steps	**To be completed the first time you use Form 2 for your BA.**
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "ERCOT".

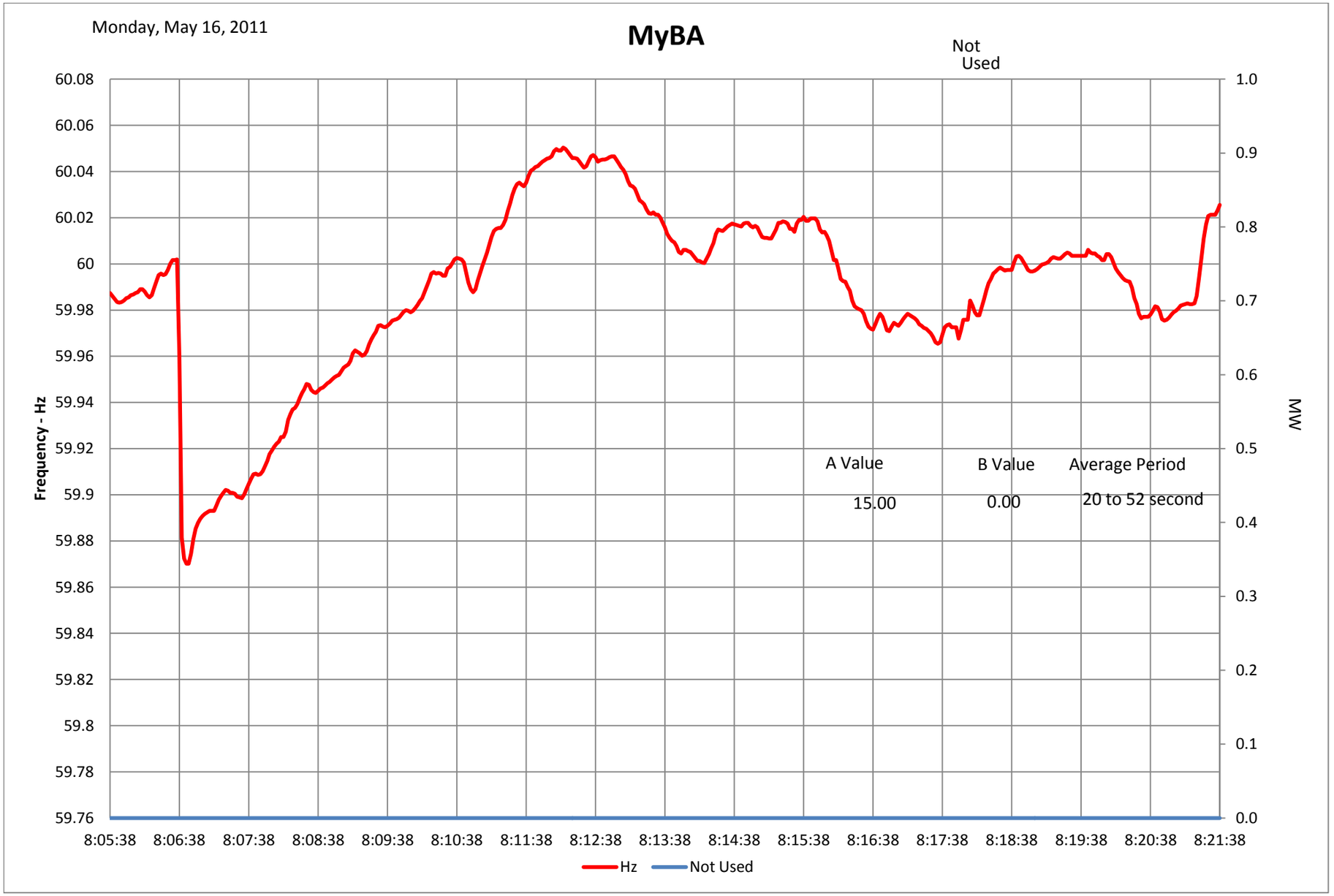

Monday, May 16, 2011
MyBA
Load Resources Tripped
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Hz
Initial Load Resources

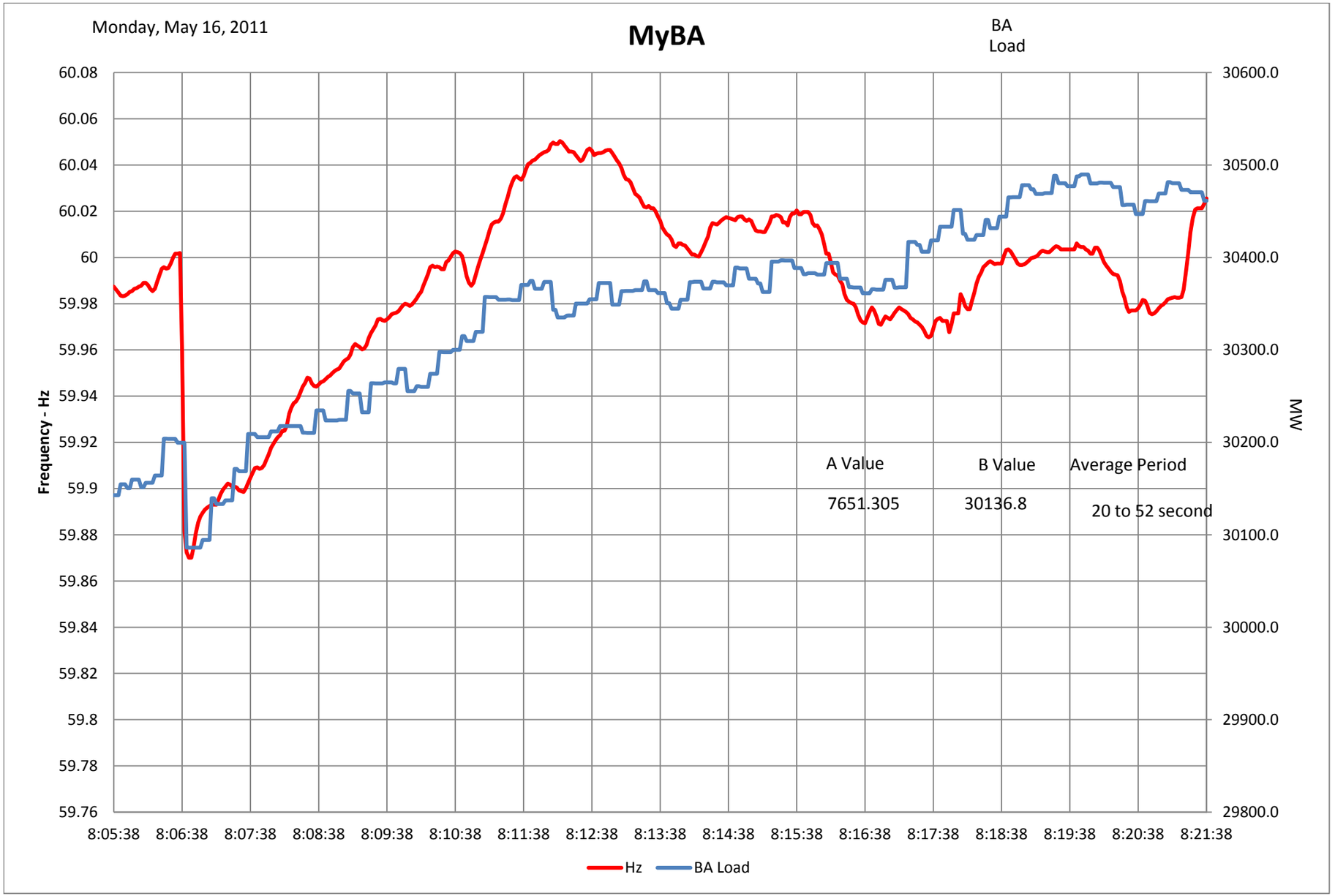

Monday, May 16, 2011
MyBA
Non-
Conforming
Load
Load (-)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Non- Conforming Load

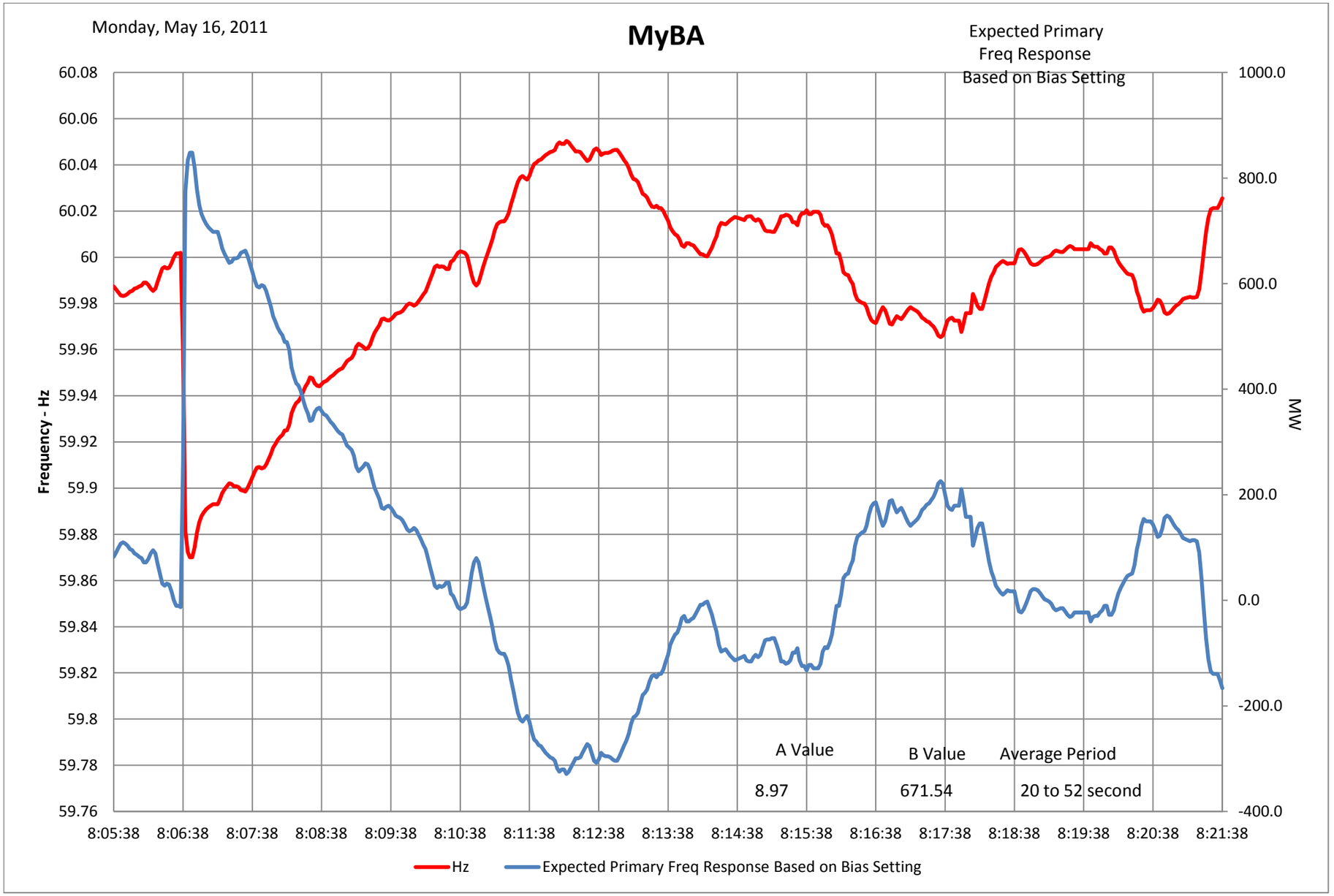

Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.2
1.0
0.8
0.6
0.4
0.2
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
15.00
B Value
0.00
Average Period
20 to 52 second
Hz
Not Used


Monday, May 16, 2011
MyBA
BA Load
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
30600.0
30500.0
30400.0
30300.0
30200.0
30100.0
30000.0
29900.0
29800.0
MW
A Value
7651.305
B Value
30136.8
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Load


Monday, May 16, 2011
MyBA
Expected Primary
Freq Response
Based on Bias Setting
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
MW
A Value
8.97
B Value
671.54
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Expected Primary Freq Response Based on Bias Setting

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	003705 Rows of data to shift to align T(0) 1
05/16/11 07:40:00	60.0097	471		0	0				-653	29756.85		0				
05/16/11 07:40:02	60.00745	471		0	0				-653	29756.85	0	0	0	-0.002	0.002	
05/16/11 07:40:04	60.00452	471		0	0				-653	29756.82	0	0	0	-0.003	0.003	
05/16/11 07:40:06	60.00259	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:08	60.00034	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:10	59.99872	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:12	59.9971	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:14	59.99548	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:16	59.99353	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:18	59.99063	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:20	59.9874	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:22	59.98416	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:24	59.98093	471		0	0				-653	29766.37	0	0	0	-0.003	0.003	
05/16/11 07:40:26	59.97867	471		0	0				-653	29766.37	0	0	0	-0.002	0.002	
05/16/11 07:40:28	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:30	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:32	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:34	59.97577	471		0	0				-653	29780.98	0	0	0	-0.003	0.003	
05/16/11 07:40:36	59.97382	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:38	59.97223	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:40	59.97223	471		0	0				-653	29780.98	0	0	0	0.000	0.000	
05/16/11 07:40:42	59.97318	471		0	0				-653	29780.98	0	0	0	0.001	0.001	
05/16/11 07:40:44	59.97351	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:46	59.97415	471		0	0				-653	29780.95	0	0	0	0.001	0.001	
05/16/11 07:40:48	59.97287	471		0	0				-653	29780.95	0	0	0	-0.001	0.001	
05/16/11 07:40:50	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:52	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:54	59.96832	471		0	0				-653	29770.34	0	0	0	-0.005	0.005	
05/16/11 07:40:56	59.96768	471		0	0				-653	29770.34	0	0	0	-0.001	0.001	
05/16/11 07:40:58	59.96899	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:00	59.97028	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:02	59.97223	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:04	59.97382	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:06	59.97479	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:08	59.9761	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:10	59.97769	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:12	59.97998	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:14	59.98318	471		0	0				-653	29782.73	0	0	0	0.003	0.003	
05/16/11 07:41:16	59.98578	471		0	0				-653	29782.73	0	0	0	0.003	0.003	
05/16/11 07:41:18	59.9874	471		0	0				-653	29782.73	0	0	0	0.002	0.002	
05/16/11 07:41:20	59.98868	471		0	0				-653	29782.73	0	0	0	0.001	0.001	
05/16/11 07:41:22	59.98999	471		0	0				-653	29782.73	0	0	0	0.001	0.001	
05/16/11 07:41:24	59.99191	471		0	0				-653	29782.82	0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:41:26	59.99353	471		0	0				-653	29782.82
05/16/11 07:41:28	59.99612	471		0	0				-653	29782.82
05/16/11 07:41:30	59.99805	471		0	0				-653	29782.82
05/16/11 07:41:32	59.99902	471		0	0				-653	29782.82
05/16/11 07:41:34	59.99902	471		0	0				-653	29786.15
05/16/11 07:41:36	59.99774	471		0	0				-653	29786.15
05/16/11 07:41:38	59.99646	471		0	0				-653	29786.15
05/16/11 07:41:40	59.99579	471		0	0				-653	29786.15
05/16/11 07:41:42	59.99612	471		0	0				-653	29786.15
05/16/11 07:41:44	59.9971	471		0	0				-653	29786.21
05/16/11 07:41:46	59.99774	471		0	0				-653	29786.21
05/16/11 07:41:48	59.99838	471		0	0				-653	29786.21
05/16/11 07:41:50	59.99936	471		0	0				-653	29786.21
05/16/11 07:41:52	60	471		0	0				-653	29786.21
05/16/11 07:41:54	60.00064	471		0	0				-653	29778.98
05/16/11 07:41:56	60.00128	471		0	0				-653	29778.98
05/16/11 07:41:58	60.00226	471		0	0				-653	29778.98
05/16/11 07:42:00	60.00388	471		0	0				-653	29778.98
05/16/11 07:42:02	60.00647	471		0	0				-653	29778.98
05/16/11 07:42:04	60.0097	471		0	0				-653	29778.92
05/16/11 07:42:06	60.01358	471		0	0				-653	29778.92
05/16/11 07:42:08	60.01614	471		0	0				-653	29778.92
05/16/11 07:42:10	60.01776	471		0	0				-653	29778.92
05/16/11 07:42:12	60.01776	471		0	0				-653	29778.92
05/16/11 07:42:14	60.01486	471		0	0				-653	29787.9
05/16/11 07:42:16	60.01163	471		0	0				-653	29787.9
05/16/11 07:42:18	60.00903	471		0	0				-653	29787.9
05/16/11 07:42:20	60.00775	471		0	0				-653	29787.9
05/16/11 07:42:22	60.00775	471		0	0				-653	29787.9
05/16/11 07:42:24	60.00903	471		0	0				-653	29787.84
05/16/11 07:42:26	60.00903	471		0	0				-653	29787.84
05/16/11 07:42:28	60.01324	471		0	0				-653	29787.84
05/16/11 07:42:30	60.01486	471		0	0				-653	29787.84
05/16/11 07:42:32	60.0152	471		0	0				-653	29787.84
05/16/11 07:42:34	60.0152	471		0	0				-653	29813.39
05/16/11 07:42:36	60.01486	471		0	0				-653	29813.39
05/16/11 07:42:38	60.01422	471		0	0				-653	29813.39
05/16/11 07:42:40	60.01358	471		0	0				-653	29813.39
05/16/11 07:42:42	60.01227	471		0	0				-653	29813.39
05/16/11 07:42:44	60.01099	471		0	0				-653	29813.33
05/16/11 07:42:46	60.00873	471		0	0				-653	29813.33
05/16/11 07:42:48	60.00647	471		0	0				-653	29813.33
05/16/11 07:42:50	60.00485	471		0	0				-653	29813.33

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003706 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:42:52	60.00354	471		0	0				-653	29813.33
05/16/11 07:42:54	60.00195	471		0	0				-653	29797.46
05/16/11 07:42:56	60	471		0	0				-653	29797.46
05/16/11 07:42:58	59.99774	471		0	0				-653	29797.46
05/16/11 07:43:00	59.99612	471		0	0				-653	29797.46
05/16/11 07:43:02	59.99646	471		0	0				-653	29797.46
05/16/11 07:43:04	59.99741	471		0	0				-653	29797.52
05/16/11 07:43:06	59.99838	471		0	0				-653	29797.52
05/16/11 07:43:08	59.99936	471		0	0				-653	29797.52
05/16/11 07:43:10	59.99902	471		0	0				-653	29797.52
05/16/11 07:43:12	59.99872	471		0	0				-653	29797.52
05/16/11 07:43:14	59.99774	471		0	0				-653	29780.33
05/16/11 07:43:16	59.99646	471		0	0				-653	29780.33
05/16/11 07:43:18	59.99677	471		0	0				-653	29780.33
05/16/11 07:43:20	59.99677	471		0	0				-653	29780.33
05/16/11 07:43:22	59.99774	471		0	0				-653	29780.33
05/16/11 07:43:24	59.99805	471		0	0				-653	29780.27
05/16/11 07:43:26	59.99774	471		0	0				-653	29780.27
05/16/11 07:43:28	59.99579	471		0	0				-653	29780.27
05/16/11 07:43:30	59.99387	471		0	0				-653	29780.27
05/16/11 07:43:32	59.99255	471		0	0				-653	29780.27
05/16/11 07:43:34	59.99127	471		0	0				-653	29785.63
05/16/11 07:43:36	59.98999	471		0	0				-653	29785.63
05/16/11 07:43:38	59.98965	471		0	0				-653	29785.63
05/16/11 07:43:40	59.98837	471		0	0				-653	29785.63
05/16/11 07:43:42	59.98709	471		0	0				-653	29785.63
05/16/11 07:43:44	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:46	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:48	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:50	59.98676	471		0	0				-653	29785.63
05/16/11 07:43:52	59.98676	471		0	0				-653	29785.63
05/16/11 07:43:54	59.98642	471		0	0				-653	29787.12
05/16/11 07:43:56	59.98611	471		0	0				-653	29787.12
05/16/11 07:43:58	59.98611	471		0	0				-653	29787.12
05/16/11 07:44:00	59.98514	471		0	0				-653	29787.12
05/16/11 07:44:02	59.98416	471		0	0				-653	29787.12
05/16/11 07:44:04	59.98352	471		0	0				-653	29787.12
05/16/11 07:44:06	59.98224	471		0	0				-653	29787.12
05/16/11 07:44:08	59.98029	471		0	0				-653	29787.12
05/16/11 07:44:10	59.979	471		0	0				-653	29787.12
05/16/11 07:44:12	59.97769	471		0	0				-653	29787.12
05/16/11 07:44:14	59.97675	471		0	0				-653	29780.67
05/16/11 07:44:16	59.97641	471		0	0				-653	29780.67

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003707 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:44:18	59.97739	471		0	0				-653	29780.67
05/16/11 07:44:20	59.97998	471		0	0				-653	29780.67
05/16/11 07:44:22	59.98318	471		0	0				-653	29780.67
05/16/11 07:44:24	59.98611	471		0	0				-653	29780.76
05/16/11 07:44:26	59.98837	471		0	0				-653	29780.76
05/16/11 07:44:28	59.9903	471		0	0				-653	29780.76
05/16/11 07:44:30	59.99191	471		0	0				-653	29780.76
05/16/11 07:44:32	59.99353	471		0	0				-653	29780.76
05/16/11 07:44:34	59.99579	471		0	0				-653	29777.7
05/16/11 07:44:36	60	471		0	0				-653	29777.7
05/16/11 07:44:38	60.00354	471		0	0				-653	29777.7
05/16/11 07:44:40	60.00647	471		0	0				-653	29777.7
05/16/11 07:44:42	60.00839	471		0	0				-653	29777.7
05/16/11 07:44:44	60.00903	471		0	0				-653	29777.7
05/16/11 07:44:46	60.00873	471		0	0				-653	29777.7
05/16/11 07:44:48	60.00873	471		0	0				-653	29777.7
05/16/11 07:44:50	60.00937	471		0	0				-653	29777.7
05/16/11 07:44:52	60.01099	471		0	0				-653	29777.7
05/16/11 07:44:54	60.01453	471		0	0				-653	29788.63
05/16/11 07:44:56	60.0181	471		0	0				-653	29788.63
05/16/11 07:44:58	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:00	60.02036	471		0	0				-653	29788.63
05/16/11 07:45:02	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:04	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:06	60.01907	471		0	0				-653	29788.63
05/16/11 07:45:08	60.0181	471		0	0				-653	29788.63
05/16/11 07:45:10	60.01712	471		0	0				-653	29788.63
05/16/11 07:45:12	60.01712	471		0	0				-653	29788.63
05/16/11 07:45:14	60.01712	471		0	0				-653	29788.51
05/16/11 07:45:16	60.01453	471		0	0				-653	29788.51
05/16/11 07:45:18	60.01358	471		0	0				-653	29788.51
05/16/11 07:45:20	60.01227	471		0	0				-653	29788.51
05/16/11 07:45:22	60.01163	471		0	0				-653	29788.51
05/16/11 07:45:24	60.01065	471		0	0				-653	29788.51
05/16/11 07:45:26	60.0097	471		0	0				-653	29788.51
05/16/11 07:45:28	60.00839	471		0	0				-653	29788.51
05/16/11 07:45:30	60.00745	471		0	0				-653	29788.51
05/16/11 07:45:32	60.00775	471		0	0				-653	29788.51
05/16/11 07:45:34	60.00839	471		0	0				-653	29780.62
05/16/11 07:45:36	60.00839	471		0	0				-653	29780.62
05/16/11 07:45:38	60.00809	471		0	0				-653	29780.62
05/16/11 07:45:40	60.00745	471		0	0				-653	29780.62
05/16/11 07:45:42	60.00711	471		0	0				-653	29780.62

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003708 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:45:44	60.00839	471		0	0				-653	29780.56
05/16/11 07:45:46	60.00937	471		0	0				-653	29780.56
05/16/11 07:45:48	60.0097	471		0	0				-653	29780.56
05/16/11 07:45:50	60.01001	471		0	0				-653	29780.56
05/16/11 07:45:52	60.01065	471		0	0				-653	29780.56
05/16/11 07:45:54	60.01196	471		0	0				-653	29784.96
05/16/11 07:45:56	60.01324	471		0	0				-653	29784.96
05/16/11 07:45:58	60.01453	471		0	0				-653	29784.96
05/16/11 07:46:00	60.01614	471		0	0				-653	29784.96
05/16/11 07:46:02	60.01712	471		0	0				-653	29784.96
05/16/11 07:46:04	60.01712	471		0	0				-653	29784.93
05/16/11 07:46:06	60.01614	471		0	0				-653	29784.93
05/16/11 07:46:08	60.01584	471		0	0				-653	29784.93
05/16/11 07:46:10	60.01614	471		0	0				-653	29784.93
05/16/11 07:46:12	60.01584	471		0	0				-653	29784.93
05/16/11 07:46:14	60.01486	471		0	0				-653	29760.42
05/16/11 07:46:16	60.01422	471		0	0				-653	29760.42
05/16/11 07:46:18	60.01227	471		0	0				-653	29760.42
05/16/11 07:46:20	60.0097	471		0	0				-653	29760.42
05/16/11 07:46:22	60.00711	471		0	0				-653	29760.42
05/16/11 07:46:24	60.00583	471		0	0				-653	29760.42
05/16/11 07:46:26	60.00516	471		0	0				-653	29760.42
05/16/11 07:46:28	60.00516	471		0	0				-653	29760.42
05/16/11 07:46:30	60.00485	471		0	0				-653	29760.42
05/16/11 07:46:32	60.00388	471		0	0				-653	29760.42
05/16/11 07:46:34	60.00259	471		0	0				-653	29782.35
05/16/11 07:46:36	59.99902	471		0	0				-653	29782.35
05/16/11 07:46:38	59.9971	471		0	0				-653	29782.35
05/16/11 07:46:40	59.99646	471		0	0				-653	29782.35
05/16/11 07:46:42	59.99579	471		0	0				-653	29782.35
05/16/11 07:46:44	59.99417	471		0	0				-653	29782.44
05/16/11 07:46:46	59.99225	471		0	0				-653	29782.44
05/16/11 07:46:48	59.9903	471		0	0				-653	29782.44
05/16/11 07:46:50	59.98804	471		0	0				-653	29782.44
05/16/11 07:46:52	59.98709	471		0	0				-653	29782.44
05/16/11 07:46:54	59.98676	471		0	0				-653	29785.52
05/16/11 07:46:56	59.98578	471		0	0				-653	29785.52
05/16/11 07:46:58	59.9845	471		0	0				-653	29785.52
05/16/11 07:47:00	59.98288	471		0	0				-653	29785.52
05/16/11 07:47:02	59.98224	471		0	0				-653	29785.52
05/16/11 07:47:04	59.98224	471		0	0				-653	29785.55
05/16/11 07:47:06	59.98224	471		0	0				-653	29785.55
05/16/11 07:47:08	59.98254	471		0	0				-653	29785.55

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003709 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:47:10	59.98386	471		0	0				-653	29785.55
05/16/11 07:47:12	59.9848	471		0	0				-653	29785.55
05/16/11 07:47:14	59.98578	471		0	0				-653	29788.21
05/16/11 07:47:16	59.98642	471		0	0				-653	29788.21
05/16/11 07:47:18	59.98999	471		0	0				-653	29788.21
05/16/11 07:47:20	59.99225	471		0	0				-653	29788.21
05/16/11 07:47:22	59.99323	471		0	0				-653	29788.21
05/16/11 07:47:24	59.99646	471		0	0				-653	29788.06
05/16/11 07:47:26	59.99902	471		0	0				-653	29788.06
05/16/11 07:47:28	60.00064	471		0	0				-653	29788.06
05/16/11 07:47:30	60.00647	471		0	0				-653	29788.06
05/16/11 07:47:32	60.00903	471		0	0				-653	29788.06
05/16/11 07:47:34	60.01099	471		0	0				-653	29776.11
05/16/11 07:47:36	60.01132	471		0	0				-653	29776.11
05/16/11 07:47:38	60.01291	471		0	0				-653	29776.11
05/16/11 07:47:40	60.01324	471		0	0				-653	29776.11
05/16/11 07:47:42	60.01324	471		0	0				-653	29776.11
05/16/11 07:47:44	60.01422	471		0	0				-653	29776.17
05/16/11 07:47:46	60.0181	471		0	0				-653	29776.17
05/16/11 07:47:48	60.01907	471		0	0				-653	29776.17
05/16/11 07:47:50	60.02133	471		0	0				-653	29776.17
05/16/11 07:47:52	60.02197	471		0	0				-653	29776.17
05/16/11 07:47:54	60.02164	471		0	0				-653	29794.69
05/16/11 07:47:56	60.01971	471		0	0				-653	29794.69
05/16/11 07:47:58	60.01907	471		0	0				-653	29794.69
05/16/11 07:48:00	60.01746	471		0	0				-653	29794.69
05/16/11 07:48:02	60.01776	471		0	0				-653	29794.69
05/16/11 07:48:04	60.0184	471		0	0				-653	29794.66
05/16/11 07:48:06	60.01776	471		0	0				-653	29794.66
05/16/11 07:48:08	60.0152	471		0	0				-653	29794.66
05/16/11 07:48:10	60.01389	471		0	0				-653	29794.66
05/16/11 07:48:12	60.01422	471		0	0				-653	29794.66
05/16/11 07:48:14	60.0152	471		0	0				-653	29804.78
05/16/11 07:48:16	60.01614	471		0	0				-653	29804.78
05/16/11 07:48:18	60.01614	471		0	0				-653	29804.78
05/16/11 07:48:20	60.01422	471		0	0				-653	29804.78
05/16/11 07:48:22	60.01196	471		0	0				-653	29804.78
05/16/11 07:48:24	60.01035	471		0	0				-653	29804.86
05/16/11 07:48:26	60.00809	471		0	0				-653	29804.86
05/16/11 07:48:28	60.00613	471		0	0				-653	29804.86
05/16/11 07:48:30	60.00516	471		0	0				-653	29804.86
05/16/11 07:48:32	60.00452	471		0	0				-653	29804.86
05/16/11 07:48:34	60.00354	471		0	0				-653	29800.12

Event Detection Row	805	Recovery Target Freq:	59.999	Max Absolute Delta Hz	0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003710 Rows of data to shift to align T(0) 1
	921		8:06:38	t(0)				
	806		8:10:30	t(Recovery)				
			03:52	Event Length mm:ss		Delta Hz	Absolute Delta Hz	
					0	0.001	0.001	
					0	0.001	0.001	
					0	0.001	0.001	
					0	0.001	0.001	
					0	0.004	0.004	
					0	0.002	0.002	
					0	0.001	0.001	
					0	0.003	0.003	
					0	0.003	0.003	
					0	0.002	0.002	
					0	0.006	0.006	
					0	0.003	0.003	
					0	0.002	0.002	
					0	0.000	0.000	
					0	0.002	0.002	
					0	0.000	0.000	
					0	0.000	0.000	
					0	0.001	0.001	
					0	0.004	0.004	
					0	0.001	0.001	
					0	0.002	0.002	
					0	0.001	0.001	
					0	0.000	0.000	
					0	-0.002	0.002	
					0	-0.001	0.001	
					0	-0.002	0.002	
					0	0.000	0.000	
					0	0.001	0.001	
					0	-0.001	0.001	
					0	-0.003	0.003	
					0	-0.001	0.001	
					0	0.000	0.000	
					0	0.001	0.001	
					0	0.001	0.001	
					0	0.000	0.000	
					0	-0.002	0.002	
					0	-0.002	0.002	
					0	-0.002	0.002	
					0	-0.002	0.002	
					0	-0.002	0.002	
					0	-0.001	0.001	
					0	-0.001	0.001	
					0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 t(0) 8:10:30 t(Recovery) 03:52 Event Length mm:ss	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	003711 Rows of data to shift to align T(0) 1
05/16/11 07:48:36	60.00128	471		0	0				-653	29800.12	0	0	0	-0.002	0.002	
05/16/11 07:48:38	60	471		0	0				-653	29800.12	0	0	0	-0.001	0.001	
05/16/11 07:48:40	59.99936	471		0	0				-653	29800.12	0	0	0	-0.001	0.001	
05/16/11 07:48:42	59.99838	471		0	0				-653	29800.12	0	0	0	-0.001	0.001	
05/16/11 07:48:44	59.99741	471		0	0				-653	29800.18	0	0	0	-0.001	0.001	
05/16/11 07:48:46	59.99579	471		0	0				-653	29800.18	0	0	0	-0.002	0.002	
05/16/11 07:48:48	59.99515	471		0	0				-653	29800.18	0	0	0	-0.001	0.001	
05/16/11 07:48:50	59.99646	471		0	0				-653	29800.18	0	0	0	0.001	0.001	
05/16/11 07:48:52	59.99872	471		0	0				-653	29800.18	0	0	0	0.002	0.002	
05/16/11 07:48:54	60.00128	471		0	0				-653	29799.82	0	0	0	0.003	0.003	
05/16/11 07:48:56	60.00323	471		0	0				-653	29799.82	0	0	0	0.002	0.002	
05/16/11 07:48:58	60.00421	471		0	0				-653	29799.82	0	0	0	0.001	0.001	
05/16/11 07:49:00	60.00485	471		0	0				-653	29799.82	0	0	0	0.001	0.001	
05/16/11 07:49:02	60.00549	471		0	0				-653	29799.82	0	0	0	0.001	0.001	
05/16/11 07:49:04	60.00583	471		0	0				-653	29799.79	0	0	0	0.000	0.000	
05/16/11 07:49:06	60.00583	471		0	0				-653	29799.79	0	0	0	0.000	0.000	
05/16/11 07:49:08	60.00549	471		0	0				-653	29799.79	0	0	0	0.000	0.000	
05/16/11 07:49:10	60.00388	471		0	0				-653	29799.79	0	0	0	-0.002	0.002	
05/16/11 07:49:12	60.00226	471		0	0				-653	29799.79	0	0	0	-0.002	0.002	
05/16/11 07:49:14	60.00226	471		0	0				-653	29795.67	0	0	0	0.000	0.000	
05/16/11 07:49:16	60	471		0	0				-653	29795.67	0	0	0	-0.002	0.002	
05/16/11 07:49:18	60	471		0	0				-653	29795.67	0	0	0	0.000	0.000	
05/16/11 07:49:20	60	471		0	0				-653	29795.67	0	0	0	0.000	0.000	
05/16/11 07:49:22	60	471		0	0				-653	29795.67	0	0	0	0.000	0.000	
05/16/11 07:49:24	60.00452	471		0	0				-653	29795.55	0	0	0	0.005	0.005	
05/16/11 07:49:26	60.00583	471		0	0				-653	29795.55	0	0	0	0.001	0.001	
05/16/11 07:49:28	60.00613	471		0	0				-653	29795.55	0	0	0	0.000	0.000	
05/16/11 07:49:30	60.00583	471		0	0				-653	29795.55	0	0	0	0.000	0.000	
05/16/11 07:49:32	60.00516	471		0	0				-653	29795.55	0	0	0	-0.001	0.001	
05/16/11 07:49:34	60.00388	471		0	0				-653	29783.53	0	0	0	-0.001	0.001	
05/16/11 07:49:36	60.00195	471		0	0				-653	29783.53	0	0	0	-0.002	0.002	
05/16/11 07:49:38	60.00128	471		0	0				-653	29783.53	0	0	0	-0.001	0.001	
05/16/11 07:49:40	60.00098	471		0	0				-653	29783.53	0	0	0	0.000	0.000	
05/16/11 07:49:42	60.00034	471		0	0				-653	29783.53	0	0	0	-0.001	0.001	
05/16/11 07:49:44	60	471		0	0				-653	29783.47	0	0	0	0.000	0.000	
05/16/11 07:49:46	59.99902	471		0	0				-653	29783.47	0	0	0	-0.001	0.001	
05/16/11 07:49:48	59.99872	471		0	0				-653	29783.47	0	0	0	0.000	0.000	
05/16/11 07:49:50	59.99838	471		0	0				-653	29783.47	0	0	0	0.000	0.000	
05/16/11 07:49:52	59.99612	471		0	0				-653	29783.47	0	0	0	-0.002	0.002	
05/16/11 07:49:54	59.99579	471		0	0				-653	29788.38	0	0	0	0.000	0.000	
05/16/11 07:49:56	59.99515	471		0	0				-653	29788.38	0	0	0	-0.001	0.001	
05/16/11 07:49:58	59.99387	471		0	0				-653	29788.38	0	0	0	-0.001	0.001	
05/16/11 07:50:00	59.99225	471		0	0				-653	29788.38	0	0	0	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:50:02	59.99225	471		0	0				-653	29788.38
05/16/11 07:50:04	59.99484	471		0	0				-653	29788.38
05/16/11 07:50:06	59.99646	471		0	0				-653	29788.38
05/16/11 07:50:08	59.9971	471		0	0				-653	29788.38
05/16/11 07:50:10	59.99548	471		0	0				-653	29788.38
05/16/11 07:50:12	59.99289	471		0	0				-653	29788.38
05/16/11 07:50:14	59.98999	471		0	0				-653	29790.16
05/16/11 07:50:16	59.98773	471		0	0				-653	29790.16
05/16/11 07:50:18	59.98642	471		0	0				-653	29790.16
05/16/11 07:50:20	59.98547	471		0	0				-653	29790.16
05/16/11 07:50:22	59.98547	471		0	0				-653	29790.16
05/16/11 07:50:24	59.98611	471		0	0				-653	29790.07
05/16/11 07:50:26	59.98611	471		0	0				-653	29790.07
05/16/11 07:50:28	59.98676	471		0	0				-653	29790.07
05/16/11 07:50:30	59.98709	471		0	0				-653	29790.07
05/16/11 07:50:32	59.9874	471		0	0				-653	29790.07
05/16/11 07:50:34	59.98676	471		0	0				-653	29777.49
05/16/11 07:50:36	59.98611	471		0	0				-653	29777.49
05/16/11 07:50:38	59.98642	471		0	0				-653	29777.49
05/16/11 07:50:40	59.9874	471		0	0				-653	29777.49
05/16/11 07:50:42	59.98804	471		0	0				-653	29777.49
05/16/11 07:50:44	59.9874	471		0	0				-653	29777.49
05/16/11 07:50:46	59.98676	471		0	0				-653	29777.49
05/16/11 07:50:48	59.9848	471		0	0				-653	29777.49
05/16/11 07:50:50	59.98288	471		0	0				-653	29777.49
05/16/11 07:50:52	59.98062	471		0	0				-653	29777.49
05/16/11 07:50:54	59.97998	471		0	0				-653	29782.49
05/16/11 07:50:56	59.97931	471		0	0				-653	29782.49
05/16/11 07:50:58	59.979	471		0	0				-653	29782.49
05/16/11 07:51:00	59.97931	471		0	0				-653	29782.49
05/16/11 07:51:02	59.98093	471		0	0				-653	29782.49
05/16/11 07:51:04	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:06	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:08	59.9819	471		0	0				-653	29782.46
05/16/11 07:51:10	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:12	59.97964	471		0	0				-653	29782.46
05/16/11 07:51:14	59.97705	471		0	0				-653	29756.13
05/16/11 07:51:16	59.97479	471		0	0				-653	29756.13
05/16/11 07:51:18	59.97351	471		0	0				-653	29756.13
05/16/11 07:51:20	59.97287	471		0	0				-653	29756.13
05/16/11 07:51:22	59.97223	471		0	0				-653	29756.13
05/16/11 07:51:24	59.97189	471		0	0				-653	29756.18
05/16/11 07:51:26	59.97125	471		0	0				-653	29756.18

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003712 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:51:28	59.97156	471		0	0				-653	29756.18
05/16/11 07:51:30	59.97318	471		0	0				-653	29756.18
05/16/11 07:51:32	59.97415	471		0	0				-653	29756.18
05/16/11 07:51:34	59.97479	471		0	0				-653	29777.58
05/16/11 07:51:36	59.97382	471		0	0				-653	29777.58
05/16/11 07:51:38	59.97287	471		0	0				-653	29777.58
05/16/11 07:51:40	59.97318	471		0	0				-653	29777.58
05/16/11 07:51:42	59.97449	471		0	0				-653	29777.58
05/16/11 07:51:44	59.97675	471		0	0				-653	29777.4
05/16/11 07:51:46	59.97803	471		0	0				-653	29777.4
05/16/11 07:51:48	59.97998	471		0	0				-653	29777.4
05/16/11 07:51:50	59.98093	471		0	0				-653	29777.4
05/16/11 07:51:52	59.98093	471		0	0				-653	29777.4
05/16/11 07:51:54	59.97964	471		0	0				-653	29802.24
05/16/11 07:51:56	59.97803	471		0	0				-653	29802.24
05/16/11 07:51:58	59.97705	471		0	0				-653	29802.24
05/16/11 07:52:00	59.97739	471		0	0				-653	29802.24
05/16/11 07:52:02	59.97836	471		0	0				-653	29802.24
05/16/11 07:52:04	59.97931	471		0	0				-653	29802.18
05/16/11 07:52:06	59.98126	471		0	0				-653	29802.18
05/16/11 07:52:08	59.98416	471		0	0				-653	29802.18
05/16/11 07:52:10	59.98611	471		0	0				-653	29802.18
05/16/11 07:52:12	59.98709	471		0	0				-653	29802.18
05/16/11 07:52:14	59.9874	471		0	0				-653	29802.29
05/16/11 07:52:16	59.98804	471		0	0				-653	29802.29
05/16/11 07:52:18	59.98804	471		0	0				-653	29802.29
05/16/11 07:52:20	59.98773	471		0	0				-653	29802.29
05/16/11 07:52:22	59.9874	471		0	0				-653	29802.29
05/16/11 07:52:24	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:26	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:28	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:30	59.98773	471		0	0				-653	29802.32
05/16/11 07:52:32	59.98901	471		0	0				-653	29802.32
05/16/11 07:52:34	59.98965	471		0	0				-653	29795.02
05/16/11 07:52:36	59.98935	471		0	0				-653	29795.02
05/16/11 07:52:38	59.98837	471		0	0				-653	29795.02
05/16/11 07:52:40	59.98868	471		0	0				-653	29795.02
05/16/11 07:52:42	59.98868	471		0	0				-653	29795.02
05/16/11 07:52:44	59.9874	471		0	0				-653	29795.05
05/16/11 07:52:46	59.98611	471		0	0				-653	29795.05
05/16/11 07:52:48	59.98611	471		0	0				-653	29795.05
05/16/11 07:52:50	59.98709	471		0	0				-653	29795.05
05/16/11 07:52:52	59.98837	471		0	0				-653	29795.05

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003713 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:52:54	59.98935	471		0	0				-653	29781.42
05/16/11 07:52:56	59.98999	471		0	0				-653	29781.42
05/16/11 07:52:58	59.99127	471		0	0				-653	29781.42
05/16/11 07:53:00	59.99255	471		0	0				-653	29781.42
05/16/11 07:53:02	59.99387	471		0	0				-653	29781.42
05/16/11 07:53:04	59.99387	471		0	0				-653	29781.45
05/16/11 07:53:06	59.99289	471		0	0				-653	29781.45
05/16/11 07:53:08	59.99097	471		0	0				-653	29781.45
05/16/11 07:53:10	59.98868	471		0	0				-653	29781.45
05/16/11 07:53:12	59.98642	471		0	0				-653	29781.45
05/16/11 07:53:14	59.98386	471		0	0				-653	29802.43
05/16/11 07:53:16	59.9816	471		0	0				-653	29802.43
05/16/11 07:53:18	59.97931	471		0	0				-653	29802.43
05/16/11 07:53:20	59.97675	471		0	0				-653	29802.43
05/16/11 07:53:22	59.97415	471		0	0				-653	29802.43
05/16/11 07:53:24	59.97287	471		0	0				-653	29802.4
05/16/11 07:53:26	59.97223	471		0	0				-653	29802.4
05/16/11 07:53:28	59.97318	471		0	0				-653	29802.4
05/16/11 07:53:30	59.97449	471		0	0				-653	29802.4
05/16/11 07:53:32	59.97351	471		0	0				-653	29802.4
05/16/11 07:53:34	59.97253	471		0	0				-653	29804.4
05/16/11 07:53:36	59.97253	471		0	0				-653	29804.4
05/16/11 07:53:38	59.97223	471		0	0				-653	29804.4
05/16/11 07:53:40	59.97156	471		0	0				-653	29804.4
05/16/11 07:53:42	59.97189	471		0	0				-653	29804.4
05/16/11 07:53:44	59.97318	471		0	0				-653	29804.4
05/16/11 07:53:46	59.97479	471		0	0				-653	29804.4
05/16/11 07:53:48	59.9761	471		0	0				-653	29804.4
05/16/11 07:53:50	59.97803	471		0	0				-653	29804.4
05/16/11 07:53:52	59.98062	471		0	0				-653	29804.4
05/16/11 07:53:54	59.98254	471		0	0				-653	29797.32
05/16/11 07:53:56	59.98416	471		0	0				-653	29797.32
05/16/11 07:53:58	59.98611	471		0	0				-653	29797.32
05/16/11 07:54:00	59.98804	471		0	0				-653	29797.32
05/16/11 07:54:02	59.9903	471		0	0				-653	29797.32
05/16/11 07:54:04	59.99161	471		0	0				-653	29797.29
05/16/11 07:54:06	59.99323	471		0	0				-653	29797.29
05/16/11 07:54:08	59.99484	471		0	0				-653	29797.29
05/16/11 07:54:10	59.99579	471		0	0				-653	29797.29
05/16/11 07:54:12	59.99515	471		0	0				-653	29797.29
05/16/11 07:54:14	59.99612	471		0	0				-653	29823.76
05/16/11 07:54:16	59.99805	471		0	0				-653	29823.76
05/16/11 07:54:18	59.99936	471		0	0				-653	29823.76

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003714 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:54:20	60.00064	471		0	0				-653	29823.76
05/16/11 07:54:22	60.00098	471		0	0				-653	29823.76
05/16/11 07:54:24	60.00064	471		0	0				-653	29818.41
05/16/11 07:54:26	60	471		0	0				-653	29818.41
05/16/11 07:54:28	59.99902	471		0	0				-653	29818.41
05/16/11 07:54:30	59.99872	471		0	0				-653	29818.41
05/16/11 07:54:32	59.99936	471		0	0				-653	29818.41
05/16/11 07:54:34	60.00034	471		0	0				-653	29808.89
05/16/11 07:54:36	60.00162	471		0	0				-653	29808.89
05/16/11 07:54:38	60.00354	471		0	0				-653	29808.89
05/16/11 07:54:40	60.00485	471		0	0				-653	29808.89
05/16/11 07:54:42	60.00421	471		0	0				-653	29808.89
05/16/11 07:54:44	60.00195	471		0	0				-653	29814.89
05/16/11 07:54:46	59.99902	471		0	0				-653	29814.89
05/16/11 07:54:48	59.99646	471		0	0				-653	29814.89
05/16/11 07:54:50	59.99417	471		0	0				-653	29814.89
05/16/11 07:54:52	59.99323	471		0	0				-653	29814.89
05/16/11 07:54:54	59.99127	471		0	0				-653	29826.47
05/16/11 07:54:56	59.98935	471		0	0				-653	29826.47
05/16/11 07:54:58	59.98709	471		0	0				-653	29826.47
05/16/11 07:55:00	59.98578	471		0	0				-653	29826.47
05/16/11 07:55:02	59.98547	471		0	0				-653	29826.47
05/16/11 07:55:04	59.98547	471		0	0				-653	29826.41
05/16/11 07:55:06	59.98514	471		0	0				-653	29826.41
05/16/11 07:55:08	59.9845	471		0	0				-653	29826.41
05/16/11 07:55:10	59.9845	471		0	0				-653	29826.41
05/16/11 07:55:12	59.9848	471		0	0				-653	29826.41
05/16/11 07:55:14	59.9848	471		0	0				-653	29834.18
05/16/11 07:55:16	59.98611	471		0	0				-653	29834.18
05/16/11 07:55:18	59.9874	471		0	0				-653	29834.18
05/16/11 07:55:20	59.98868	471		0	0				-653	29834.18
05/16/11 07:55:22	59.98837	471		0	0				-653	29834.18
05/16/11 07:55:24	59.98837	471		0	0				-653	29836.13
05/16/11 07:55:26	59.98578	471		0	0				-653	29836.13
05/16/11 07:55:28	59.9845	471		0	0				-653	29836.13
05/16/11 07:55:30	59.9848	471		0	0				-653	29836.13
05/16/11 07:55:32	59.98547	471		0	0				-653	29836.13
05/16/11 07:55:34	59.98642	471		0	0				-653	29821.84
05/16/11 07:55:36	59.98773	471		0	0				-653	29821.84
05/16/11 07:55:38	59.98965	471		0	0				-653	29821.84
05/16/11 07:55:40	59.99063	471		0	0				-653	29821.84
05/16/11 07:55:42	59.99063	471		0	0				-653	29821.84
05/16/11 07:55:44	59.99063	471		0	0				-653	29821.87

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003715 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:55:46	59.99063	471		0	0				-653	29821.87
05/16/11 07:55:48	59.98642	471		0	0				-653	29821.87
05/16/11 07:55:50	59.9845	471		0	0				-653	29821.87
05/16/11 07:55:52	59.98224	471		0	0				-653	29821.87
05/16/11 07:55:54	59.98062	471		0	0				-653	29831.33
05/16/11 07:55:56	59.97739	471		0	0				-653	29831.33
05/16/11 07:55:58	59.97641	471		0	0				-653	29831.33
05/16/11 07:56:00	59.97641	471		0	0				-653	29831.33
05/16/11 07:56:02	59.9761	471		0	0				-653	29831.33
05/16/11 07:56:04	59.97543	471		0	0				-653	29831.33
05/16/11 07:56:06	59.97577	471		0	0				-653	29831.33
05/16/11 07:56:08	59.97675	471		0	0				-653	29831.33
05/16/11 07:56:10	59.97705	471		0	0				-653	29831.33
05/16/11 07:56:12	59.97705	471		0	0				-653	29831.33
05/16/11 07:56:14	59.97705	471		0	0				-653	29835.51
05/16/11 07:56:16	59.97675	471		0	0				-653	29835.51
05/16/11 07:56:18	59.97705	471		0	0				-653	29835.51
05/16/11 07:56:20	59.97739	471		0	0				-653	29835.51
05/16/11 07:56:22	59.97803	471		0	0				-653	29835.51
05/16/11 07:56:24	59.97803	471		0	0				-653	29856.55
05/16/11 07:56:26	59.97867	471		0	0				-653	29856.55
05/16/11 07:56:28	59.97964	471		0	0				-653	29856.55
05/16/11 07:56:30	59.9816	471		0	0				-653	29856.55
05/16/11 07:56:32	59.98352	471		0	0				-653	29856.55
05/16/11 07:56:34	59.98642	471		0	0				-653	29846.76
05/16/11 07:56:36	59.9903	471		0	0				-653	29846.76
05/16/11 07:56:38	59.99451	471		0	0				-653	29846.76
05/16/11 07:56:40	59.99741	471		0	0				-653	29846.76
05/16/11 07:56:42	59.99838	471		0	0				-653	29846.76
05/16/11 07:56:44	59.99805	471		0	0				-653	29860.05
05/16/11 07:56:46	59.99677	471		0	0				-653	29860.05
05/16/11 07:56:48	59.99612	471		0	0				-653	29860.05
05/16/11 07:56:50	59.99548	471		0	0				-653	29860.05
05/16/11 07:56:52	59.99612	471		0	0				-653	29860.05
05/16/11 07:56:54	59.99936	471		0	0				-653	29873.15
05/16/11 07:56:56	60.00323	471		0	0				-653	29873.15
05/16/11 07:56:58	60.00745	471		0	0				-653	29873.15
05/16/11 07:57:00	60.01163	471		0	0				-653	29873.15
05/16/11 07:57:02	60.01453	471		0	0				-653	29873.15
05/16/11 07:57:04	60.01746	471		0	0				-653	29873.15
05/16/11 07:57:06	60.01907	471		0	0				-653	29873.15
05/16/11 07:57:08	60.01938	471		0	0				-653	29873.15
05/16/11 07:57:10	60.01938	471		0	0				-653	29873.15

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003716 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:57:12	60.01938	471		0	0				-653	29873.15
05/16/11 07:57:14	60.02036	471		0	0				-653	29889.67
05/16/11 07:57:16	60.02197	471		0	0				-653	29889.67
05/16/11 07:57:18	60.02423	471		0	0				-653	29889.67
05/16/11 07:57:20	60.02682	471		0	0				-653	29889.67
05/16/11 07:57:22	60.02811	471		0	0				-653	29889.67
05/16/11 07:57:24	60.02939	471		0	0				-653	29886.6
05/16/11 07:57:26	60.03036	471		0	0				-653	29886.6
05/16/11 07:57:28	60.02875	471		0	0				-653	29886.6
05/16/11 07:57:30	60.02682	471		0	0				-653	29886.6
05/16/11 07:57:32	60.02457	471		0	0				-653	29886.6
05/16/11 07:57:34	60.02261	471		0	0				-653	29891.67
05/16/11 07:57:36	60.02231	471		0	0				-653	29891.67
05/16/11 07:57:38	60.02295	471		0	0				-653	29891.67
05/16/11 07:57:40	60.02359	471		0	0				-653	29891.67
05/16/11 07:57:42	60.02261	471		0	0				-653	29891.67
05/16/11 07:57:44	60.02164	471		0	0				-653	29891.64
05/16/11 07:57:46	60.01971	471		0	0				-653	29891.64
05/16/11 07:57:48	60.01776	471		0	0				-653	29891.64
05/16/11 07:57:50	60.01746	471		0	0				-653	29891.64
05/16/11 07:57:52	60.01682	471		0	0				-653	29891.64
05/16/11 07:57:54	60.01712	471		0	0				-653	29891.51
05/16/11 07:57:56	60.0184	471		0	0				-653	29891.51
05/16/11 07:57:58	60.01874	471		0	0				-653	29891.51
05/16/11 07:58:00	60.0181	471		0	0				-653	29891.51
05/16/11 07:58:02	60.01682	471		0	0				-653	29891.51
05/16/11 07:58:04	60.0152	471		0	0				-653	29891.6
05/16/11 07:58:06	60.0152	471		0	0				-653	29891.6
05/16/11 07:58:08	60.0155	471		0	0				-653	29891.6
05/16/11 07:58:10	60.0155	471		0	0				-653	29891.6
05/16/11 07:58:12	60.01453	471		0	0				-653	29891.6
05/16/11 07:58:14	60.01453	471		0	0				-653	29884.5
05/16/11 07:58:16	60.0152	471		0	0				-653	29884.5
05/16/11 07:58:18	60.01584	471		0	0				-653	29884.5
05/16/11 07:58:20	60.01614	471		0	0				-653	29884.5
05/16/11 07:58:22	60.01584	471		0	0				-653	29884.5
05/16/11 07:58:24	60.0152	471		0	0				-653	29881.79
05/16/11 07:58:26	60.0155	471		0	0				-653	29881.79
05/16/11 07:58:28	60.01614	471		0	0				-653	29881.79
05/16/11 07:58:30	60.01776	471		0	0				-653	29881.79
05/16/11 07:58:32	60.01907	471		0	0				-653	29881.79
05/16/11 07:58:34	60.02069	471		0	0				-653	29887.14
05/16/11 07:58:36	60.02133	471		0	0				-653	29887.14

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003717 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:58:38	60.02069	471		0	0				-653	29887.14
05/16/11 07:58:40	60.01907	471		0	0				-653	29887.14
05/16/11 07:58:42	60.01746	471		0	0				-653	29887.14
05/16/11 07:58:44	60.01614	471		0	0				-653	29873.08
05/16/11 07:58:46	60.0152	471		0	0				-653	29873.08
05/16/11 07:58:48	60.01453	471		0	0				-653	29873.08
05/16/11 07:58:50	60.01389	471		0	0				-653	29873.08
05/16/11 07:58:52	60.01358	471		0	0				-653	29873.08
05/16/11 07:58:54	60.01099	471		0	0				-653	29862.1
05/16/11 07:58:56	60.00549	471		0	0				-653	29862.1
05/16/11 07:58:58	59.99966	471		0	0				-653	29862.1
05/16/11 07:59:00	59.99451	471		0	0				-653	29862.1
05/16/11 07:59:02	59.99127	471		0	0				-653	29862.1
05/16/11 07:59:04	59.98965	471		0	0				-653	29861.95
05/16/11 07:59:06	59.98868	471		0	0				-653	29861.95
05/16/11 07:59:08	59.98676	471		0	0				-653	29861.95
05/16/11 07:59:10	59.9848	471		0	0				-653	29861.95
05/16/11 07:59:12	59.98288	471		0	0				-653	29861.95
05/16/11 07:59:14	59.98062	471		0	0				-653	29906.21
05/16/11 07:59:16	59.97803	471		0	0				-653	29906.21
05/16/11 07:59:18	59.9761	471		0	0				-653	29906.21
05/16/11 07:59:20	59.97577	471		0	0				-653	29906.21
05/16/11 07:59:22	59.9761	471		0	0				-653	29906.21
05/16/11 07:59:24	59.9761	471		0	0				-653	29878.69
05/16/11 07:59:26	59.97641	471		0	0				-653	29878.69
05/16/11 07:59:28	59.97543	471		0	0				-653	29878.69
05/16/11 07:59:30	59.97479	471		0	0				-653	29878.69
05/16/11 07:59:32	59.97382	471		0	0				-653	29878.69
05/16/11 07:59:34	59.97253	471		0	0				-653	29900.56
05/16/11 07:59:36	59.97223	471		0	0				-653	29900.56
05/16/11 07:59:38	59.97253	471		0	0				-653	29900.56
05/16/11 07:59:40	59.97351	471		0	0				-653	29900.56
05/16/11 07:59:42	59.97351	471		0	0				-653	29900.56
05/16/11 07:59:44	59.97318	471		0	0				-653	29896.99
05/16/11 07:59:46	59.97189	471		0	0				-653	29896.99
05/16/11 07:59:48	59.97092	471		0	0				-653	29896.99
05/16/11 07:59:50	59.97028	471		0	0				-653	29896.99
05/16/11 07:59:52	59.97028	471		0	0				-653	29896.99
05/16/11 07:59:54	59.97028	471		0	0				-653	29905.8
05/16/11 07:59:56	59.97028	471		0	0				-653	29905.8
05/16/11 07:59:58	59.97061	471		0	0				-653	29905.8
05/16/11 08:00:00	59.97287	471		0	0				-653	29905.8
05/16/11 08:00:02	59.97287	471		0	0				-653	29905.8

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	003718 Rows of data to shift to align T(0)		
805	59.999	0.078	-0.078	0.009	1		
921	8:06:38	t(0)					
806	8:10:30	t(Recovery)					
	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz			
0	0	0	-0.001	0.001			
0	0	0	-0.002	0.002			
0	0	0	-0.002	0.002			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	0.000	0.000			
0	0	0	-0.003	0.003			
0	0	0	-0.005	0.005			
0	0	0	-0.006	0.006			
0	0	0	-0.005	0.005			
0	0	0	-0.003	0.003			
0	0	0	-0.002	0.002			
0	0	0	-0.001	0.001			
0	0	0	-0.002	0.002			
0	0	0	-0.002	0.002			
0	0	0	-0.002	0.002			
0	0	0	-0.002	0.002			
0	0	0	-0.003	0.003			
0	0	0	-0.002	0.002			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.001	0.001			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.002	0.002			
0	0	0	0.000	0.000			

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:00:04	59.97479	471		0	0				-653	29905.77
05/16/11 08:00:06	59.97479	471		0	0				-653	29905.77
05/16/11 08:00:08	59.97382	471		0	0				-653	29905.77
05/16/11 08:00:10	59.96832	471		0	0				-653	29905.77
05/16/11 08:00:12	59.96802	471		0	0				-653	29905.77
05/16/11 08:00:14	59.96899	471		0	0				-653	29914.9
05/16/11 08:00:16	59.96994	471		0	0				-653	29914.9
05/16/11 08:00:18	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:20	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:22	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:24	59.97769	471		0	0				-653	29925.58
05/16/11 08:00:26	59.97739	471		0	0				-653	29925.58
05/16/11 08:00:28	59.9761	471		0	0				-653	29925.58
05/16/11 08:00:30	59.9761	471		0	0				-653	29925.58
05/16/11 08:00:32	59.97705	471		0	0				-653	29925.58
05/16/11 08:00:34	59.97769	471		0	0				-653	29938.87
05/16/11 08:00:36	59.97803	471		0	0				-653	29938.87
05/16/11 08:00:38	59.97803	471		0	0				-653	29938.87
05/16/11 08:00:40	59.97739	471		0	0				-653	29938.87
05/16/11 08:00:42	59.97675	471		0	0				-653	29938.87
05/16/11 08:00:44	59.97641	471		0	0				-653	29952.51
05/16/11 08:00:46	59.97479	471		0	0				-653	29952.51
05/16/11 08:00:48	59.97449	471		0	0				-653	29952.51
05/16/11 08:00:50	59.97543	471		0	0				-653	29952.51
05/16/11 08:00:52	59.97705	471		0	0				-653	29952.51
05/16/11 08:00:54	59.97931	471		0	0				-653	29952.51
05/16/11 08:00:56	59.97964	471		0	0				-653	29948.95
05/16/11 08:00:58	59.979	471		0	0				-653	29948.95
05/16/11 08:01:00	59.97803	471		0	0				-653	29948.95
05/16/11 08:01:02	59.97803	471		0	0				-653	29948.95
05/16/11 08:01:04	59.979	471		0	0				-653	29948.95
05/16/11 08:01:06	59.98029	471		0	0				-653	29948.95
05/16/11 08:01:08	59.9819	471		0	0				-653	29948.95
05/16/11 08:01:10	59.98318	471		0	0				-653	29948.95
05/16/11 08:01:12	59.9845	471		0	0				-653	29948.95
05/16/11 08:01:14	59.98578	471		0	0				-653	29951.05
05/16/11 08:01:16	59.98642	471		0	0				-653	29951.05
05/16/11 08:01:18	59.98642	471		0	0				-653	29951.05
05/16/11 08:01:20	59.98709	471		0	0				-653	29951.05
05/16/11 08:01:22	59.98773	471		0	0				-653	29951.05
05/16/11 08:01:24	59.98965	471		0	0				-653	29955.09
05/16/11 08:01:26	59.99161	471		0	0				-653	29955.09
05/16/11 08:01:28	59.99255	471		0	0				-653	29955.09

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003719 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta	Absolute	
806	03:52	Event Length mm:ss	Hz	Delta Hz	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:01:30	59.99323	471		0	0				-653	29955.09
05/16/11 08:01:32	59.99289	471		0	0				-653	29955.09
05/16/11 08:01:34	59.99097	471		0	0				-653	29967.69
05/16/11 08:01:36	59.98804	471		0	0				-653	29967.69
05/16/11 08:01:38	59.98578	471		0	0				-653	29967.69
05/16/11 08:01:40	59.98386	471		0	0				-653	29967.69
05/16/11 08:01:42	59.98318	471		0	0				-653	29967.69
05/16/11 08:01:44	59.98318	471		0	0				-653	29983.13
05/16/11 08:01:46	59.98288	471		0	0				-653	29983.13
05/16/11 08:01:48	59.98126	471		0	0				-653	29983.13
05/16/11 08:01:50	59.97998	471		0	0				-653	29983.13
05/16/11 08:01:52	59.97964	471		0	0				-653	29983.13
05/16/11 08:01:54	59.98029	471		0	0				-653	29976.75
05/16/11 08:01:56	59.98126	471		0	0				-653	29976.75
05/16/11 08:01:58	59.98352	471		0	0				-653	29976.75
05/16/11 08:02:00	59.98386	471		0	0				-653	29976.75
05/16/11 08:02:02	59.98126	471		0	0				-653	29976.75
05/16/11 08:02:04	59.97543	471		0	0				-653	29976.78
05/16/11 08:02:06	59.96832	471		0	0				-653	29976.78
05/16/11 08:02:08	59.9635	471		0	0				-653	29976.78
05/16/11 08:02:10	59.96155	471		0	0				-653	29976.78
05/16/11 08:02:12	59.96091	471		0	0				-653	29976.78
05/16/11 08:02:14	59.96155	471		0	0				-653	30008.51
05/16/11 08:02:16	59.96057	471		0	0				-653	30008.51
05/16/11 08:02:18	59.95801	471		0	0				-653	30008.51
05/16/11 08:02:20	59.95575	471		0	0				-653	30008.51
05/16/11 08:02:22	59.95575	471		0	0				-653	30008.51
05/16/11 08:02:24	59.95703	471		0	0				-653	30037.25
05/16/11 08:02:26	59.95895	471		0	0				-653	30037.25
05/16/11 08:02:28	59.96057	471		0	0				-653	30037.25
05/16/11 08:02:30	59.96155	471		0	0				-653	30037.25
05/16/11 08:02:32	59.96252	471		0	0				-653	30037.25
05/16/11 08:02:34	59.96414	471		0	0				-653	30055.73
05/16/11 08:02:36	59.96512	471		0	0				-653	30055.73
05/16/11 08:02:38	59.96512	471		0	0				-653	30055.73
05/16/11 08:02:40	59.96576	471		0	0				-653	30055.73
05/16/11 08:02:42	59.96704	471		0	0				-653	30055.73
05/16/11 08:02:44	59.96994	471		0	0				-653	30068.76
05/16/11 08:02:46	59.97253	471		0	0				-653	30068.76
05/16/11 08:02:48	59.97415	471		0	0				-653	30068.76
05/16/11 08:02:50	59.9761	471		0	0				-653	30068.76
05/16/11 08:02:52	59.97739	471		0	0				-653	30068.76
05/16/11 08:02:54	59.97931	471		0	0				-653	30068.21

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003720 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.006	0.006	
0	0	0	-0.007	0.007	
0	0	0	-0.005	0.005	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:02:56	59.98029	471		0	0				-653	30068.21
05/16/11 08:02:58	59.98062	471		0	0				-653	30068.21
05/16/11 08:03:00	59.98029	471		0	0				-653	30068.21
05/16/11 08:03:02	59.98029	471		0	0				-653	30068.21
05/16/11 08:03:04	59.97836	471		0	0				-653	30068.24
05/16/11 08:03:06	59.97836	471		0	0				-653	30068.24
05/16/11 08:03:08	59.979	471		0	0				-653	30068.24
05/16/11 08:03:10	59.97998	471		0	0				-653	30068.24
05/16/11 08:03:12	59.98029	471		0	0				-653	30068.24
05/16/11 08:03:14	59.98093	471		0	0				-653	30076.2
05/16/11 08:03:16	59.98093	471		0	0				-653	30076.2
05/16/11 08:03:18	59.97998	471		0	0				-653	30076.2
05/16/11 08:03:20	59.98062	471		0	0				-653	30076.2
05/16/11 08:03:22	59.98029	471		0	0				-653	30076.2
05/16/11 08:03:24	59.97998	471		0	0				-653	30093.95
05/16/11 08:03:26	59.979	471		0	0				-653	30093.95
05/16/11 08:03:28	59.97931	471		0	0				-653	30093.95
05/16/11 08:03:30	59.97998	471		0	0				-653	30093.95
05/16/11 08:03:32	59.98029	471		0	0				-653	30093.95
05/16/11 08:03:34	59.98029	471		0	0				-653	30100.97
05/16/11 08:03:36	59.98029	471		0	0				-653	30100.97
05/16/11 08:03:38	59.97964	471		0	0				-653	30100.97
05/16/11 08:03:40	59.979	471		0	0				-653	30100.97
05/16/11 08:03:42	59.97803	471		0	0				-653	30100.97
05/16/11 08:03:44	59.97803	471		0	0				-653	30118.87
05/16/11 08:03:46	59.97867	471		0	0				-653	30118.87
05/16/11 08:03:48	59.97964	471		0	0				-653	30118.87
05/16/11 08:03:50	59.98224	471		0	0				-653	30118.87
05/16/11 08:03:52	59.9848	471		0	0				-653	30118.87
05/16/11 08:03:54	59.98514	471		0	0				-653	30118.77
05/16/11 08:03:56	59.98416	471		0	0				-653	30118.77
05/16/11 08:03:58	59.98224	471		0	0				-653	30118.77
05/16/11 08:04:00	59.98029	471		0	0				-653	30118.77
05/16/11 08:04:02	59.979	471		0	0				-653	30118.77
05/16/11 08:04:04	59.97867	471		0	0				-653	30118.74
05/16/11 08:04:06	59.97931	471		0	0				-653	30118.74
05/16/11 08:04:08	59.97998	471		0	0				-653	30118.74
05/16/11 08:04:10	59.97931	471		0	0				-653	30118.74
05/16/11 08:04:12	59.979	471		0	0				-653	30118.74
05/16/11 08:04:14	59.97803	471		0	0				-653	30106.93
05/16/11 08:04:16	59.97675	471		0	0				-653	30106.93
05/16/11 08:04:18	59.97739	471		0	0				-653	30106.93
05/16/11 08:04:20	59.979	471		0	0				-653	30106.93

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003721 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:04:22	59.97964	471		0	0				-653	30106.93
05/16/11 08:04:24	59.98093	471		0	0				-653	30106.61
05/16/11 08:04:26	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:28	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:30	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:32	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:34	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:36	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:38	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:40	59.9816	471		0	0				-653	30116.02
05/16/11 08:04:42	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:44	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:46	59.98126	471		0	0				-653	30141.59
05/16/11 08:04:48	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:50	59.98254	471		0	0				-653	30141.59
05/16/11 08:04:52	59.98352	471		0	0				-653	30141.59
05/16/11 08:04:54	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:56	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:58	59.98416	471		0	0				-653	30144.23
05/16/11 08:05:00	59.98514	471		0	0				-653	30144.23
05/16/11 08:05:02	59.9874	471		0	0				-653	30144.23
05/16/11 08:05:04	59.98901	471		0	0				-653	30144.23
05/16/11 08:05:06	59.98804	471		0	0				-653	30144.23
05/16/11 08:05:08	59.98642	471		0	0				-653	30144.23
05/16/11 08:05:10	59.98288	471		0	0				-653	30144.23
05/16/11 08:05:12	59.98254	471		0	0				-653	30144.23
05/16/11 08:05:14	59.98318	471		0	0				-653	30148.67
05/16/11 08:05:16	59.9819	471		0	0				-653	30148.67
05/16/11 08:05:18	59.98062	471		0	0				-653	30148.67
05/16/11 08:05:20	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:22	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:24	59.97964	471		0	0				-653	30155.67
05/16/11 08:05:26	59.98029	471		0	0				-653	30155.67
05/16/11 08:05:28	59.98224	471		0	0				-653	30155.67
05/16/11 08:05:30	59.98352	471		0	0				-653	30155.67
05/16/11 08:05:32	59.98578	471		0	0				-653	30155.67
05/16/11 08:05:34	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:36	59.98804	471		0	0				-653	30142.79
05/16/11 08:05:38	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:40	59.98611	471		0	0				-653	30142.79
05/16/11 08:05:42	59.9848	471		0	0				-653	30142.79
05/16/11 08:05:44	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:46	59.98318	471		0	0				-653	30154.67

Event Detection Row	805	Recovery Target Freq:	59.999	Max Absolute Delta Hz	0.078	Lowest Delta Hz	-0.078
	921		8:06:38	t(0)			
	806		8:10:30	t(Recovery)		Delta Hz	Absolute Delta Hz
			03:52	Event Length mm:ss			

Highest Delta Hz	0.009

Rows of data to shift to align T(0)	003722 1

05/16/11 08:04:22	59.97964	471		0	0				-653	30106.93
05/16/11 08:04:24	59.98093	471		0	0				-653	30106.61
05/16/11 08:04:26	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:28	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:30	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:32	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:34	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:36	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:38	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:40	59.9816	471		0	0				-653	30116.02
05/16/11 08:04:42	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:44	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:46	59.98126	471		0	0				-653	30141.59
05/16/11 08:04:48	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:50	59.98254	471		0	0				-653	30141.59
05/16/11 08:04:52	59.98352	471		0	0				-653	30141.59
05/16/11 08:04:54	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:56	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:58	59.98416	471		0	0				-653	30144.23
05/16/11 08:05:00	59.98514	471		0	0				-653	30144.23
05/16/11 08:05:02	59.9874	471		0	0				-653	30144.23
05/16/11 08:05:04	59.98901	471		0	0				-653	30144.23
05/16/11 08:05:06	59.98804	471		0	0				-653	30144.23
05/16/11 08:05:08	59.98642	471		0	0				-653	30144.23
05/16/11 08:05:10	59.98288	471		0	0				-653	30144.23
05/16/11 08:05:12	59.98254	471		0	0				-653	30144.23
05/16/11 08:05:14	59.98318	471		0	0				-653	30148.67
05/16/11 08:05:16	59.9819	471		0	0				-653	30148.67
05/16/11 08:05:18	59.98062	471		0	0				-653	30148.67
05/16/11 08:05:20	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:22	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:24	59.97964	471		0	0				-653	30155.67
05/16/11 08:05:26	59.98029	471		0	0				-653	30155.67
05/16/11 08:05:28	59.98224	471		0	0				-653	30155.67
05/16/11 08:05:30	59.98352	471		0	0				-653	30155.67
05/16/11 08:05:32	59.98578	471		0	0				-653	30155.67
05/16/11 08:05:34	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:36	59.98804	471		0	0				-653	30142.79
05/16/11 08:05:38	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:40	59.98611	471		0	0				-653	30142.79
05/16/11 08:05:42	59.9848	471		0	0				-653	30142.79
05/16/11 08:05:44	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:46	59.98318	471		0	0				-653	30154.67

0	0	0	0.001	0.001			
0	0	0	0.001	0.001			
0	0	0	0.001	0.001			
0	0	0	0.001	0.001			
0	0	0	0.000	0.000			
0	0	0	-0.001	0.001			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.001	0.001			
0	0	0	0.001	0.001			
0	0	0	0.001	0.001			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.001	0.001			
0	0	0	0.002	0.002			
0	0	0	0.002	0.002			
0	0	0	-0.001	0.001			
0	0	0	-0.002	0.002			
0	0	0	-0.004	0.004			
0	0	0	0.000	0.000			
0	0	0	0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	0.000	0.000			
0	0	0	0.000	0.000			
0	0	0	0.001	0.001			
0	0	0	0.002	0.002			
0	0	0	0.001	0.001			
0	0	0	0.002	0.002			
0	0	0	0.002	0.002			
0	0	0	0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	-0.001	0.001			
0	0	0	0.000	0.000			

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:05:48	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:50	59.98416	471.3000183		0	0				-653	30150.35
05/16/11 08:05:52	59.98514	471.3000183		0	0				-653	30150.35
05/16/11 08:05:54	59.98547	471.3000183		0	0				-653	30159.63
05/16/11 08:05:56	59.98642	471.3000183		0	0				-653	30159.63
05/16/11 08:05:58	59.98676	471.8999939		0	0				-653	30159.63
05/16/11 08:06:00	59.9874	471.8999939		0	0				-653	30159.63
05/16/11 08:06:02	59.98773	471.8999939		0	0				-653	30151.42
05/16/11 08:06:04	59.98901	471.8999939		0	0				-653	30151.42
05/16/11 08:06:06	59.98901	471.8999939		0	0				-653	30156.16
05/16/11 08:06:08	59.98804	471.3999939		0	0				-653	30156.16
05/16/11 08:06:10	59.98642	471.3999939		0	0				-653	30156.16
05/16/11 08:06:12	59.98547	471.3999939		0	0				-653	30156.16
05/16/11 08:06:14	59.98642	471.3999939		0	0				-653	30164.15
05/16/11 08:06:16	59.98935	471.3999939		0	0				-653	30164.15
05/16/11 08:06:18	59.99225	471.3999939		0	0				-653	30164.15
05/16/11 08:06:20	59.99515	471.3999939		0	0				-653	30164.15
05/16/11 08:06:22	59.99579	471.3999939		0	0				-653	30203.91
05/16/11 08:06:24	59.99515	471.3999939		0	0				-653	30203.91
05/16/11 08:06:26	59.99548	471.3999939		0	0				-653	30203.73
05/16/11 08:06:28	59.99741	470.8999939		0	0				-653	30203.73
05/16/11 08:06:30	60	470.8999939		0	0				-653	30203.73
05/16/11 08:06:32	60.00162	470.8999939		0	0				-653	30203.73
05/16/11 08:06:34	60.00162	470.8999939		0	0				-653	30199.61
05/16/11 08:06:36	60.00195	470.8999939		0	0				-653	30199.61
05/16/11 08:06:38	59.95963	0		0	0				-653	30199.61
05/16/11 08:06:40	59.88144	0		0	0				-653	30199.61
05/16/11 08:06:42	59.87237	0		0	0				-653	30086.11
05/16/11 08:06:44	59.87011	0		0	0				-653	30086.11
05/16/11 08:06:46	59.87432	0		0	0				-653	30086.14
05/16/11 08:06:48	59.88076	0		0	0				-653	30086.14
05/16/11 08:06:50	59.88531	0		0	0				-653	30086.14
05/16/11 08:06:52	59.88787	0		0	0				-653	30086.14
05/16/11 08:06:54	59.88949	0		0	0				-653	30094.43
05/16/11 08:06:56	59.8908	0		0	0				-653	30094.43
05/16/11 08:06:58	59.89175	0		0	0				-653	30094.43
05/16/11 08:07:00	59.89242	0		0	0				-653	30094.43
05/16/11 08:07:02	59.89306	0		0	0				-653	30139.49
05/16/11 08:07:04	59.89306	0		0	0				-653	30139.49
05/16/11 08:07:06	59.89306	0		0	0				-653	30133.38
05/16/11 08:07:08	59.89532	0		0	0				-653	30133.38
05/16/11 08:07:10	59.89788	0		0	0				-653	30133.38
05/16/11 08:07:12	59.8995	0		0	0				-653	30133.38

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003723 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	1	-0.042	0.042	
1	0	1	-0.078	0.078	
1	0	1	-0.009	0.009	
1	0	1	-0.002	0.002	
1	0	1	0.004	0.004	
1	0	1	0.006	0.006	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:07:14	59.90081	0		0	0				-653	30137.26
05/16/11 08:07:16	59.9021	0		0	0				-653	30137.26
05/16/11 08:07:18	59.90179	0		0	0				-653	30137.26
05/16/11 08:07:20	59.90081	0		0	0				-653	30137.26
05/16/11 08:07:22	59.90081	0		0	0				-653	30171.38
05/16/11 08:07:24	59.90048	0		0	0				-653	30171.38
05/16/11 08:07:26	59.8992	0		0	0				-653	30168.76
05/16/11 08:07:28	59.89886	0		0	0				-653	30168.76
05/16/11 08:07:30	59.89856	0		0	0				-653	30168.76
05/16/11 08:07:32	59.90017	0		0	0				-653	30168.76
05/16/11 08:07:34	59.90243	0		0	0				-653	30208.99
05/16/11 08:07:36	59.90469	0		0	0				-653	30208.99
05/16/11 08:07:38	59.90695	0		0	0				-653	30208.99
05/16/11 08:07:40	59.90887	0		0	0				-653	30208.99
05/16/11 08:07:42	59.90921	0		0	0				-653	30205.66
05/16/11 08:07:44	59.90857	0		0	0				-653	30205.66
05/16/11 08:07:46	59.90887	0		0	0				-653	30205.66
05/16/11 08:07:48	59.91018	0		0	0				-653	30205.66
05/16/11 08:07:50	59.91244	0		0	0				-653	30205.66
05/16/11 08:07:52	59.9147	0		0	0				-653	30205.66
05/16/11 08:07:54	59.9176	0		0	0				-653	30211.75
05/16/11 08:07:56	59.91922	0		0	0				-653	30211.75
05/16/11 08:07:58	59.92083	0		0	0				-653	30211.75
05/16/11 08:08:00	59.92215	0		0	0				-653	30211.75
05/16/11 08:08:02	59.92309	0		0	0				-653	30217.55
05/16/11 08:08:04	59.92505	0		0	0				-653	30217.55
05/16/11 08:08:06	59.92505	0		0	0				-653	30217.57
05/16/11 08:08:08	59.9273	0		0	0				-653	30217.57
05/16/11 08:08:10	59.93246	0		0	0				-653	30217.57
05/16/11 08:08:12	59.93505	0		0	0				-653	30217.57
05/16/11 08:08:14	59.93701	0		0	0				-653	30217.59
05/16/11 08:08:16	59.93765	0		0	0				-653	30217.59
05/16/11 08:08:18	59.93927	0		0	0				-653	30217.59
05/16/11 08:08:20	59.94183	0		0	0				-653	30217.59
05/16/11 08:08:22	59.94409	0		0	0				-653	30210.49
05/16/11 08:08:24	59.94571	0		0	0				-653	30210.49
05/16/11 08:08:26	59.94797	0		0	0				-653	30210.26
05/16/11 08:08:28	59.94766	0		0	0				-653	30210.26
05/16/11 08:08:30	59.9454	0		0	0				-653	30210.26
05/16/11 08:08:32	59.94443	0		0	0				-653	30210.26
05/16/11 08:08:34	59.94409	0		0	0				-653	30234.59
05/16/11 08:08:36	59.94507	0		0	0				-653	30234.59
05/16/11 08:08:38	59.94604	0		0	0				-653	30234.59

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003724 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:08:40	59.94638	0		0	0				-653	30234.59
05/16/11 08:08:42	59.94733	0		0	0				-653	30223.6
05/16/11 08:08:44	59.9483	0		0	0				-653	30223.6
05/16/11 08:08:46	59.94894	0		0	0				-653	30223.73
05/16/11 08:08:48	59.94992	0		0	0				-653	30223.73
05/16/11 08:08:50	59.9509	0		0	0				-653	30223.73
05/16/11 08:08:52	59.95154	0		0	0				-653	30223.73
05/16/11 08:08:54	59.95187	0		0	0				-653	30224.39
05/16/11 08:08:56	59.95346	0		0	0				-653	30224.39
05/16/11 08:08:58	59.95508	0		0	0				-653	30224.39
05/16/11 08:09:00	59.95575	0		0	0				-653	30224.39
05/16/11 08:09:02	59.95639	0		0	0				-653	30255.53
05/16/11 08:09:04	59.95801	0		0	0				-653	30255.53
05/16/11 08:09:06	59.96124	0		0	0				-653	30252.87
05/16/11 08:09:08	59.96252	0		0	0				-653	30252.87
05/16/11 08:09:10	59.96188	0		0	0				-653	30252.87
05/16/11 08:09:12	59.96124	0		0	0				-653	30252.87
05/16/11 08:09:14	59.96027	0		0	0				-653	30232.45
05/16/11 08:09:16	59.96057	0		0	0				-653	30232.45
05/16/11 08:09:18	59.96219	0		0	0				-653	30232.45
05/16/11 08:09:20	59.96512	0		0	0				-653	30232.45
05/16/11 08:09:22	59.96738	0		0	0				-653	30263.99
05/16/11 08:09:24	59.96899	0		0	0				-653	30263.99
05/16/11 08:09:26	59.97061	0		0	0				-653	30263.68
05/16/11 08:09:28	59.97318	0		0	0				-653	30263.68
05/16/11 08:09:30	59.97351	0		0	0				-653	30263.68
05/16/11 08:09:32	59.97287	0		0	0				-653	30263.68
05/16/11 08:09:34	59.97253	0		0	0				-653	30264.96
05/16/11 08:09:36	59.97318	0		0	0				-653	30264.96
05/16/11 08:09:38	59.97415	0		0	0				-653	30264.96
05/16/11 08:09:40	59.97543	0		0	0				-653	30264.96
05/16/11 08:09:42	59.97577	0		0	0				-653	30263.63
05/16/11 08:09:44	59.9761	0		0	0				-653	30263.63
05/16/11 08:09:46	59.97675	0		0	0				-653	30279.39
05/16/11 08:09:48	59.97803	0		0	0				-653	30279.39
05/16/11 08:09:50	59.97931	0		0	0				-653	30279.39
05/16/11 08:09:52	59.97998	0		0	0				-653	30279.39
05/16/11 08:09:54	59.97964	0		0	0				-653	30255.32
05/16/11 08:09:56	59.979	0		0	0				-653	30255.32
05/16/11 08:09:58	59.97964	0		0	0				-653	30255.32
05/16/11 08:10:00	59.98093	0		0	0				-653	30255.32
05/16/11 08:10:02	59.98224	0		0	0				-653	30260.67
05/16/11 08:10:04	59.98386	0		0	0				-653	30260.67

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	003725 Rows of data to shift to align T(0)
805	59.999	0.078	-0.078	0.009	1
921	8:06:38	t(0)			
806	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
	03:52	Event Length mm:ss			
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:10:06	59.98514	0		0	0				-653	30259.99
05/16/11 08:10:08	59.98773	0		0	0				-653	30259.99
05/16/11 08:10:10	59.9903	0		0	0				-653	30259.99
05/16/11 08:10:12	59.99289	0		0	0				-653	30259.99
05/16/11 08:10:14	59.99579	0		0	0				-653	30274.08
05/16/11 08:10:16	59.99646	0		0	0				-653	30274.08
05/16/11 08:10:18	59.99579	0		0	0				-653	30274.08
05/16/11 08:10:20	59.99612	0		0	0				-653	30274.08
05/16/11 08:10:22	59.99579	0		0	0				-653	30297.68
05/16/11 08:10:24	59.99484	0		0	0				-653	30297.68
05/16/11 08:10:26	59.99484	0		0	0				-653	30297.65
05/16/11 08:10:28	59.99805	0		0	0				-653	30297.65
05/16/11 08:10:30	59.99872	0		0	0				-653	30297.65
05/16/11 08:10:32	60.00034	0		0	0				-653	30297.65
05/16/11 08:10:34	60.00195	0		0	0				-653	30300.1
05/16/11 08:10:36	60.00259	0		0	0				-653	30300.1
05/16/11 08:10:38	60.00226	0		0	0				-653	30300.1
05/16/11 08:10:40	60.00195	0		0	0				-653	30300.1
05/16/11 08:10:42	60.00064	0		0	0				-653	30314.84
05/16/11 08:10:44	59.99646	0		0	0				-653	30314.84
05/16/11 08:10:46	59.99191	0		0	0				-653	30309.71
05/16/11 08:10:48	59.98901	0		0	0				-653	30309.71
05/16/11 08:10:50	59.98773	0		0	0				-653	30309.71
05/16/11 08:10:52	59.98901	0		0	0				-653	30309.71
05/16/11 08:10:54	59.99255	0		0	0				-653	30319.5
05/16/11 08:10:56	59.99579	0		0	0				-653	30319.5
05/16/11 08:10:58	59.99902	0		0	0				-653	30319.5
05/16/11 08:11:00	60.00195	0		0	0				-653	30319.5
05/16/11 08:11:02	60.00485	0		0	0				-653	30357.21
05/16/11 08:11:04	60.00809	0		0	0				-653	30357.21
05/16/11 08:11:06	60.01163	0		0	0				-653	30357.18
05/16/11 08:11:08	60.01422	0		0	0				-653	30357.18
05/16/11 08:11:10	60.0152	0		0	0				-653	30357.18
05/16/11 08:11:12	60.0155	0		0	0				-653	30357.18
05/16/11 08:11:14	60.0155	0		0	0				-653	30354.26
05/16/11 08:11:16	60.01682	0		0	0				-653	30354.26
05/16/11 08:11:18	60.01907	0		0	0				-653	30354.26
05/16/11 08:11:20	60.02295	0		0	0				-653	30354.26
05/16/11 08:11:22	60.02618	0		0	0				-653	30354.48
05/16/11 08:11:24	60.02972	0		0	0				-653	30354.48
05/16/11 08:11:26	60.03262	0		0	0				-653	30353.83
05/16/11 08:11:28	60.03458	0		0	0				-653	30353.83
05/16/11 08:11:30	60.03522	0		0	0				-653	30353.83

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003726 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:11:32	60.03424	0		0	0				-653	30353.83
05/16/11 08:11:34	60.0336	0		0	0				-653	30370.41
05/16/11 08:11:36	60.03522	0		0	0				-653	30370.41
05/16/11 08:11:38	60.03812	0		0	0				-653	30370.41
05/16/11 08:11:40	60.04037	0		0	0				-653	30370.41
05/16/11 08:11:42	60.04105	0		0	0				-653	30374.79
05/16/11 08:11:44	60.04199	0		0	0				-653	30374.79
05/16/11 08:11:46	60.04233	0		0	0				-653	30366.14
05/16/11 08:11:48	60.0433	0		0	0				-653	30366.14
05/16/11 08:11:50	60.04425	0		0	0				-653	30366.14
05/16/11 08:11:52	60.04492	0		0	0				-653	30366.14
05/16/11 08:11:54	60.04556	0		0	0				-653	30373.53
05/16/11 08:11:56	60.04587	0		0	0				-653	30373.53
05/16/11 08:11:58	60.04654	0		0	0				-653	30373.53
05/16/11 08:12:00	60.0488	0		0	0				-653	30373.53
05/16/11 08:12:02	60.04974	0		0	0				-653	30343.46
05/16/11 08:12:04	60.0491	0		0	0				-653	30343.46
05/16/11 08:12:06	60.0491	0		0	0				-653	30335.12
05/16/11 08:12:08	60.05042	0		0	0				-653	30335.12
05/16/11 08:12:10	60.04974	0		0	0				-653	30335.12
05/16/11 08:12:12	60.04846	0		0	0				-653	30335.12
05/16/11 08:12:14	60.04718	0		0	0				-653	30337.29
05/16/11 08:12:16	60.04587	0		0	0				-653	30337.29
05/16/11 08:12:18	60.04587	0		0	0				-653	30337.29
05/16/11 08:12:20	60.04556	0		0	0				-653	30337.29
05/16/11 08:12:22	60.04425	0		0	0				-653	30350.2
05/16/11 08:12:24	60.04297	0		0	0				-653	30350.2
05/16/11 08:12:26	60.04169	0		0	0				-653	30350.07
05/16/11 08:12:28	60.04233	0		0	0				-653	30350.07
05/16/11 08:12:30	60.04459	0		0	0				-653	30350.07
05/16/11 08:12:32	60.04654	0		0	0				-653	30350.07
05/16/11 08:12:34	60.04718	0		0	0				-653	30354.77
05/16/11 08:12:36	60.0462	0		0	0				-653	30354.77
05/16/11 08:12:38	60.04425	0		0	0				-653	30354.77
05/16/11 08:12:40	60.04492	0		0	0				-653	30354.77
05/16/11 08:12:42	60.04523	0		0	0				-653	30372.38
05/16/11 08:12:44	60.04523	0		0	0				-653	30372.38
05/16/11 08:12:46	60.04556	0		0	0				-653	30372.38
05/16/11 08:12:48	60.0462	0		0	0				-653	30372.38
05/16/11 08:12:50	60.04654	0		0	0				-653	30372.38
05/16/11 08:12:52	60.04654	0		0	0				-653	30372.38
05/16/11 08:12:54	60.04523	0		0	0				-653	30349.1
05/16/11 08:12:56	60.04361	0		0	0				-653	30349.1

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003727 Rows of data to shift to align T(0) 1	
805	8:06:38 t(0)					
921	8:10:30 t(Recovery)		Delta	Absolute		
806	03:52 Event Length mm:ss		Hz	Delta Hz		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	0.002	0.002		
1	1	1	0.003	0.003		
1	1	1	0.002	0.002		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		
1	1	1	0.002	0.002		
1	1	1	0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.002	0.002		
1	1	1	0.002	0.002		
1	1	1	0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.002	0.002		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	-0.001	0.001		
1	1	1	-0.002	0.002		

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:12:58	60.04199	0		0	0				-653	30349.1
05/16/11 08:13:00	60.04071	0		0	0				-653	30349.1
05/16/11 08:13:02	60.03876	0		0	0				-653	30363.65
05/16/11 08:13:04	60.03586	0		0	0				-653	30363.65
05/16/11 08:13:06	60.03394	0		0	0				-653	30363.88
05/16/11 08:13:08	60.0336	0		0	0				-653	30363.88
05/16/11 08:13:10	60.03262	0		0	0				-653	30363.88
05/16/11 08:13:12	60.03006	0		0	0				-653	30363.88
05/16/11 08:13:14	60.02747	0		0	0				-653	30364.77
05/16/11 08:13:16	60.02682	0		0	0				-653	30364.77
05/16/11 08:13:18	60.02585	0		0	0				-653	30364.77
05/16/11 08:13:20	60.02359	0		0	0				-653	30364.77
05/16/11 08:13:22	60.02197	0		0	0				-653	30374.33
05/16/11 08:13:24	60.02164	0		0	0				-653	30374.33
05/16/11 08:13:26	60.02231	0		0	0				-653	30364.67
05/16/11 08:13:28	60.02133	0		0	0				-653	30364.67
05/16/11 08:13:30	60.02133	0		0	0				-653	30364.67
05/16/11 08:13:32	60.02002	0		0	0				-653	30364.67
05/16/11 08:13:34	60.01776	0		0	0				-653	30361.56
05/16/11 08:13:36	60.01584	0		0	0				-653	30361.56
05/16/11 08:13:38	60.01291	0		0	0				-653	30361.56
05/16/11 08:13:40	60.01132	0		0	0				-653	30361.56
05/16/11 08:13:42	60.01001	0		0	0				-653	30350.69
05/16/11 08:13:44	60.00937	0		0	0				-653	30350.69
05/16/11 08:13:46	60.00775	0		0	0				-653	30344.52
05/16/11 08:13:48	60.00516	0		0	0				-653	30344.52
05/16/11 08:13:50	60.00452	0		0	0				-653	30344.52
05/16/11 08:13:52	60.00613	0		0	0				-653	30344.52
05/16/11 08:13:54	60.00613	0		0	0				-653	30354.37
05/16/11 08:13:56	60.00549	0		0	0				-653	30354.37
05/16/11 08:13:58	60.00516	0		0	0				-653	30354.37
05/16/11 08:14:00	60.00388	0		0	0				-653	30354.37
05/16/11 08:14:02	60.00259	0		0	0				-653	30373.31
05/16/11 08:14:04	60.00128	0		0	0				-653	30373.31
05/16/11 08:14:06	60.00128	0		0	0				-653	30373.78
05/16/11 08:14:08	60.00064	0		0	0				-653	30373.78
05/16/11 08:14:10	60.00034	0		0	0				-653	30373.78
05/16/11 08:14:12	60.00226	0		0	0				-653	30373.78
05/16/11 08:14:14	60.00421	0		0	0				-653	30366.33
05/16/11 08:14:16	60.00677	0		0	0				-653	30366.33
05/16/11 08:14:18	60.00903	0		0	0				-653	30366.33
05/16/11 08:14:20	60.01291	0		0	0				-653	30366.33
05/16/11 08:14:22	60.01486	0		0	0				-653	30373.85

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003728 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:14:24	60.01453	0		0	0				-653	30373.85
05/16/11 08:14:26	60.01422	0		0	0				-653	30373.05
05/16/11 08:14:28	60.0152	0		0	0				-653	30373.05
05/16/11 08:14:30	60.01614	0		0	0				-653	30373.05
05/16/11 08:14:32	60.01682	0		0	0				-653	30373.05
05/16/11 08:14:34	60.01746	0		0	0				-653	30369.77
05/16/11 08:14:36	60.01712	0		0	0				-653	30369.77
05/16/11 08:14:38	60.01682	0		0	0				-653	30369.77
05/16/11 08:14:40	60.01648	0		0	0				-653	30369.77
05/16/11 08:14:42	60.01614	0		0	0				-653	30388.99
05/16/11 08:14:44	60.01746	0		0	0				-653	30388.99
05/16/11 08:14:46	60.01776	0		0	0				-653	30388.16
05/16/11 08:14:48	60.01776	0		0	0				-653	30388.16
05/16/11 08:14:50	60.01648	0		0	0				-653	30388.16
05/16/11 08:14:52	60.01584	0		0	0				-653	30388.16
05/16/11 08:14:54	60.01648	0		0	0				-653	30376.94
05/16/11 08:14:56	60.01584	0		0	0				-653	30376.94
05/16/11 08:14:58	60.01358	0		0	0				-653	30376.94
05/16/11 08:15:00	60.01163	0		0	0				-653	30376.94
05/16/11 08:15:02	60.01132	0		0	0				-653	30371.85
05/16/11 08:15:04	60.01132	0		0	0				-653	30371.85
05/16/11 08:15:06	60.01099	0		0	0				-653	30362.65
05/16/11 08:15:08	60.01099	0		0	0				-653	30362.65
05/16/11 08:15:10	60.01291	0		0	0				-653	30362.65
05/16/11 08:15:12	60.01486	0		0	0				-653	30362.65
05/16/11 08:15:14	60.01776	0		0	0				-653	30395.46
05/16/11 08:15:16	60.01776	0		0	0				-653	30395.46
05/16/11 08:15:18	60.0184	0		0	0				-653	30395.46
05/16/11 08:15:20	60.0181	0		0	0				-653	30395.46
05/16/11 08:15:22	60.01746	0		0	0				-653	30397.03
05/16/11 08:15:24	60.0152	0		0	0				-653	30397.03
05/16/11 08:15:26	60.0152	0		0	0				-653	30396.67
05/16/11 08:15:28	60.01389	0		0	0				-653	30396.67
05/16/11 08:15:30	60.01746	0		0	0				-653	30396.67
05/16/11 08:15:32	60.01907	0		0	0				-653	30396.67
05/16/11 08:15:34	60.01907	0		0	0				-653	30388.62
05/16/11 08:15:36	60.02036	0		0	0				-653	30388.62
05/16/11 08:15:38	60.01874	0		0	0				-653	30388.62
05/16/11 08:15:40	60.01874	0		0	0				-653	30388.62
05/16/11 08:15:42	60.01971	0		0	0				-653	30381.78
05/16/11 08:15:44	60.01971	0		0	0				-653	30381.78
05/16/11 08:15:46	60.01971	0		0	0				-653	30382.96
05/16/11 08:15:48	60.0184	0		0	0				-653	30382.96

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003729 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:15:50	60.01486	0		0	0				-653	30382.96
05/16/11 08:15:52	60.01358	0		0	0				-653	30382.96
05/16/11 08:15:54	60.01389	0		0	0				-653	30381.48
05/16/11 08:15:56	60.01227	0		0	0				-653	30381.48
05/16/11 08:15:58	60.01001	0		0	0				-653	30381.48
05/16/11 08:16:00	60.00583	0		0	0				-653	30381.48
05/16/11 08:16:02	60.00162	0		0	0				-653	30394.03
05/16/11 08:16:04	60.00162	0		0	0				-653	30394.03
05/16/11 08:16:06	59.99805	0		0	0				-653	30394.07
05/16/11 08:16:08	59.99353	0		0	0				-653	30394.07
05/16/11 08:16:10	59.99255	0		0	0				-653	30394.07
05/16/11 08:16:12	59.99225	0		0	0				-653	30394.07
05/16/11 08:16:14	59.98999	0		0	0				-653	30376.91
05/16/11 08:16:16	59.98837	0		0	0				-653	30376.91
05/16/11 08:16:18	59.98416	0		0	0				-653	30376.91
05/16/11 08:16:20	59.9816	0		0	0				-653	30376.91
05/16/11 08:16:22	59.98093	0		0	0				-653	30367.96
05/16/11 08:16:24	59.98029	0		0	0				-653	30367.96
05/16/11 08:16:26	59.97998	0		0	0				-653	30367.46
05/16/11 08:16:28	59.97836	0		0	0				-653	30367.46
05/16/11 08:16:30	59.97513	0		0	0				-653	30367.46
05/16/11 08:16:32	59.97287	0		0	0				-653	30367.46
05/16/11 08:16:34	59.97189	0		0	0				-653	30361.18
05/16/11 08:16:36	59.97156	0		0	0				-653	30361.18
05/16/11 08:16:38	59.97382	0		0	0				-653	30361.18
05/16/11 08:16:40	59.97641	0		0	0				-653	30361.18
05/16/11 08:16:42	59.97836	0		0	0				-653	30365.59
05/16/11 08:16:44	59.97705	0		0	0				-653	30365.59
05/16/11 08:16:46	59.97449	0		0	0				-653	30365.19
05/16/11 08:16:48	59.97125	0		0	0				-653	30365.19
05/16/11 08:16:50	59.97092	0		0	0				-653	30365.19
05/16/11 08:16:52	59.97287	0		0	0				-653	30365.19
05/16/11 08:16:54	59.97449	0		0	0				-653	30375.91
05/16/11 08:16:56	59.97382	0		0	0				-653	30375.91
05/16/11 08:16:58	59.97318	0		0	0				-653	30375.91
05/16/11 08:17:00	59.97449	0		0	0				-653	30375.91
05/16/11 08:17:02	59.9761	0		0	0				-653	30367.4
05/16/11 08:17:04	59.97739	0		0	0				-653	30367.4
05/16/11 08:17:06	59.97836	0		0	0				-653	30367.72
05/16/11 08:17:08	59.97769	0		0	0				-653	30367.72
05/16/11 08:17:10	59.97705	0		0	0				-653	30367.72
05/16/11 08:17:12	59.97641	0		0	0				-653	30367.72
05/16/11 08:17:14	59.97543	0		0	0				-653	30416.87

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	003730 Rows of data to shift to align T(0)	
805	59.999	0.078	-0.078	0.009	1	
921	8:06:38	t(0)				
806	8:10:30	t(Recovery)				
	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz		
1	1	1	-0.004	0.004		
1	1	1	-0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	-0.002	0.002		
1	1	1	-0.002	0.002		
1	1	1	-0.004	0.004		
1	1	1	-0.004	0.004		
1	1	1	0.000	0.000		
1	0	1	-0.004	0.004		
1	0	1	-0.005	0.005		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	-0.002	0.002		
1	0	1	-0.002	0.002		
1	0	1	-0.004	0.004		
1	0	1	-0.003	0.003		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	-0.002	0.002		
1	0	1	-0.003	0.003		
1	0	1	-0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.002	0.002		
1	0	1	0.003	0.003		
1	0	1	0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	-0.003	0.003		
1	0	1	-0.003	0.003		
1	0	1	0.000	0.000		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.002	0.002		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:17:16	59.97382	0		0	0				-653	30416.87
05/16/11 08:17:18	59.97318	0		0	0				-653	30416.87
05/16/11 08:17:20	59.97223	0		0	0				-653	30416.87
05/16/11 08:17:22	59.97189	0		0	0				-653	30413.65
05/16/11 08:17:24	59.97092	0		0	0				-653	30413.65
05/16/11 08:17:26	59.96994	0		0	0				-653	30406.3
05/16/11 08:17:28	59.96832	0		0	0				-653	30406.3
05/16/11 08:17:30	59.96606	0		0	0				-653	30406.3
05/16/11 08:17:32	59.96542	0		0	0				-653	30406.3
05/16/11 08:17:34	59.96606	0		0	0				-653	30418.59
05/16/11 08:17:36	59.9693	0		0	0				-653	30418.59
05/16/11 08:17:38	59.97253	0		0	0				-653	30418.59
05/16/11 08:17:40	59.97351	0		0	0				-653	30418.59
05/16/11 08:17:42	59.97382	0		0	0				-653	30433.31
05/16/11 08:17:44	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:46	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:48	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:50	59.96768	0		0	0				-653	30433.31
05/16/11 08:17:52	59.97125	0		0	0				-653	30433.31
05/16/11 08:17:54	59.97577	0		0	0				-653	30451.3
05/16/11 08:17:56	59.97577	0		0	0				-653	30451.3
05/16/11 08:17:58	59.97577	0		0	0				-653	30451.3
05/16/11 08:18:00	59.98416	0		0	0				-653	30451.3
05/16/11 08:18:02	59.9819	0		0	0				-653	30425.74
05/16/11 08:18:04	59.979	0		0	0				-653	30425.74
05/16/11 08:18:06	59.97769	0		0	0				-653	30419.18
05/16/11 08:18:08	59.97769	0		0	0				-653	30419.18
05/16/11 08:18:10	59.98126	0		0	0				-653	30419.18
05/16/11 08:18:12	59.9848	0		0	0				-653	30419.18
05/16/11 08:18:14	59.98868	0		0	0				-653	30424.29
05/16/11 08:18:16	59.99161	0		0	0				-653	30424.29
05/16/11 08:18:18	59.99353	0		0	0				-653	30424.29
05/16/11 08:18:20	59.99579	0		0	0				-653	30424.29
05/16/11 08:18:22	59.99677	0		0	0				-653	30440.82
05/16/11 08:18:24	59.99774	0		0	0				-653	30440.82
05/16/11 08:18:26	59.99838	0		0	0				-653	30431.58
05/16/11 08:18:28	59.99774	0		0	0				-653	30431.58
05/16/11 08:18:30	59.9971	0		0	0				-653	30431.58
05/16/11 08:18:32	59.99741	0		0	0				-653	30431.58
05/16/11 08:18:34	59.99741	0		0	0				-653	30444.25
05/16/11 08:18:36	59.99741	0		0	0				-653	30444.25
05/16/11 08:18:38	60.00064	0		0	0				-653	30444.25
05/16/11 08:18:40	60.00323	0		0	0				-653	30444.25

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	003731 Rows of data to shift to align T(0)	
805	59.999	0.078	-0.078	0.009	1	
921	8:06:38	t(0)				
806	8:10:30	t(Recovery)				
	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz		
1	0	1	-0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	-0.002	0.002		
1	0	1	-0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.003	0.003		
1	0	1	0.003	0.003		
1	0	1	0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	0	1	-0.005	0.005		
1	0	1	0.004	0.004		
1	0	1	0.005	0.005		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	0	1	0.008	0.008		
1	0	1	-0.002	0.002		
1	0	1	-0.003	0.003		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.004	0.004		
1	0	1	0.004	0.004		
1	0	1	0.004	0.004		
1	0	1	0.003	0.003		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	1	1	0.003	0.003		
1	1	1	0.003	0.003		

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:18:42	60.00354	0		0	0				-653	30465.11
05/16/11 08:18:44	60.00259	0		0	0				-653	30465.11
05/16/11 08:18:46	60.00098	0		0	0				-653	30465.3
05/16/11 08:18:48	59.99936	0		0	0				-653	30465.3
05/16/11 08:18:50	59.99741	0		0	0				-653	30465.3
05/16/11 08:18:52	59.99677	0		0	0				-653	30465.3
05/16/11 08:18:54	59.99677	0		0	0				-653	30478.25
05/16/11 08:18:56	59.9971	0		0	0				-653	30478.25
05/16/11 08:18:58	59.99774	0		0	0				-653	30478.25
05/16/11 08:19:00	59.99872	0		0	0				-653	30478.25
05/16/11 08:19:02	59.99966	0		0	0				-653	30473.86
05/16/11 08:19:04	60	0		0	0				-653	30473.86
05/16/11 08:19:06	60.00034	0		0	0				-653	30468.84
05/16/11 08:19:08	60.00098	0		0	0				-653	30468.84
05/16/11 08:19:10	60.00226	0		0	0				-653	30468.84
05/16/11 08:19:12	60.0029	0		0	0				-653	30468.84
05/16/11 08:19:14	60.00259	0		0	0				-653	30469.63
05/16/11 08:19:16	60.00226	0		0	0				-653	30469.63
05/16/11 08:19:18	60.00226	0		0	0				-653	30469.63
05/16/11 08:19:20	60.00323	0		0	0				-653	30469.63
05/16/11 08:19:22	60.00421	0		0	0				-653	30488.41
05/16/11 08:19:24	60.00485	0		0	0				-653	30488.41
05/16/11 08:19:26	60.00452	0		0	0				-653	30480.29
05/16/11 08:19:28	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:30	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:32	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:34	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:36	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:38	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:40	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:42	60.00613	0		0	0				-653	30487.82
05/16/11 08:19:44	60.00485	0		0	0				-653	30487.82
05/16/11 08:19:46	60.00452	0		0	0				-653	30489.73
05/16/11 08:19:48	60.00452	0		0	0				-653	30489.73
05/16/11 08:19:50	60.00354	0		0	0				-653	30489.73
05/16/11 08:19:52	60.0029	0		0	0				-653	30489.73
05/16/11 08:19:54	60.00162	0		0	0				-653	30480.09
05/16/11 08:19:56	60.00162	0		0	0				-653	30480.09
05/16/11 08:19:58	60.00421	0		0	0				-653	30480.09
05/16/11 08:20:00	60.00421	0		0	0				-653	30480.09
05/16/11 08:20:02	60.0029	0		0	0				-653	30480.91
05/16/11 08:20:04	60.00034	0		0	0				-653	30480.91
05/16/11 08:20:06	59.99805	0		0	0				-653	30480.84

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003732 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	0	1	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:20:08	59.99646	0		0	0				-653	30480.84
05/16/11 08:20:10	59.99515	0		0	0				-653	30480.84
05/16/11 08:20:12	59.99387	0		0	0				-653	30480.84
05/16/11 08:20:14	59.99289	0		0	0				-653	30476.09
05/16/11 08:20:16	59.99255	0		0	0				-653	30476.09
05/16/11 08:20:18	59.99225	0		0	0				-653	30476.09
05/16/11 08:20:20	59.98965	0		0	0				-653	30476.09
05/16/11 08:20:22	59.98514	0		0	0				-653	30456.76
05/16/11 08:20:24	59.98254	0		0	0				-653	30456.76
05/16/11 08:20:26	59.97836	0		0	0				-653	30457.12
05/16/11 08:20:28	59.97641	0		0	0				-653	30457.12
05/16/11 08:20:30	59.97705	0		0	0				-653	30457.12
05/16/11 08:20:32	59.97705	0		0	0				-653	30457.12
05/16/11 08:20:34	59.97705	0		0	0				-653	30446.98
05/16/11 08:20:36	59.97803	0		0	0				-653	30446.98
05/16/11 08:20:38	59.97964	0		0	0				-653	30446.98
05/16/11 08:20:40	59.9816	0		0	0				-653	30446.98
05/16/11 08:20:42	59.98126	0		0	0				-653	30461.02
05/16/11 08:20:44	59.97931	0		0	0				-653	30461.02
05/16/11 08:20:46	59.9761	0		0	0				-653	30460.94
05/16/11 08:20:48	59.97543	0		0	0				-653	30460.94
05/16/11 08:20:50	59.97577	0		0	0				-653	30460.94
05/16/11 08:20:52	59.97675	0		0	0				-653	30460.94
05/16/11 08:20:54	59.97803	0		0	0				-653	30469.23
05/16/11 08:20:56	59.979	0		0	0				-653	30469.23
05/16/11 08:20:58	59.97964	0		0	0				-653	30469.23
05/16/11 08:21:00	59.98062	0		0	0				-653	30469.23
05/16/11 08:21:02	59.9819	0		0	0				-653	30481.49
05/16/11 08:21:04	59.98224	0		0	0				-653	30481.49
05/16/11 08:21:06	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:08	59.98288	0		0	0				-653	30480.29
05/16/11 08:21:10	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:12	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:14	59.98288	0		0	0				-653	30473.15
05/16/11 08:21:16	59.98611	0		0	0				-653	30473.15
05/16/11 08:21:18	59.99387	0		0	0				-653	30473.15
05/16/11 08:21:20	60.00226	0		0	0				-653	30473.15
05/16/11 08:21:22	60.01099	0		0	0				-653	30470.66
05/16/11 08:21:24	60.01712	0		0	0				-653	30470.66
05/16/11 08:21:26	60.02069	0		0	0				-653	30470.6
05/16/11 08:21:28	60.02133	0		0	0				-653	30470.6
05/16/11 08:21:30	60.02133	0		0	0				-653	30470.6
05/16/11 08:21:32	60.02133	0		0	0				-653	30470.6

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003733 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	0.008	0.008	
1	1	1	0.008	0.008	
1	1	1	0.009	0.009	
1	1	1	0.006	0.006	
1	1	1	0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:21:34	60.02325	0		0	0				-653	30461.28
05/16/11 08:21:36	60.02551	0		0	0				-653	30461.28
05/16/11 08:21:38	60.02682	0		0	0				-653	30461.28
05/16/11 08:21:40	60.02844	0		0	0				-653	30461.28
05/16/11 08:21:42	60.02972	0		0	0				-653	30450.44
05/16/11 08:21:44	60.03101	0		0	0				-653	30450.44
05/16/11 08:21:46	60.03198	0		0	0				-653	30451.91
05/16/11 08:21:48	60.03296	0		0	0				-653	30451.91
05/16/11 08:21:50	60.03458	0		0	0				-653	30451.91
05/16/11 08:21:52	60.03488	0		0	0				-653	30451.91
05/16/11 08:21:54	60.03488	0		0	0				-653	30446.52
05/16/11 08:21:56	60.03424	0		0	0				-653	30446.52
05/16/11 08:21:58	60.03458	0		0	0				-653	30446.52
05/16/11 08:22:00	60.03458	0		0	0				-653	30446.52
05/16/11 08:22:02	60.03555	0		0	0				-653	30452.43
05/16/11 08:22:04	60.03586	0		0	0				-653	30452.43
05/16/11 08:22:06	60.03683	0		0	0				-653	30452.43
05/16/11 08:22:08	60.03748	0		0	0				-653	30452.43
05/16/11 08:22:10	60.03748	0		0	0				-653	30452.43
05/16/11 08:22:12	60.03717	0		0	0				-653	30452.43
05/16/11 08:22:14	60.03781	0		0	0				-653	30473.21
05/16/11 08:22:16	60.03781	0		0	0				-653	30473.21
05/16/11 08:22:18	60.03748	0		0	0				-653	30473.21
05/16/11 08:22:20	60.0365	0		0	0				-653	30473.21
05/16/11 08:22:22	60.03683	0		0	0				-653	30476.61
05/16/11 08:22:24	60.03748	0		0	0				-653	30476.61
05/16/11 08:22:26	60.03748	0		0	0				-653	30476.55
05/16/11 08:22:28	60.03812	0		0	0				-653	30476.55
05/16/11 08:22:30	60.03876	0		0	0				-653	30476.55
05/16/11 08:22:32	60.04007	0		0	0				-653	30476.55
05/16/11 08:22:34	60.04169	0		0	0				-653	30473.8
05/16/11 08:22:36	60.04361	0		0	0				-653	30473.8
05/16/11 08:22:38	60.04523	0		0	0				-653	30473.8
05/16/11 08:22:40	60.04492	0		0	0				-653	30473.8
05/16/11 08:22:42	60.04459	0		0	0				-653	30471
05/16/11 08:22:44	60.04395	0		0	0				-653	30471
05/16/11 08:22:46	60.04199	0		0	0				-653	30471.97
05/16/11 08:22:48	60.03717	0		0	0				-653	30471.97
05/16/11 08:22:50	60.03296	0		0	0				-653	30471.97
05/16/11 08:22:52	60.03101	0		0	0				-653	30471.97
05/16/11 08:22:54	60.03134	0		0	0				-653	30485.47
05/16/11 08:22:56	60.03168	0		0	0				-653	30485.47
05/16/11 08:22:58	60.03101	0		0	0				-653	30485.47

Event Detection Row	805	Recovery Target Freq:	59.999	Max Absolute Delta Hz	0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003734 Rows of data to shift to align T(0) 1
	921		8:06:38	t(0)				
	806		8:10:30	t(Recovery)				
			03:52	Event Length mm:ss		Delta Hz	Absolute Delta Hz	
					1	0.002	0.002	
					1	0.002	0.002	
					1	0.001	0.001	
					1	0.002	0.002	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.002	0.002	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.002	0.002	
					1	0.002	0.002	
					1	0.002	0.002	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	-0.002	0.002	
					1	-0.005	0.005	
					1	-0.004	0.004	
					1	-0.002	0.002	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:23:00	60.03101	0		0	0				-653	30485.47
05/16/11 08:23:02	60.03232	0		0	0				-653	30505.49
05/16/11 08:23:04	60.03326	0		0	0				-653	30505.49
05/16/11 08:23:06	60.03326	0		0	0				-653	30505.26
05/16/11 08:23:08	60.03394	0		0	0				-653	30505.26
05/16/11 08:23:10	60.03296	0		0	0				-653	30505.26
05/16/11 08:23:12	60.03232	0		0	0				-653	30505.26
05/16/11 08:23:14	60.03168	0		0	0				-653	30515.6
05/16/11 08:23:16	60.03168	0		0	0				-653	30515.6
05/16/11 08:23:18	60.03232	0		0	0				-653	30515.6
05/16/11 08:23:20	60.03232	0		0	0				-653	30515.6
05/16/11 08:23:22	60.03168	0		0	0				-653	30505.28
05/16/11 08:23:24	60.03168	0		0	0				-653	30505.28
05/16/11 08:23:26	60.03134	0		0	0				-653	30506.12
05/16/11 08:23:28	60.03101	0		0	0				-653	30506.12
05/16/11 08:23:30	60.03036	0		0	0				-653	30506.12
05/16/11 08:23:32	60.03036	0		0	0				-653	30506.12
05/16/11 08:23:34	60.02972	0		0	0				-653	30493.68
05/16/11 08:23:36	60.02875	0		0	0				-653	30493.68
05/16/11 08:23:38	60.03006	0		0	0				-653	30493.68
05/16/11 08:23:40	60.03198	0		0	0				-653	30493.68
05/16/11 08:23:42	60.03326	0		0	0				-653	30529.28
05/16/11 08:23:44	60.03458	0		0	0				-653	30529.28
05/16/11 08:23:46	60.03488	0		0	0				-653	30529.08
05/16/11 08:23:48	60.0336	0		0	0				-653	30529.08
05/16/11 08:23:50	60.03326	0		0	0				-653	30529.08
05/16/11 08:23:52	60.03232	0		0	0				-653	30529.08
05/16/11 08:23:54	60.03134	0		0	0				-653	30529.52
05/16/11 08:23:56	60.03168	0		0	0				-653	30529.52
05/16/11 08:23:58	60.03326	0		0	0				-653	30529.52
05/16/11 08:24:00	60.03458	0		0	0				-653	30529.52
05/16/11 08:24:02	60.03586	0		0	0				-653	30535.57
05/16/11 08:24:04	60.0365	0		0	0				-653	30535.57
05/16/11 08:24:06	60.03748	0		0	0				-653	30533.89
05/16/11 08:24:08	60.03683	0		0	0				-653	30533.89
05/16/11 08:24:10	60.03619	0		0	0				-653	30533.89
05/16/11 08:24:12	60.03522	0		0	0				-653	30533.89
05/16/11 08:24:14	60.03424	0		0	0				-653	30521.82
05/16/11 08:24:16	60.03296	0		0	0				-653	30521.82
05/16/11 08:24:18	60.03198	0		0	0				-653	30521.82
05/16/11 08:24:20	60.03134	0		0	0				-653	30521.82
05/16/11 08:24:22	60.03168	0		0	0				-653	30533.64
05/16/11 08:24:24	60.03134	0		0	0				-653	30533.64

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003735 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:24:26	60.03101	0		0	0				-653	30532.32
05/16/11 08:24:28	60.03036	0		0	0				-653	30532.32
05/16/11 08:24:30	60.02972	0		0	0				-653	30532.32
05/16/11 08:24:32	60.03006	0		0	0				-653	30532.32
05/16/11 08:24:34	60.0307	0		0	0				-653	30551.2
05/16/11 08:24:36	60.03168	0		0	0				-653	30551.2
05/16/11 08:24:38	60.0336	0		0	0				-653	30551.2
05/16/11 08:24:40	60.03488	0		0	0				-653	30551.2
05/16/11 08:24:42	60.03522	0		0	0				-653	30548.06
05/16/11 08:24:44	60.03586	0		0	0				-653	30548.06
05/16/11 08:24:46	60.03717	0		0	0				-653	30543.69
05/16/11 08:24:48	60.03812	0		0	0				-653	30543.69
05/16/11 08:24:50	60.03717	0		0	0				-653	30543.69
05/16/11 08:24:52	60.03748	0		0	0				-653	30543.69
05/16/11 08:24:54	60.03845	0		0	0				-653	30546.32
05/16/11 08:24:56	60.03876	0		0	0				-653	30546.32
05/16/11 08:24:58	60.03781	0		0	0				-653	30546.32
05/16/11 08:25:00	60.03619	0		0	0				-653	30546.32
05/16/11 08:25:02	60.03488	0		0	0				-653	30546.28
05/16/11 08:25:04	60.03394	0		0	0				-653	30546.28
05/16/11 08:25:06	60.0336	0		0	0				-653	30546.38
05/16/11 08:25:08	60.0336	0		0	0				-653	30546.38
05/16/11 08:25:10	60.03458	0		0	0				-653	30546.38
05/16/11 08:25:12	60.0365	0		0	0				-653	30546.38
05/16/11 08:25:14	60.03748	0		0	0				-653	30556.84
05/16/11 08:25:16	60.03781	0		0	0				-653	30556.84
05/16/11 08:25:18	60.03748	0		0	0				-653	30556.84
05/16/11 08:25:20	60.0365	0		0	0				-653	30556.84
05/16/11 08:25:22	60.03488	0		0	0				-653	30557.42
05/16/11 08:25:24	60.0336	0		0	0				-653	30557.42
05/16/11 08:25:26	60.03232	0		0	0				-653	30557.43
05/16/11 08:25:28	60.03134	0		0	0				-653	30557.43
05/16/11 08:25:30	60.03101	0		0	0				-653	30557.43
05/16/11 08:25:32	60.03101	0		0	0				-653	30557.43
05/16/11 08:25:34	60.0307	0		0	0				-653	30566.39
05/16/11 08:25:36	60.02972	0		0	0				-653	30566.39
05/16/11 08:25:38	60.02908	0		0	0				-653	30566.39
05/16/11 08:25:40	60.02811	0		0	0				-653	30566.39
05/16/11 08:25:42	60.02649	0		0	0				-653	30567.26
05/16/11 08:25:44	60.02521	0		0	0				-653	30567.26
05/16/11 08:25:46	60.02359	0		0	0				-653	30562.43
05/16/11 08:25:48	60.02133	0		0	0				-653	30562.43
05/16/11 08:25:50	60.02002	0		0	0				-653	30562.43

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003736 Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta	Absolute	
806	03:52 Event Length mm:ss		Hz	Delta Hz	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:25:52	60.02002	0		0	0				-653	30562.43
05/16/11 08:25:54	60.02069	0		0	0				-653	30573.32
05/16/11 08:25:56	60.02133	0		0	0				-653	30573.32
05/16/11 08:25:58	60.021	0		0	0				-653	30573.32
05/16/11 08:26:00	60.02036	0		0	0				-653	30573.32
05/16/11 08:26:02	60.01938	0		0	0				-653	30567
05/16/11 08:26:04	60.01938	0		0	0				-653	30567
05/16/11 08:26:06	60.01938	0		0	0				-653	30567.04
05/16/11 08:26:08	60.01971	0		0	0				-653	30567.04
05/16/11 08:26:10	60.01971	0		0	0				-653	30567.04
05/16/11 08:26:12	60.01907	0		0	0				-653	30567.04
05/16/11 08:26:14	60.01938	0		0	0				-653	30556.49
05/16/11 08:26:16	60.02036	0		0	0				-653	30556.49
05/16/11 08:26:18	60.02036	0		0	0				-653	30556.49
05/16/11 08:26:20	60.01907	0		0	0				-653	30556.49
05/16/11 08:26:22	60.01712	0		0	0				-653	30530.19
05/16/11 08:26:24	60.01584	0		0	0				-653	30530.19
05/16/11 08:26:26	60.0152	0		0	0				-653	30530.04
05/16/11 08:26:28	60.0155	0		0	0				-653	30530.04
05/16/11 08:26:30	60.01614	0		0	0				-653	30530.04
05/16/11 08:26:32	60.01746	0		0	0				-653	30530.04
05/16/11 08:26:34	60.0181	0		0	0				-653	30542.27
05/16/11 08:26:36	60.01746	0		0	0				-653	30542.27
05/16/11 08:26:38	60.01712	0		0	0				-653	30542.27
05/16/11 08:26:40	60.01648	0		0	0				-653	30542.27
05/16/11 08:26:42	60.01486	0		0	0				-653	30559.64
05/16/11 08:26:44	60.01227	0		0	0				-653	30559.64
05/16/11 08:26:46	60.01035	0		0	0				-653	30559.67
05/16/11 08:26:48	60.00937	0		0	0				-653	30559.67
05/16/11 08:26:50	60.00903	0		0	0				-653	30559.67
05/16/11 08:26:52	60.00937	0		0	0				-653	30559.67
05/16/11 08:26:54	60.01065	0		0	0				-653	30552.02
05/16/11 08:26:56	60.01163	0		0	0				-653	30552.02
05/16/11 08:26:58	60.01227	0		0	0				-653	30552.02
05/16/11 08:27:00	60.01163	0		0	0				-653	30552.02
05/16/11 08:27:02	60.00873	0		0	0				-653	30556.78
05/16/11 08:27:04	60.00647	0		0	0				-653	30556.78
05/16/11 08:27:06	60.00583	0		0	0				-653	30550.7
05/16/11 08:27:08	60.00613	0		0	0				-653	30550.7
05/16/11 08:27:10	60.00613	0		0	0				-653	30550.7
05/16/11 08:27:12	60.00711	0		0	0				-653	30550.7
05/16/11 08:27:14	60.00903	0		0	0				-653	30559.76
05/16/11 08:27:16	60.01099	0		0	0				-653	30559.76

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003737 Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta	Absolute	
806	03:52 Event Length mm:ss		Hz	Delta Hz	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:27:18	60.01099	0		0	0				-653	30559.76
05/16/11 08:27:20	60.01035	0		0	0				-653	30559.76
05/16/11 08:27:22	60.0097	0		0	0				-653	30563.61
05/16/11 08:27:24	60.00873	0		0	0				-653	30563.61
05/16/11 08:27:26	60.00711	0		0	0				-653	30556.57
05/16/11 08:27:28	60.00613	0		0	0				-653	30556.57
05/16/11 08:27:30	60.00583	0		0	0				-653	30556.57
05/16/11 08:27:32	60.00711	0		0	0				-653	30556.57
05/16/11 08:27:34	60.00809	0		0	0				-653	30556.7
05/16/11 08:27:36	60.00839	0		0	0				-653	30556.7
05/16/11 08:27:38	60.00809	0		0	0				-653	30556.7
05/16/11 08:27:40	60.00711	0		0	0				-653	30556.7
05/16/11 08:27:42	60.00677	0		0	0				-653	30544.52
05/16/11 08:27:44	60.00775	0		0	0				-653	30544.52
05/16/11 08:27:46	60.00711	0		0	0				-653	30543.34
05/16/11 08:27:48	60.00647	0		0	0				-653	30543.34
05/16/11 08:27:50	60.00388	0		0	0				-653	30543.34
05/16/11 08:27:52	60.00128	0		0	0				-653	30543.34
05/16/11 08:27:54	59.99936	0		0	0				-653	30554.42
05/16/11 08:27:56	59.99805	0		0	0				-653	30554.42
05/16/11 08:27:58	59.99741	0		0	0				-653	30554.42
05/16/11 08:28:00	59.9971	0		0	0				-653	30554.42
05/16/11 08:28:02	59.99677	0		0	0				-653	30534.33
05/16/11 08:28:04	59.9971	0		0	0				-653	30534.33
05/16/11 08:28:06	59.99646	0		0	0				-653	30533.84
05/16/11 08:28:08	59.99579	0		0	0				-653	30533.84
05/16/11 08:28:10	59.99451	0		0	0				-653	30533.84
05/16/11 08:28:12	59.99353	0		0	0				-653	30533.84
05/16/11 08:28:14	59.99289	0		0	0				-653	30557.2
05/16/11 08:28:16	59.99191	0		0	0				-653	30557.2
05/16/11 08:28:18	59.98901	0		0	0				-653	30557.2
05/16/11 08:28:20	59.98611	0		0	0				-653	30557.2
05/16/11 08:28:22	59.9845	0		0	0				-653	30560.91
05/16/11 08:28:24	59.98318	0		0	0				-653	30560.91
05/16/11 08:28:26	59.9819	0		0	0				-653	30560.56
05/16/11 08:28:28	59.98093	0		0	0				-653	30560.56
05/16/11 08:28:30	59.97964	0		0	0				-653	30560.56
05/16/11 08:28:32	59.97867	0		0	0				-653	30560.56
05/16/11 08:28:34	59.97964	0		0	0				-653	30560.08
05/16/11 08:28:36	59.97998	0		0	0				-653	30560.08
05/16/11 08:28:38	59.98062	0		0	0				-653	30560.08
05/16/11 08:28:40	59.98029	0		0	0				-653	30560.08
05/16/11 08:28:42	59.979	0		0	0				-653	30558.72

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003738 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:28:44	59.97739	0		0	0				-653	30558.72
05/16/11 08:28:46	59.97513	0		0	0				-653	30553.46
05/16/11 08:28:48	59.97351	0		0	0				-653	30553.46
05/16/11 08:28:50	59.97253	0		0	0				-653	30553.46
05/16/11 08:28:52	59.97189	0		0	0				-653	30553.46
05/16/11 08:28:54	59.97318	0		0	0				-653	30562.63
05/16/11 08:28:56	59.97415	0		0	0				-653	30562.63
05/16/11 08:28:58	59.97449	0		0	0				-653	30562.63
05/16/11 08:29:00	59.97513	0		0	0				-653	30562.63
05/16/11 08:29:02	59.97577	0		0	0				-653	30578.05
05/16/11 08:29:04	59.97641	0		0	0				-653	30578.05
05/16/11 08:29:06	59.97705	0		0	0				-653	30570.97
05/16/11 08:29:08	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:10	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:12	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:14	59.9761	0		0	0				-653	30593.17
05/16/11 08:29:16	59.9761	0		0	0				-653	30593.17
05/16/11 08:29:18	59.97641	0		0	0				-653	30593.17
05/16/11 08:29:20	59.97705	0		0	0				-653	30593.17
05/16/11 08:29:22	59.97803	0		0	0				-653	30575.07
05/16/11 08:29:24	59.98029	0		0	0				-653	30575.07
05/16/11 08:29:26	59.98318	0		0	0				-653	30575.07
05/16/11 08:29:28	59.98547	0		0	0				-653	30575.07
05/16/11 08:29:30	59.98709	0		0	0				-653	30575.07
05/16/11 08:29:32	59.98965	0		0	0				-653	30575.07
05/16/11 08:29:34	59.99225	0		0	0				-653	30575.72
05/16/11 08:29:36	59.99484	0		0	0				-653	30575.72
05/16/11 08:29:38	59.99646	0		0	0				-653	30575.72
05/16/11 08:29:40	59.99774	0		0	0				-653	30575.72
05/16/11 08:29:42	59.99966	0		0	0				-653	30583.84
05/16/11 08:29:44	60.00034	0		0	0				-653	30583.84
05/16/11 08:29:46	60.00128	0		0	0				-653	30586.4
05/16/11 08:29:48	60.00195	0		0	0				-653	30586.4
05/16/11 08:29:50	60.00226	0		0	0				-653	30586.4
05/16/11 08:29:52	60.0029	0		0	0				-653	30586.4
05/16/11 08:29:54	60.00354	0		0	0				-653	30589.72
05/16/11 08:29:56	60.00421	0		0	0				-653	30589.72
05/16/11 08:29:58	60.00452	0		0	0				-653	30589.72
05/16/11 08:30:00	60.00388	0		0	0				-653	30589.72
05/16/11 08:30:02	60.00388	0		0	0				-653	30590.3
05/16/11 08:30:04	60.00421	0		0	0				-653	30590.3
05/16/11 08:30:06	60.00421	0		0	0				-653	30590.22
05/16/11 08:30:08	60.00388	0		0	0				-653	30590.22

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	003739 Rows of data to shift to align T(0)	
805	59.999	0.078	-0.078	0.009	1	
921	8:06:38	t(0)				
806	8:10:30	t(Recovery)				
	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz		
1	0	1	-0.002	0.002		
1	0	1	-0.002	0.002		
1	0	1	-0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.002	0.002		
1	0	1	0.003	0.003		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.003	0.003		
1	0	1	0.003	0.003		
1	0	1	0.003	0.003		
1	0	1	0.002	0.002		
1	0	1	0.001	0.001		
1	1	1	0.002	0.002		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	-0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:30:10	60.00195	0		0	0				-653	30590.22
05/16/11 08:30:12	59.99966	0		0	0				-653	30590.22
05/16/11 08:30:14	59.99387	0		0	0				-653	30600.12
05/16/11 08:30:16	59.99387	0		0	0				-653	30600.12
05/16/11 08:30:18	59.98999	0		0	0				-653	30600.12
05/16/11 08:30:20	59.98868	0		0	0				-653	30600.12
05/16/11 08:30:22	59.98709	0		0	0				-653	30603.38
05/16/11 08:30:24	59.98578	0		0	0				-653	30603.38
05/16/11 08:30:26	59.98578	0		0	0				-653	30597.09
05/16/11 08:30:28	59.98288	0		0	0				-653	30597.09
05/16/11 08:30:30	59.97964	0		0	0				-653	30597.09
05/16/11 08:30:32	59.97675	0		0	0				-653	30597.09
05/16/11 08:30:34	59.97479	0		0	0				-653	30603.96
05/16/11 08:30:36	59.97479	0		0	0				-653	30603.96
05/16/11 08:30:38	59.97641	0		0	0				-653	30603.96
05/16/11 08:30:40	59.97641	0		0	0				-653	30603.96
05/16/11 08:30:42	59.97543	0		0	0				-653	30607.96
05/16/11 08:30:44	59.97351	0		0	0				-653	30607.96
05/16/11 08:30:46	59.97318	0		0	0				-653	30601.98
05/16/11 08:30:48	59.97513	0		0	0				-653	30601.98
05/16/11 08:30:50	59.97641	0		0	0				-653	30597.09
05/16/11 08:30:52	59.97705	0		0	0				-653	30597.09
05/16/11 08:30:54	59.97867	0		0	0				-653	30607.96
05/16/11 08:30:56	59.97836	0		0	0				-653	30607.96
05/16/11 08:30:58	59.97803	0		0	0				-653	30607.96
05/16/11 08:31:00	59.97543	0		0	0				-653	30607.96
05/16/11 08:31:02	59.97415	0		0	0				-653	30607.96
05/16/11 08:31:04	59.97415	0		0	0				-653	30601.98
05/16/11 08:31:06	59.97479	0		0	0				-653	30601.98
05/16/11 08:31:08	59.97415	0		0	0				-653	30601.98
05/16/11 08:31:10	59.97351	0		0	0				-653	30601.98
05/16/11 08:31:12	59.97351	0		0	0				-653	30601.98
05/16/11 08:31:14	59.97543	0		0	0				-653	30632.79
05/16/11 08:31:16	59.97769	0		0	0				-653	30632.79
05/16/11 08:31:18	59.98062	0		0	0				-653	30632.79
05/16/11 08:31:20	59.98514	0		0	0				-653	30632.79
05/16/11 08:31:22	59.98773	0		0	0				-653	30632.79
05/16/11 08:31:24	59.98965	0		0	0				-653	30633.18
05/16/11 08:31:26	59.99097	0		0	0				-653	30633.18
05/16/11 08:31:28	59.99225	0		0	0				-653	30633.18
05/16/11 08:31:30	59.99323	0		0	0				-653	30633.18
05/16/11 08:31:32	59.99612	0		0	0				-653	30633.18
05/16/11 08:31:34	60.00034	0		0	0				-653	30620.6

						003740	Rows of data to shift to align T(0)
Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz		Lowest Delta Hz	Highest Delta Hz		
805	59.999	0.078		-0.078	0.009		1
921	8:06:38	t(0)					
806	8:10:30	t(Recovery)		Delta	Absolute		
	03:52	Event Length mm:ss		Hz	Delta Hz		
1	1		1	-0.002	0.002		
1	1		1	-0.002	0.002		
1	0		1	-0.006	0.006		
1	0		1	0.000	0.000		
1	0		1	-0.004	0.004		
1	0		1	-0.001	0.001		
1	0		1	-0.002	0.002		
1	0		1	-0.001	0.001		
1	0		1	0.000	0.000		
1	0		1	-0.003	0.003		
1	0		1	-0.003	0.003		
1	0		1	-0.003	0.003		
1	0		1	-0.002	0.002		
1	0		1	0.000	0.000		
1	0		1	0.002	0.002		
1	0		1	0.000	0.000		
1	0		1	-0.001	0.001		
1	0		1	-0.002	0.002		
1	0		1	0.000	0.000		
1	0		1	0.002	0.002		
1	0		1	0.001	0.001		
1	0		1	0.001	0.001		
1	0		1	0.002	0.002		
1	0		1	0.000	0.000		
1	0		1	0.000	0.000		
1	0		1	-0.003	0.003		
1	0		1	-0.001	0.001		
1	0		1	0.000	0.000		
1	0		1	0.001	0.001		
1	0		1	-0.001	0.001		
1	0		1	-0.001	0.001		
1	0		1	0.000	0.000		
1	0		1	0.002	0.002		
1	0		1	0.002	0.002		
1	0		1	0.003	0.003		
1	0		1	0.005	0.005		
1	0		1	0.003	0.003		
1	0		1	0.002	0.002		
1	0		1	0.001	0.001		
1	0		1	0.001	0.001		
1	0		1	0.001	0.001		
1	0		1	0.003	0.003		
1	1		1	0.004	0.004		

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:31:36	60.00452	0		0	0				-653	30620.6
05/16/11 08:31:38	60.00809	0		0	0				-653	30620.6
05/16/11 08:31:40	60.01099	0		0	0				-653	30620.6
05/16/11 08:31:42	60.01389	0		0	0				-653	30620.6
05/16/11 08:31:44	60.01776	0		0	0				-653	30620.91
05/16/11 08:31:46	60.02069	0		0	0				-653	30620.91
05/16/11 08:31:48	60.02164	0		0	0				-653	30620.91
05/16/11 08:31:50	60.021	0		0	0				-653	30620.91
05/16/11 08:31:52	60.01907	0		0	0				-653	30620.91
05/16/11 08:31:54	60.0181	0		0	0				-653	30661.87
05/16/11 08:31:56	60.0184	0		0	0				-653	30661.87
05/16/11 08:31:58	60.02069	0		0	0				-653	30661.87
05/16/11 08:32:00	60.0239	0		0	0				-653	30661.87
05/16/11 08:32:02	60.02618	0		0	0				-653	30661.87
05/16/11 08:32:04	60.02682	0		0	0				-653	30663.73
05/16/11 08:32:06	60.02649	0		0	0				-653	30663.73
05/16/11 08:32:08	60.02585	0		0	0				-653	30663.73
05/16/11 08:32:10	60.02359	0		0	0				-653	30663.73
05/16/11 08:32:12	60.02359	0		0	0				-653	30663.73
05/16/11 08:32:14	60.02164	0		0	0				-653	30659.84
05/16/11 08:32:16	60.02231	0		0	0				-653	30659.84
05/16/11 08:32:18	60.02325	0		0	0				-653	30659.84
05/16/11 08:32:20	60.02359	0		0	0				-653	30659.84
05/16/11 08:32:22	60.02295	0		0	0				-653	30659.84
05/16/11 08:32:24	60.02133	0		0	0				-653	30653.46
05/16/11 08:32:26	60.021	0		0	0				-653	30653.46
05/16/11 08:32:28	60.021	0		0	0				-653	30653.46
05/16/11 08:32:30	60.02133	0		0	0				-653	30653.46
05/16/11 08:32:32	60.021	0		0	0				-653	30653.46
05/16/11 08:32:34	60.02036	0		0	0				-653	30661.6
05/16/11 08:32:36	60.02002	0		0	0				-653	30661.6
05/16/11 08:32:38	60.01938	0		0	0				-653	30661.6
05/16/11 08:32:40	60.0184	0		0	0				-653	30661.6
05/16/11 08:32:42	60.01712	0		0	0				-653	30661.6
05/16/11 08:32:44	60.01584	0		0	0				-653	30655.51
05/16/11 08:32:46	60.01486	0		0	0				-653	30655.51
05/16/11 08:32:48	60.01453	0		0	0				-653	30655.51
05/16/11 08:32:50	60.01486	0		0	0				-653	30655.51
05/16/11 08:32:52	60.01453	0		0	0				-653	30655.51
05/16/11 08:32:54	60.01486	0		0	0				-653	30648.14
05/16/11 08:32:56	60.0152	0		0	0				-653	30648.14
05/16/11 08:32:58	60.01486	0		0	0				-653	30648.14
05/16/11 08:33:00	60.0152	0		0	0				-653	30648.14

Event Detection Row	805	Recovery Target Freq:	59.999	Max Absolute Delta Hz	0.078	Lowest Delta Hz	-0.078
	921		8:06:38	t(0)			
	806		8:10:30	t(Recovery)		Delta Hz	Absolute Delta Hz
			03:52	Event Length mm:ss			
1	1	1				0.004	0.004
1	1	1				0.004	0.004
1	1	1				0.003	0.003
1	1	1				0.003	0.003
1	1	1				0.004	0.004
1	1	1				0.003	0.003
1	1	1				0.001	0.001
1	1	1				-0.001	0.001
1	1	1				-0.002	0.002
1	1	1				-0.001	0.001
1	1	1				0.000	0.000
1	1	1				0.002	0.002
1	1	1				0.003	0.003
1	1	1				0.002	0.002
1	1	1				0.001	0.001
1	1	1				0.000	0.000
1	1	1				-0.001	0.001
1	1	1				-0.002	0.002
1	1	1				0.000	0.000
1	1	1				-0.002	0.002
1	1	1				0.001	0.001
1	1	1				0.001	0.001
1	1	1				0.000	0.000
1	1	1				-0.001	0.001
1	1	1				-0.002	0.002
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				-0.001	0.001
1	1	1				0.000	0.000
1	1	1				-0.001	0.001
1	1	1				-0.001	0.001
1	1	1				-0.001	0.001
1	1	1				-0.001	0.001
1	1	1				-0.001	0.001
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				0.000	0.000
1	1	1				0.000	0.000

003741 Rows of data to shift to align T(0)
1

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:33:02	60.0152	0		0	0				-653	30648.14
05/16/11 08:33:04	60.01648	0		0	0				-653	30648.29
05/16/11 08:33:06	60.01614	0		0	0				-653	30648.29
05/16/11 08:33:08	60.0152	0		0	0				-653	30648.29
05/16/11 08:33:10	60.01486	0		0	0				-653	30648.29
05/16/11 08:33:12	60.01453	0		0	0				-653	30648.29
05/16/11 08:33:14	60.01291	0		0	0				-653	30652.04
05/16/11 08:33:16	60.01099	0		0	0				-653	30652.04
05/16/11 08:33:18	60.00775	0		0	0				-653	30652.04
05/16/11 08:33:20	60.00421	0		0	0				-653	30652.04
05/16/11 08:33:22	60.00162	0		0	0				-653	30652.04
05/16/11 08:33:24	60	0		0	0				-653	30651.84
05/16/11 08:33:26	59.99774	0		0	0				-653	30651.84
05/16/11 08:33:28	59.99515	0		0	0				-653	30651.84
05/16/11 08:33:30	59.99255	0		0	0				-653	30651.84
05/16/11 08:33:32	59.9903	0		0	0				-653	30651.84
05/16/11 08:33:34	59.98676	0		0	0				-653	30633.8
05/16/11 08:33:36	59.98352	0		0	0				-653	30633.8
05/16/11 08:33:38	59.98062	0		0	0				-653	30633.8
05/16/11 08:33:40	59.97964	0		0	0				-653	30633.8
05/16/11 08:33:42	59.97867	0		0	0				-653	30633.8
05/16/11 08:33:44	59.97705	0		0	0				-653	30627.71
05/16/11 08:33:46	59.97641	0		0	0				-653	30627.71
05/16/11 08:33:48	59.97675	0		0	0				-653	30627.71
05/16/11 08:33:50	59.97641	0		0	0				-653	30627.71
05/16/11 08:33:52	59.97577	0		0	0				-653	30627.71
05/16/11 08:33:54	59.97479	0		0	0				-653	30634.13
05/16/11 08:33:56	59.97415	0		0	0				-653	30634.13
05/16/11 08:33:58	59.97287	0		0	0				-653	30634.13
05/16/11 08:34:00	59.97125	0		0	0				-653	30634.13
05/16/11 08:34:02	59.97092	0		0	0				-653	30634.13
05/16/11 08:34:04	59.97125	0		0	0				-653	30627.05
05/16/11 08:34:06	59.97061	0		0	0				-653	30627.05
05/16/11 08:34:08	59.97092	0		0	0				-653	30627.05
05/16/11 08:34:10	59.97125	0		0	0				-653	30627.05
05/16/11 08:34:12	59.97156	0		0	0				-653	30627.05
05/16/11 08:34:14	59.97253	0		0	0				-653	30662.72
05/16/11 08:34:16	59.97449	0		0	0				-653	30662.72
05/16/11 08:34:18	59.97577	0		0	0				-653	30662.72
05/16/11 08:34:20	59.97641	0		0	0				-653	30662.72
05/16/11 08:34:22	59.97641	0		0	0				-653	30662.72
05/16/11 08:34:24	59.97513	0		0	0				-653	30656.52
05/16/11 08:34:26	59.9761	0		0	0				-653	30656.52

Event Detection Row	805	Recovery Target Freq:	59.999	Max Absolute Delta Hz	0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
	921		8:06:38	t(0)				
	806		8:10:30	t(Recovery)				
			03:52	Event Length mm:ss		Delta Hz	Absolute Delta Hz	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.002	0.002	
					1	-0.002	0.002	
					1	-0.003	0.003	
					1	-0.004	0.004	
					1	-0.003	0.003	
					1	-0.002	0.002	
					1	-0.002	0.002	
					1	-0.003	0.003	
					1	-0.003	0.003	
					1	-0.002	0.002	
					1	-0.004	0.004	
					1	-0.003	0.003	
					1	-0.003	0.003	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	-0.002	0.002	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	-0.002	0.002	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.002	0.002	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:34:28	59.979	0		0	0				-653	30656.52
05/16/11 08:34:30	59.98126	0		0	0				-653	30656.52
05/16/11 08:34:32	59.98224	0		0	0				-653	30656.52
05/16/11 08:34:34	59.98254	0		0	0				-653	30642.25
05/16/11 08:34:36	59.98254	0		0	0				-653	30642.25
05/16/11 08:34:38	59.9816	0		0	0				-653	30642.25
05/16/11 08:34:40	59.98029	0		0	0				-653	30642.25
05/16/11 08:34:42	59.97964	0		0	0				-653	30642.25
05/16/11 08:34:44	59.98062	0		0	0				-653	30642.49
05/16/11 08:34:46	59.98093	0		0	0				-653	30642.49
05/16/11 08:34:48	59.98029	0		0	0				-653	30642.49
05/16/11 08:34:50	59.97931	0		0	0				-653	30642.49
05/16/11 08:34:52	59.97836	0		0	0				-653	30642.49
05/16/11 08:34:54	59.97803	0		0	0				-653	30645.72
05/16/11 08:34:56	59.97803	0		0	0				-653	30645.72
05/16/11 08:34:58	59.97867	0		0	0				-653	30645.72
05/16/11 08:35:00	59.97964	0		0	0				-653	30645.72
05/16/11 08:35:02	59.98062	0		0	0				-653	30645.72
05/16/11 08:35:04	59.98126	0		0	0				-653	30648.55
05/16/11 08:35:06	59.98224	0		0	0				-653	30648.55
05/16/11 08:35:08	59.98416	0		0	0				-653	30648.55
05/16/11 08:35:10	59.98547	0		0	0				-653	30648.55
05/16/11 08:35:12	59.98578	0		0	0				-653	30648.55
05/16/11 08:35:14	59.98578	0		0	0				-653	30661.06
05/16/11 08:35:16	59.98676	0		0	0				-653	30661.06
05/16/11 08:35:18	59.99063	0		0	0				-653	30661.06
05/16/11 08:35:20	59.99417	0		0	0				-653	30661.06
05/16/11 08:35:22	59.99805	0		0	0				-653	30661.06
05/16/11 08:35:24	59.99966	0		0	0				-653	30661.06
05/16/11 08:35:26	60.00226	0		0	0				-653	30661.06
05/16/11 08:35:28	60.00195	0		0	0				-653	30661.06
05/16/11 08:35:30	60.00098	0		0	0				-653	30661.06
05/16/11 08:35:32	59.99936	0		0	0				-653	30661.06
05/16/11 08:35:34	59.99872	0		0	0				-653	30684.31
05/16/11 08:35:36	59.99774	0		0	0				-653	30684.31
05/16/11 08:35:38	59.99741	0		0	0				-653	30684.31
05/16/11 08:35:40	59.99741	0		0	0				-653	30684.31
05/16/11 08:35:42	59.99838	0		0	0				-653	30684.31
05/16/11 08:35:44	59.99966	0		0	0				-653	30686.83
05/16/11 08:35:46	60.00064	0		0	0				-653	30686.83
05/16/11 08:35:48	60.00098	0		0	0				-653	30686.83
05/16/11 08:35:50	60.00064	0		0	0				-653	30686.83
05/16/11 08:35:52	60	0		0	0				-653	30686.83

Event Detection Row	805	Recovery Target Freq:	59.999	Max Absolute Delta Hz	0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003743 Rows of data to shift to align T(0) 1
	921		8:06:38	t(0)				
	806		8:10:30	t(Recovery)				
			03:52	Event Length mm:ss		Delta Hz	Absolute Delta Hz	
					1	0.003	0.003	
					1	0.002	0.002	
					1	0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	0.001	0.001	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.002	0.002	
					1	0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.004	0.004	
					1	0.004	0.004	
					1	0.004	0.004	
					1	0.002	0.002	
					1	0.003	0.003	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	-0.002	0.002	
					1	-0.001	0.001	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:35:54	59.99936	0		0	0				-653	30678.05
05/16/11 08:35:56	59.99741	0		0	0				-653	30678.05
05/16/11 08:35:58	59.99484	0		0	0					30678.05
05/16/11 08:36:00	59.99289	0		0	0					30678.05
05/16/11 08:36:02	59.99097	0		0	0					30678.05
05/16/11 08:36:04	59.98965	0		0	0					30679.19
05/16/11 08:36:06	59.98804	0		0	0					30679.19
05/16/11 08:36:08	59.98773	0		0	0					30679.19
05/16/11 08:36:10	59.98804	0		0	0					30679.19
05/16/11 08:36:12	59.98901	0		0	0					30679.19
05/16/11 08:36:14	59.99063	0		0	0					30684.85
05/16/11 08:36:16	59.99255	0		0	0					30684.85
05/16/11 08:36:18	59.99484	0		0	0					30684.85
05/16/11 08:36:20	59.99677	0		0	0					30684.85
05/16/11 08:36:22	59.99838	0		0	0					30684.85
05/16/11 08:36:24	59.99872	0		0	0					30684.99
05/16/11 08:36:26	59.99872	0		0	0					30684.99
05/16/11 08:36:28	59.99936	0		0	0					30684.99
05/16/11 08:36:30	60.00195	0		0	0					30684.99
05/16/11 08:36:32	60.00485	0		0	0					30684.99
05/16/11 08:36:34	60.00809	0		0	0					30687.29
05/16/11 08:36:36	60.01099	0		0	0					30687.29
05/16/11 08:36:38	60.01324	0		0	0					30687.29
05/16/11 08:36:40	60.01422	0		0	0					30687.29
05/16/11 08:36:42	60.01486	0		0	0					30687.29
05/16/11 08:36:44	60.01453	0		0	0					30687.59
05/16/11 08:36:46	60.01227	0		0	0					30687.59
05/16/11 08:36:48	60.01099	0		0	0					30687.59
05/16/11 08:36:50	60.01099	0		0	0					30687.59
05/16/11 08:36:52	60.01227	0		0	0					30687.59
05/16/11 08:36:54	60.01227	0		0	0					30726.76
05/16/11 08:36:56	60.01163	0		0	0					30726.76
05/16/11 08:36:58	60.01132	0		0	0					30726.76
05/16/11 08:37:00	60.01132	0		0	0					30726.76
05/16/11 08:37:02	60.01065	0		0	0					30726.76
05/16/11 08:37:04	60.00903	0		0	0					30726.82
05/16/11 08:37:06	60.00839	0		0	0					30726.82
05/16/11 08:37:08	60.00809	0		0	0					30726.82
05/16/11 08:37:10	60.00809	0		0	0					30726.82
05/16/11 08:37:12	60.00937	0		0	0					30726.82
05/16/11 08:37:14	60.01099	0		0	0					30720.93
05/16/11 08:37:16	60.01227	0		0	0					30720.93
05/16/11 08:37:18	60.01291	0		0	0					30720.93

Event Detection Row	805	Recovery Target Freq:	59.999	Max Absolute Delta Hz	0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	003744 Rows of data to shift to align T(0) 1
	921		8:06:38	t(0)				
	806		8:10:30	t(Recovery)				
			03:52	Event Length mm:ss		Delta Hz	Absolute Delta Hz	
					1	-0.001	0.001	
					1	-0.002	0.002	
					1	-0.003	0.003	
					1	-0.002	0.002	
					1	-0.002	0.002	
					1	-0.001	0.001	
					1	-0.002	0.002	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.002	0.002	
					1	0.002	0.002	
					1	0.002	0.002	
					1	0.002	0.002	
					1	0.002	0.002	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.003	0.003	
					1	0.003	0.003	
					1	0.003	0.003	
					1	0.003	0.003	
					1	0.002	0.002	
					1	0.001	0.001	
					1	0.001	0.001	
					1	0.000	0.000	
					1	-0.002	0.002	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	-0.001	0.001	
					1	-0.002	0.002	
					1	-0.001	0.001	
					1	0.000	0.000	
					1	0.000	0.000	
					1	0.001	0.001	
					1	0.002	0.002	
					1	0.001	0.001	
					1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:37:20	60.0126	0		0	0					30720.93
05/16/11 08:37:22	60.01132	0		0	0					30720.93
05/16/11 08:37:24	60.0097	0		0	0					30720.53
05/16/11 08:37:26	60.00613	0		0	0					30720.53
05/16/11 08:37:28	60.00259	0		0	0					30720.53
05/16/11 08:37:30	59.99936	0		0	0					30720.53
05/16/11 08:37:32	59.99902	0		0	0					30720.53
05/16/11 08:37:34	60.00034	0		0	0					30720.62
05/16/11 08:37:36	60.00064	0		0	0					30720.62
05/16/11 08:37:38	59.99936	0		0	0					30720.62
05/16/11 08:37:40	59.99741	0		0	0					30720.62
05/16/11 08:37:42	59.99579	0		0	0					30720.62
05/16/11 08:37:44	59.99387	0		0	0					30721.15
05/16/11 08:37:46	59.99255	0		0	0					30721.15
05/16/11 08:37:48	59.99191	0		0	0					30721.15
05/16/11 08:37:50	59.99255	0		0	0					30721.15
05/16/11 08:37:52	59.99548	0		0	0					30721.15
05/16/11 08:37:54	60	0		0	0					30726.87
05/16/11 08:37:56	60.00323	0		0	0					30726.87
05/16/11 08:37:58	60.00516	0		0	0					30726.87
05/16/11 08:38:00	60.00485	0		0	0					30726.87
05/16/11 08:38:02	60.00354	0		0	0					30726.87
05/16/11 08:38:04	60.00226	0		0	0					30734.84
05/16/11 08:38:06	60.00098	0		0	0					30734.84
05/16/11 08:38:08	60	0		0	0					30734.84
05/16/11 08:38:10	59.99966	0		0	0					30734.84
05/16/11 08:38:12	59.99966	0		0	0					30734.84
05/16/11 08:38:14	59.99774	0		0	0					30757.45
05/16/11 08:38:16	59.9971	0		0	0					30757.45
05/16/11 08:38:18	59.99741	0		0	0					30757.45
05/16/11 08:38:20	59.99805	0		0	0					30757.45
05/16/11 08:38:22	59.99872	0		0	0					30757.45
05/16/11 08:38:24	59.99936	0		0	0					30757.92
05/16/11 08:38:26	60	0		0	0					30757.92
05/16/11 08:38:28	60.00162	0		0	0					30757.92
05/16/11 08:38:30	60.00323	0		0	0					30757.92
05/16/11 08:38:32	60.00388	0		0	0					30757.92
05/16/11 08:38:34	60.00485	0		0	0					30752.27
05/16/11 08:38:36	60.00549	0		0	0					30752.27
05/16/11 08:38:38	60.00613	0		0	0					30752.27
05/16/11 08:38:40	60.00647	0		0	0					30752.27
05/16/11 08:38:42	60.00677	0		0	0					30752.27
05/16/11 08:38:44	60.00677	0		0	0					30752.33

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	003745 Rows of data to shift to align T(0)	
805	59.999	0.078	-0.078	0.009	1	
921	8:06:38	t(0)				
806	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz		
	03:52	Event Length mm:ss				
1	1	1	0.000	0.000		
1	1	1	-0.001	0.001		
1	1	1	-0.002	0.002		
1	1	1	-0.004	0.004		
1	1	1	-0.004	0.004		
1	1	1	-0.003	0.003		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	-0.001	0.001		
1	0	1	-0.002	0.002		
1	0	1	-0.002	0.002		
1	0	1	-0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	-0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.003	0.003		
1	1	1	0.005	0.005		
1	1	1	0.003	0.003		
1	1	1	0.002	0.002		
1	1	1	0.000	0.000		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	0	1	-0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.002	0.002		
1	1	1	0.002	0.002		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:38:46	60.00613	0		0	0					30752.33
05/16/11 08:38:48	60.00549	0		0	0					30752.33
05/16/11 08:38:50	60.00485	0		0	0					30752.33
05/16/11 08:38:52	60.00485	0		0	0					30752.33
05/16/11 08:38:54	60.00613	0		0	0					30755.63
05/16/11 08:38:56	60.01001	0		0	0					30755.63
05/16/11 08:38:58	60.01324	0		0	0					30755.63
05/16/11 08:39:00	60.01614	0		0	0					30755.63
05/16/11 08:39:02	60.0184	0		0	0					30755.63
05/16/11 08:39:04	60.01971	0		0	0					30755.66
05/16/11 08:39:06	60.021	0		0	0					30755.66
05/16/11 08:39:08	60.02133	0		0	0					30755.66
05/16/11 08:39:10	60.02197	0		0	0					30755.66
05/16/11 08:39:12	60.02359	0		0	0					30755.66
05/16/11 08:39:14	60.02682	0		0	0					30784.89
05/16/11 08:39:16	60.0307	0		0	0					30784.89
05/16/11 08:39:18	60.0336	0		0	0					30784.89
05/16/11 08:39:20	60.03424	0		0	0					30784.89
05/16/11 08:39:22	60.03326	0		0	0					30784.89
05/16/11 08:39:24	60.0307	0		0	0					30786.98
05/16/11 08:39:26	60.02875	0		0	0					30786.98
05/16/11 08:39:28	60.02875	0		0	0					30786.98
05/16/11 08:39:30	60.02939	0		0	0					30786.98
05/16/11 08:39:32	60.02908	0		0	0					30786.98
05/16/11 08:39:34	60.02844	0		0	0					30796.28
05/16/11 08:39:36	60.02777	0		0	0					30796.28
05/16/11 08:39:38	60.02811	0		0	0					30796.28
05/16/11 08:39:40	60.02777	0		0	0					30796.28
05/16/11 08:39:42	60.02777	0		0	0					30796.28
05/16/11 08:39:44	60.02777	0		0	0					30792.94
05/16/11 08:39:46	60.02747	0		0	0					30792.94
05/16/11 08:39:48	60.02713	0		0	0					30792.94
05/16/11 08:39:50	60.02618	0		0	0					30792.94
05/16/11 08:39:52	60.02521	0		0	0					30792.94
05/16/11 08:39:54	60.02457	0		0	0					30803.58
05/16/11 08:39:56	60.02487	0		0	0					30803.58
05/16/11 08:39:58	60.02551	0		0	0					30803.58
05/16/11 08:40:00	60.02618	0		0	0					30803.58

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	003746 Rows of data to shift to align T(0)
	59.999	0.078	-0.078	0.009	1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	

Balancing Authority Name: MyBA

MyBA_110516_0806_FRS_Form2.9.xlsm

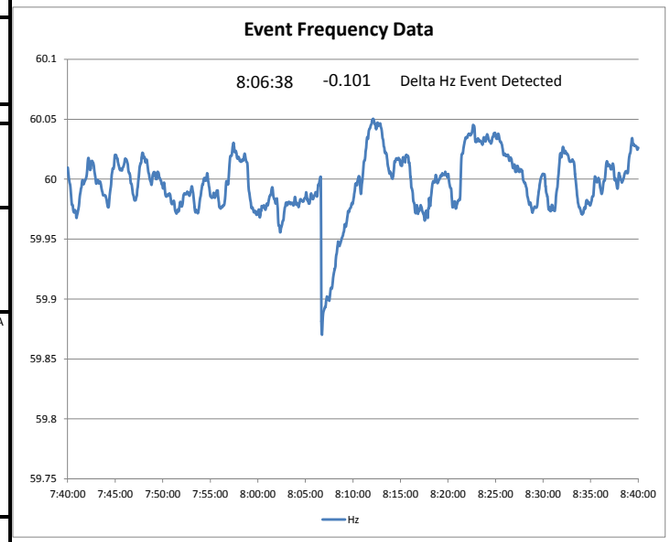
Interconnection Prevailing UFLS First Step Relay trip point 58.500 Hz

Interconnection High Relay trip point 61.500 Hz

Note: See "Instruction" tab for more detailed instructions.

	Auto	Event Detection	Auto
8:06:38	1245	Manually selected row number of the Event Starting Time.	Manual
8:10:30	1442	Manually selected row number of the Event Ending Time.	

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



11/05/16 Date yymmdd

8:06 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_110516_0806_FRS_Form2.9.xlsm

Date:	Monday, May 16, 2011	
Time of T(0)	8:06:38	
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30	
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999	Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101	Hz
Value A Pre-Perturbation Average Contingent MW [T(-2) to T(-16)]	471.09	MW
Value B Post-Perturbation Average Contingent MW [T(+20 to T(+52)]	0.00	MW
Pre to Post Perturbation Contingent Delta MW Actual	-471.09	MW
Initial Performance Ramp Magnitude Adjustment	-0.06	MW
EPFR Pre-Perturbation Average	8.97	MW
EPFR Post-Perturbation Average	671.54	MW
EPFR Delta	662.57	MW

Balancing Authority	MyBA	
Grid Nominal Frequency	60.000	Hz
Droop Setting	5.00%	3.00000 Hz
Deadband Setting	0.000	Hz
Hz Span	3.00000	Hz
TC (frequency response filter constant)	0.350	Time Constant for delayed delivery of PFR during Sustained Measure

A Point	8:06:36	
FPointA	60.00195313	8:06:36
A Value	59.99862671	
C Value	59.87011337	
Delta FC		

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-"

Low Hz	Delta Hz Event
0.00	Actual Interchange MW Average during frequency recovery period
617.52	Target Interchange MW Average during frequency recovery period
226.52	Interchange Average Ramp MW during frequency recovery period
470.90	Actual MW @ T(-4)
-494.59	Starting and Ending Difference in Interchange MW during frequency recovery period (indicates ramp direction during recovery period)
0:03:52	Event Duration (h:mm:ss)
No	Target MW Average minus MW @ T(-4) less than zero
641.21	Interchange Target Relative Average Change - MW (Low Frequency Event)
23.69	Interchange Actual Relative Average Change - MW (Low Frequency Event)
Yes	Interchange Actual Average minus MW @ T(-4) less than zero
No	Interchange Average MW minus MW @ T(-4) greater than zero
Yes	Interchange Target MW Average minus MW @ T(-4) greater than zero
146.62	Interchange Target Relative Average Change - MW (High Frequency Event)
-470.90	Interchange Actual Relative Average Change - MW (High Frequency Event)
Down	Ramp Direction during frequency recovery period

EPFR = Expected Primary Frequency Response — EPFR(Final) 662.51 MW

MW Response in right direction for frequency delta — Yes

Initial Response P.U. Performance 0.711 P.U.

0.738 P.U. Sustained Response P.U. Performance

T	Frequency Hz	Contingent Resource Lost MW	Value B 20 to 52 sec Average Frequency	Average MW	Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

T		Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW
T-72 sec	8:05:26	59.980	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	128.735
T-70 sec	8:05:28	59.982	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	115.981
T-68 sec	8:05:30	59.984	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	107.611
T-66 sec	8:05:32	59.986	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	92.864
T-64 sec	8:05:34	59.987	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30142.79	82.303

Date:	Monday, May 16, 2011	
Time of T(0)	8:06:38	
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30	
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999	Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101	Hz
Value A Pre-Perturbation Contingency MW [T(-2) to T(-16)]	471.09	MW
Value B Post-Perturbation Average Contingency MW [T(+20 to T(+52)]	0.00	MW
Pre to Post Perturbation Contingency Delta MW Actual	471.09	MW
EPFR Pre-Perturbation Average	8.97	MW
EPFR Post-Perturbation Average	671.54	MW
EPFR Unadjusted	662.57	MW
EPFR Adjusted	662.57	MW
Pre Load Resources MW	0.00	MW
Pre Non-Conforming Load MW	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Sum of Pre Perturbation Adjustments	0.00	MW
Post Load Resources MW	0.00	MW
Post Non-Conforming Load MW	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Spare	0.00	MW
Sum of Post Perturbation Adjustments	0.00	MW
Net Total Adjustments MW	0.00	MW

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

			Actual Primary Freq Response MW/0.1 Hz	Un-adjusted P.U. Performance	Load Resources Tripped Adjustment	Non-Conforming Load Adjustment	Spare Adjustment	Spare Adjustment	Spare Adjustment	Adjusted P.U. Performance
Frequency @ T(+46)	59.901	Hz								
Frequency @ T(+76)	59.915	Hz								
Frequency @ T(+106)	59.944	Hz								
Frequency @ T(+136)	59.952	Hz								
Frequency @ T(+166)	59.967	Hz								
EPFR @ T(+46)	-653.00	MW/0.1 Hz	-481.62	0.738	0.00	0.00	0.00	0.00	0.00	0.738
EPFR @ T(+76)	-653.00	MW/0.1 Hz	-561.31	0.860	0.00	0.00	0.00	0.00	0.00	0.860
EPFR @ T(+106)	-653.00	MW/0.1 Hz	-863.83	1.323	0.00	0.00	0.00	0.00	0.00	1.323
EPFR @ T(+136)	-653.00	MW/0.1 Hz	-1000.43	1.532	0.00	0.00	0.00	0.00	0.00	1.532
EPFR @ T(+166)	-653.00	MW/0.1 Hz	-1507.48	2.309	0.00	0.00	0.00	0.00	0.00	2.309

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-653.00	MW/0.1 Hz
Post-Perturbation Bias Setting	-653.00	MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	8.97	MW
EPFR for Bias Setting Post-Perturbation Average	671.54	MW
EPFR for Bias Setting Delta	662.57	MW
Primary Frequency Response Delivery % of Bias	71.10%	
Pre-Perturbation BA Load	30202.7	MW
Post-Perturbation BA Load	30136.8	MW
Pre to Post Perturbation BA Load Change	-65.973	MW
Load Dampening Frequency Response	-65.020	MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	14.00%	
Average Bias Setting when Hz is greater than +/-0.036 Hz	-653.00	MW/0.1 Hz

20 to 52 second Average Period Evaluation

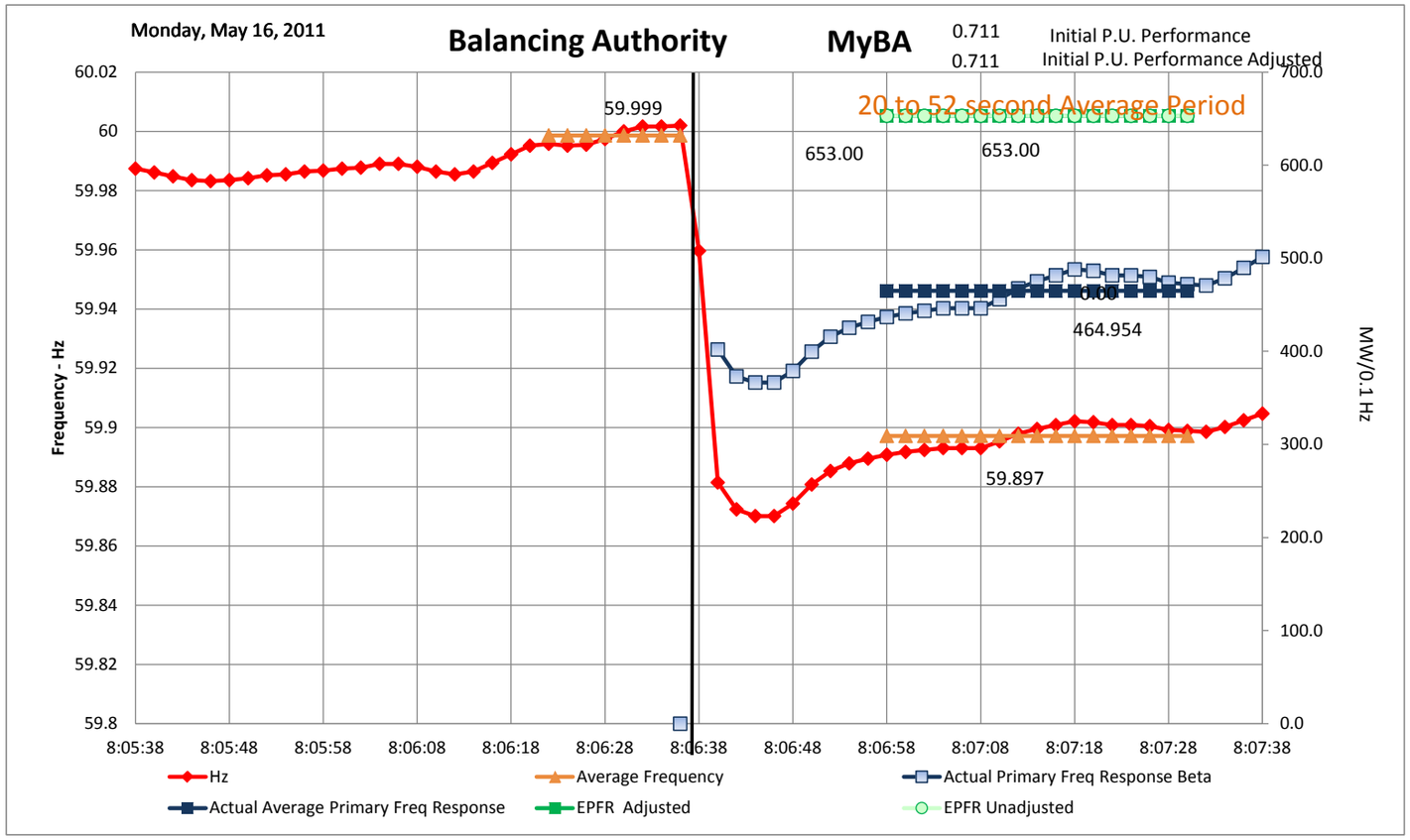
Initial P.U. Performance for FRO	0.711	P.U.
Initial P.U. Performance Adjusted for FRO	0.711	P.U.

T	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected MW/0.1 Hz Response MW/0.1 Hz	Actual Average Primary Freq Response MW/0.1 Hz	Actual Primary Freq Response Beta MW/0.1 Hz

8:14:18	60.00677	0.000	19590	-44.240	-26.315	0.000	-46.947	0.000	222.982	-18.645	105.002	8:14:18	60.007	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-44.240		0.0068
8:14:20	60.00903	0.000	19590	-58.987	-37.750	0.000	-58.383	0.000	221.769	-18.645	104.466	8:14:20	60.009	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-58.987		0.0090
8:14:22	60.01291	0.000	19590	-84.295	-54.041	0.000	-74.673	0.000	220.497	-18.645	103.936	8:14:22	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-84.295		0.0129
8:14:24	60.01486	0.000	19590	-97.049	-69.094	0.000	-89.726	0.000	219.171	-18.645	103.410	8:14:24	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.85	-97.049		0.0149
8:14:26	60.01453	0.000	19590	-94.857	-78.111	0.000	-98.743	0.000	217.818	-18.645	102.888	8:14:26	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.85	-94.857		0.0145
8:14:28	60.01422	0.000	19590	-92.864	-83.275	0.000	-103.907	0.000	216.455	-18.645	102.371	8:14:28	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-92.864		0.0142
8:14:30	60.0152	0.000	19590	-99.241	-88.863	0.000	-109.495	0.000	215.080	-18.645	101.858	8:14:30	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-99.241		0.0152
8:14:32	60.01614	0.000	19590	-105.419	-94.658	0.000	-115.290	0.000	213.691	-18.645	101.350	8:14:32	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-105.419		0.0161
8:14:34	60.01682	0.000	19590	-109.803	-99.959	0.000	-120.591	0.000	212.293	-18.645	100.846	8:14:34	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-109.803		0.0168
8:14:36	60.01746	0.000	19590	-113.988	-104.869	0.000	-125.501	0.000	210.885	-18.645	100.346	8:14:36	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-113.988		0.0175
8:14:38	60.01712	0.000	19590	-111.796	-107.293	0.000	-127.926	0.000	209.479	-18.645	99.850	8:14:38	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-111.796		0.0171
8:14:40	60.01682	0.000	19590	-109.803	-108.172	0.000	-128.804	0.000	208.082	-18.645	99.358	8:14:40	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-109.803		0.0168
8:14:42	60.01648	0.000	19590	-107.611	-107.976	0.000	-128.608	0.000	206.696	-18.645	98.870	8:14:42	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-107.611		0.0165
8:14:44	60.01614	0.000	19590	-105.419	-107.081	0.000	-127.713	0.000	205.325	-18.645	98.387	8:14:44	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.99	-105.419		0.0161
8:14:46	60.01746	0.000	19590	-113.988	-109.498	0.000	-130.131	0.000	203.956	-18.645	97.907	8:14:46	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.99	-113.988		0.0175
8:14:48	60.01776	0.000	19590	-115.981	-111.767	0.000	-132.400	0.000	202.589	-18.645	97.432	8:14:48	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-115.981		0.0178
8:14:50	60.01776	0.000	19590	-115.981	-113.242	0.000	-133.874	0.000	201.227	-18.645	96.960	8:14:50	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-115.981		0.0178
8:14:52	60.01648	0.000	19590	-107.611	-111.271	0.000	-131.904	0.000	199.883	-18.645	96.492	8:14:52	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-107.611		0.0165
8:14:54	60.01584	0.000	19590	-103.426	-108.525	0.000	-129.158	0.000	198.562	-18.645	96.027	8:14:54	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-103.426		0.0158
8:14:56	60.01648	0.000	19590	-107.611	-108.205	0.000	-128.838	0.000	197.252	-18.645	95.567	8:14:56	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-107.611		0.0165
8:14:58	60.01584	0.000	19590	-103.426	-106.533	0.000	-127.165	0.000	195.960	-18.645	95.110	8:14:58	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-103.426		0.0158
8:15:00	60.01358	0.000	19590	-88.680	-100.284	0.000	-120.917	0.000	194.703	-18.645	94.657	8:15:00	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-88.680		0.0136
8:15:02	60.01163	0.000	19590	-75.926	-91.759	0.000	-112.391	0.000	193.489	-18.645	94.207	8:15:02	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-75.926		0.0116
8:15:04	60.01132	0.000	19590	-73.933	-85.520	0.000	-106.152	0.000	192.309	-18.645	93.761	8:15:04	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30371.85	-73.933		0.0113
8:15:06	60.01132	0.000	19590	-73.933	-81.464	0.000	-102.097	0.000	191.154	-18.645	93.319	8:15:06	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30371.85	-73.933		0.0113
8:15:08	60.01099	0.000	19590	-71.741	-78.061	0.000	-98.693	0.000	190.022	-18.645	92.879	8:15:08	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-71.741		0.0110
8:15:10	60.01099	0.000	19590	-71.741	-75.849	0.000	-96.481	0.000	188.907	-18.645	92.444	8:15:10	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-71.741		0.0110
8:15:12	60.01291	0.000	19590	-84.295	-78.805	0.000	-99.438	0.000	187.790	-18.645	92.012	8:15:12	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-84.295		0.0129
8:15:14	60.01486	0.000	19590	-97.049	-85.191	0.000	-105.823	0.000	186.656	-18.645	91.583	8:15:14	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-97.049		0.0149
8:15:16	60.01776	0.000	19590	-115.981	-95.967	0.000	-116.600	0.000	185.490	-18.645	91.157	8:15:16	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-115.981		0.0178
8:15:18	60.01776	0.000	19590	-115.981	-102.972	0.000	-123.604	0.000	184.306	-18.645	90.735	8:15:18	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-115.981		0.0178
8:15:20	60.0184	0.000	19590	-120.166	-108.990	0.000	-129.622	0.000	183.107	-18.645	90.316	8:15:20	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-120.166		0.0184
8:15:22	60.0181	0.000	19590	-118.173	-112.204	0.000	-132.836	0.000	181.906	-18.645	89.900	8:15:22	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-118.173		0.0181
8:15:24	60.01746	0.000	19590	-113.988	-112.828	0.000	-133.461	0.000	180.711	-18.645	89.487	8:15:24	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30397.03	-113.988		0.0175
8:15:26	60.0152	0.000	19590	-99.241	-108.073	0.000	-128.705	0.000	179.544	-18.645	89.078	8:15:26	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30397.03	-99.241		0.0152
8:15:28	60.0152	0.000	19590	-99.241	-104.982	0.000	-125.614	0.000	178.397	-18.645	88.671	8:15:28	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-99.241		0.0152
8:15:30	60.01389	0.000	19590	-90.672	-99.974	0.000	-120.606	0.000	177.277	-18.645	88.268	8:15:30	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-90.672		0.0139
8:15:32	60.01746	0.000	19590	-113.988	-104.879	0.000	-125.511	0.000	176.147	-18.645	87.867	8:15:32	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-113.988		0.0175
8:15:34	60.01907	0.000	19590	-124.550	-111.764	0.000	-132.396	0.000	175.000	-18.645	87.470	8:15:34	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-124.550		0.0191
8:15:36	60.01907	0.000	19590	-124.550	-116.239	0.000	-136.871	0.000	173.845	-18.645	87.075	8:15:36	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-124.550		0.0191
8:15:38	60.02036	0.000	19590	-132.920	-122.077	0.000	-142.710	0.000	172.677	-18.645	86.684	8:15:38	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-132.920		0.0204
8:15:40	60.01874	0.000	19590	-122.358	-122.175	0.000	-142.808	0.000	171.517	-18.645	86.295	8:15:40	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-122.358		0.0187
8:15:42	60.01874	0.000	19590	-122.358	-122.239	0.000	-142.872	0.000	170.365	-18.645	85.909	8:15:42	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-122.358		0.0187
8:15:44	60.01971	0.000	19590	-128.735	-124.513	0.000	-145.145	0.000	169.214	-18.645	85.526	8:15:44	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.78	-128.735		0.0197
8:15:46	60.01971	0.000	19590	-128.735	-125.990	0.000	-146.623	0.000	168.065	-18.645	85.146	8:15:46	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.78	-128.735		0.0197
8:15:48	60.01971	0.000	19590	-128.735	-126.951	0.000	-147.583	0.000	166.922	-18.645	84.769	8:15:48	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-128.735		0.0197
8:15:50	60.0184	0.000	19590	-120.166	-124.576	0.000	-145.209	0.000	165.795	-18.645	84.394	8:15:50	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-120.166		0.0184
8:15:52	60.01486	0.000	19590	-97.049	-114.942	0.000	-135.574	0.000	164.711	-18.645	84.022	8:15:52	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-97.049		0.0149
8:15:54	60.01358	0.000	19590	-88.680	-105.750	0.000	-126.382	0.000	163.667	-18.645	83.653	8:15:54	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-88.680		0.0136
8:15:56	60.01389	0.000	19590	-90.672	-100.473	0.000	-121.105	0.000	162.650	-18.645	83.286	8:15:56	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-90.672		0.0139
8:15:58	60.01227	0.000	19590	-80.110	-93.346	0.000	-113.978	0.000	161.666	-18.645	82.922	8:15:58	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-80.110		0.0123
8:16:00	60.01001	0.000	19590	-65.364	-83.552	0.000	-104.185	0.000	160.723	-18.645	82.561	8:16:00	60.010	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-65.364		0.0100
8:16:02	60.00583	0.000	19590	-38.062	-67.631	0.000	-88.263	0.000	159.843	-18.645	82.202	8:16:02	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-38.062		0.0058
8:16:04	60.00162	0.000	19590	-10.562	-47.657	0.000	-68.289	0.000	159.040	-18.645	81.845	8:16:04	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.03	-10.562		0.0016
8:16:06	60.00162	0.000	19590	-10.562	-34.673	0.000	-55.306	0.000	158.288	-18.645	81.491	8:16:06	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.03	-10.562		0.0016
8:16:08	59.99805	0.000	19590	12.754	-18.074	0.000	-38.706	0.000	157.599	-18.645	81.140	8:16:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	12.754	81245.24	0.0020
8:16:10	59.99353	0.000	19590	42.247	3.039	0.000	-17.594	0.000	156.989	-18.645	80.791	8:16:10	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	42.247	9243.47	0.0065
8:16:12	59.99255	0.000	19590	48.624	18.994	0.000	-1.639	0.000	156.438	-18.645	80.445	8:16:12	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	48.624	7757.08	0.0074
8:16:14	59.99225	0.000	19590	50.617	30.062	0.000	9.429	0.000	155.929	-18.645	80.101	8:16:14	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	50.617	7385.93	0.0078
8:16:16	59.98999	0.000	19590	65.364	42.417	0.000	21.785	0.000	155.467	-18.645	79.759	8:16:16	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	65.364	5454.63	0.0100
8:16:18	59.98837	0.000	19590	75.926	54.145	0.000	33.513	0.000	155.048	-18.645	79.420	8:16:18	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	75.926	4594.22	0.0116
8:16:20	59.98416	0.000	19590	103.426	71.394	0.000	50.761	0.000	154.691	-18.645	79.083	8:16:20	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	103.426	3256.67	0.0158
8:16:22	59.9816	0.000	19590	120.166	88.464	0.000	67.831	0.000	154.394	-18.645	78.748	8:16:22	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	120.166	2766.41	0.0184
8:16:24	59.98093	0.000	19590	124.550	101.094	0.000	80.462	0.000	154.143	-18.645	78.416	8:16:24	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.96	124.550	2661.48	0.0191
8:16:26	59.98029	0.000	19590	128.735	110.768	0.000	90.136	0.000	153.926	-18.645	78.085	8:16:26	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.96	128.735	2568.49	0.0197
8:16:28	59.97998	0.000	19590	130.728	117.754	0.000	97.122	0.000	153.734	-18.645	77.758	8:16:28	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	130.728	2526.45	0.0200
8:16:30	59.97836	0.000	19590	141.289	125.991	0.000	105.359	0.000	153.571	-18.645	77.432	8:16:30	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	141.289	2324.79	0.0216
8:16:32	59.97513	0.000	19590	162.413	138.739	0.000	118.107	0.000	153.452	-18.645	77.108	8:16:32	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	162.413	2004.75	0.0249
8:16:34	59.97287	0.000	19590	177.160	152.186	0.000	131.554	0.000	153.379	-18.645	76.787	8:16:34	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	177.160	1828.98	0.0271
8:16:36	59.97189	0.000	19590	183.537	163.159	0.000	142.526	0.000	153.342	-18.645	76.468	8:16:36	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	183.537	1762.17	0.0281
8:16:38	59.97156	0.000	19590	185.729	171.058	0.000	150.426	0.000	153.333	-18.645	76.151	8:16:38	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	185.729	1740.32	0.0284
8:16:40	59.97382	0.000	19590	170.982	171.032	0.000	150.399	0.000	153.323	-18.645	75.836	8:16:40	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	170.982	1898.72	0.0262
8:16:42	59.97641	0.000	19590	154.043	165.086	0.000	144.453	0.000	153.294	-18.645	75.523	8:16:42	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	154.043	2120.41	0.0236
8:16:44	59.97836	0.000	19590	141.289	156.757	0.000	136.125	0.000	153.237	-18.645	75.212	8:16:44	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.59	141.289	2324.79	0.0216
8:16:46	59.97705	0.000	19590	149.858	154.342	0.000	133.710	0.000	153.173	-18.645	74.904	8:16:46	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.59	149.858	2183.39	0.0229
8:16:48	59.97449	0.000	19590	166.598	158.632	0.000	137.999	0.000	153.124	-18.645	74.597	8:16:48	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	166.598	1951.53	0.0255
8:16:50	59.97125	0.000	19590	187.722	168.813	0.000	148.181	0.000	153.108	-18.645	74.292	8:16:50	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	187.722	1720.91	0.0287
8:16:52	59.97092	0.000	19590	189.914	176.198	0.000	155.566	0.000	153.116	-18.645	73.989	8:16:52	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	189.914	1700.07	0.0291
8:16:54	59.97287	0.000	19590	177.160	176.535	0.000	155.902	0.000	153.125	-18.645	73.689	8:16:54	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	177.160	1828.98	0.0271
8:16:56	59.97449	0.000	19590	166.598	173.057	0.000	152.424	0.000	153.122	-18.645	73.390	8:16:56	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	166.598	1951.53	0.0255
8:16:58	59.97382	0.000	19590	170.982	172.331	0.000	151.698	0.000	153.118	-18.645	73.093	8:16:58	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	170.982	1898.72	0.0262
8:17:00	59.97318	0.000	19590	175.167	173.323	0.000	152.691	0.000	153.116	-18.645	72.798	8:17:00	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	175.167	1850.91	0.0268
8:17:02	59.97449	0.000	19590	166.598	170.969	0.000	150.337	0.000	153.108	-18.645	72.505	8:17:02	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	166.598	1951.53	0.0255
8:17:04	59.9761	0.000	19590	156.036	165.743	0.000	145.110	0.000	153.082	-18.645	72.214	8:17:04	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.40	156.036	2091.68	0.0239
8:17:06	59.97739	0.000	19590	147.666	159.416	0.000	138.784	0.000	153.037	-18.645	71.924	8:17:06	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.40	147.666	2217.90	0.0226
8:17:08	59.97836	0.000	19590	141.289	153.072	0.000	132.439	0.000	152.971	-18.645	71.637	8:17:08	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	141.289	2324.79	0.0216
8:17:10	59.97769	0.000	19590	145.674	150.482	0.000	129.850	0.000	152.899	-18.645	71.351	8:17:10	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	145.674	2250.23	0.0223
8:17:12	59.97705	0.000	19590	149.858	150.264	0.000	129.632	0.000	152.825	-18.645	71.067	8:17:12	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	149.858	2183.39	0.0229
8:17:14	59.97641	0.000	19590	154.043	151.587	0.000	130.954	0.000	152.757	-18.645	70.785	8:17:14	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	154.043	2120.41	0.0236
8:17:16	59.97543	0.000	19590	160.420	154.678	0.000	134.046	0.000	152.698	-18.645	70.505	8:17:16	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	160.420	2031.13	0.0246
8:17:18	59.97382	0.000	19590	170.982	160.385	0.000	139.752	0.000	152.658	-18.645	70.226	8:17:18	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	170.982	1898.72	0.0262
8:17:20	59.97318	0.000	19590	175.167	165.558	0.000	144.926	0.000	152.634	-18.645	69.949	8:17:20	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	175.167	1850.91	0.0268
8:17:22	59.97223	0.000	19590	181.345	171.084	0.000	150.451	0.000	152.627	-18.645	69.674	8:17:22	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	181.345	1784.58	0.0278
8:17:24	59.97189	0.000	19590	183.537	175.442	0.000	154.810	0.000	152.634	-18.645	69.401	8:17:24	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30413.65	183.537	1762.17	0.0281
8:17:26	59.97092	0.000	19590	189.914	180.507	0.000	159.875	0.000	152.656	-18.645	69.129	8:17:26	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30413.65	189.914	1700.07	0.0291
8:17:28	59.96994	0.000	19590	196.291	186.031	0.000	165.399	0.000	152.695	-18.645	68.859	8:17:28	59.970	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	196.291	1642.19	0.0301
8:17:30	59.96832	0.000	19590	206.852	193.319	0.000	172.686	0.000	152.756	-18.645	68.590	8:17:30	59.968	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	206.852	1554.54	0.0317
8:17:32	59.96606	0.000	19590	221.599	203.217	0.000	182.584	0.000	152.847	-18.645	68.324	8:17:32	59.966	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	221.599	1446.73	0.0339
8:17:34	59.96542	0.000	19590	225.784	211.115	0.000	190.483	0.000	152.962	-18.645	68.059	8:17:34	59.965	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	225.784	1418.80	0.0346
8:17:36	59.96606	0.000	19590	221.599	214.785	0.000	194.152	0.000	153.087	-18.645	67.795	8:17:36	59.966	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	221.599	1446.73	0.0339
8:17:38	59.9693	0.000	19590	200.475	209.776	0.000	189.144	0.000	153.196	-18.645	67.533	8:17:38	59.969	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	200.475	1606.31	0.0307
8:17:40	59.97253	0.000	19590	179.352	199.128	0.000	178.495	0.000	153.272	-18.645	67.273	8:17:40	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	179.352	1805.45	0.0275
8:17:42	59.97351	0.000	19590	172.975	189.974	0.000	169.342	0.000	153.320	-18.645	67.014	8:17:42	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	172.975	1875.65	0.0265
8:17:44	59.97382	0.000	19590	170.982	183.327	0.000	162.695	0.000	153.348	-18.645	66.757	8:17:44	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	170.982	1898.72	0.0262
8:17:46	59.97253	0.000	19590	179.352	181.936	0.000	161.303	0.000	153.372	-18.645	66.501	8:17:46	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352	1805.45	0.0275
8:17:48	59.97253	0.000	19590	179.352	181.031	0.000	160.399	0.000	153.393	-18.645	66.247	8:17:48	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352	1805.45	0.0275
8:17:50	59.97253	0.000	19590	179.352	180.443	0.000	159.811	0.000	153.412	-18.645	65.994	8:17:50	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352	1805.45	0.0275
8:17:52	59.96768	0.000	19590	211.037	191.151	0.000	170.519	0.000	153.462	-18.645	65.743	8:17:52	59.968	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	211.037	1522.35	0.0323
8:17:54	59.97125	0.000	19590	187.722	189.951	0.000	169.318	0.000	153.509	-18.645	65.493	8:17:54	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	187.722	1720.91	0.0287
8:17:56	59.97577	0.000	19590	158.228	178.848	0.000	158.215	0.000	153.523	-18.645	65.245	8:17:56	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228	2060.96	0.0242
8:17:58	59.97577	0.000	19590	158.228	171.631	0.000	150.999	0.000	153.516	-18.645	64.998	8:17:58	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228	2060.96	0.0242
8:18:00	59.97577	0.000	19590	158.228	166.940	0.000	146.308	0.000	153.495	-18.645	64.753	8:18:00	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228	2060.96	0.0242
8:18:02	59.98416	0.000	19590	103.426	144.710	0.000	124.078	0.000	153.409	-18.645	64.509	8:18:02	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	103.426	3256.67	0.0158
8:18:04	59.9819	0.000	19590	118.173	135.422	0.000	114.790	0.000	153.297	-18.645	64.267	8:18:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30425.74	118.173	2816.90	0.0181
8:18:06	59.979	0.000	19590	137.104	136.011	0.000	115.379	0.000	153.187	-18.645	64.026	8:18:06	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30425.74	137.104	2400.71	0.0210
8:18:08	59.97769	0.000	19590	145.674	139.393	0.000	118.760	0.000	153.087	-18.645	63.786	8:18:08	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	145.674	2250.23	0.0223
8:18:10	59.97769	0.000	19590	145.674	141.591	0.000	120.959	0.000	152.995	-18.645	63.548	8:18:10	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	145.674	2250.23	0.0223
8:18:12	59.98126	0.000	19590	122.358	134.859	0.000	114.227	0.000	152.883	-18.645	63.311	8:18:12	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	122.358	2712.93	0.0187
8:18:14	59.9848	0.000	19590	99.241	122.393	0.000	101.761	0.000	152.737	-18.645	63.076	8:18:14	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	99.241	3407.64	0.0152
8:18:16	59.98868	0.000	19590	73.933	105.432	0.000	84.800	0.000	152.543	-18.645	62.841	8:18:16	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	73.933	4735.15	0.0113
8:18:18	59.99161	0.000	19590	54.802	87.711	0.000	67.079	0.000	152.299	-18.645	62.609	8:18:18	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	54.802	6711.56	0.0084
8:18:20	59.99353	0.000	19590	42.247	71.799	0.000	51.167	0.000	152.012	-18.645	62.377	8:18:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	42.247	9243.47	0.0065
8:18:22	59.99579	0.000	19590	27.501	56.295	0.000	35.662	0.000	151.682	-18.645	62.147	8:18:22	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	27.501	16598.49	0.0042
8:18:24	59.99677	0.000	19590	21.124	43.985	0.000	23.352	0.000	151.320	-18.645	61.918	8:18:24	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30440.82	21.124	25305.89	0.0032
8:18:26	59.99774	0.000	19590	14.747	33.751	0.000	13.119	0.000	150.930	-18.645	61.690	8:18:26	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30440.82	14.747	53229.64	0.0023
8:18:28	59.99838	0.000	19590	10.562	25.635	0.000	5.003	0.000	150.520	-18.645	61.464	8:18:28	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	10.562	192957.44	0.0016
8:18:30	59.99774	0.000	19590	14.747	21.824	0.000	1.192	0.000	150.102	-18.645	61.239	8:18:30	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	14.747	53229.64	0.0023
8:18:32	59.9971	0.000	19590	18.932	20.812	0.000	0.179	0.000	149.683	-18.645	61.015	8:18:32	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	18.932	30873.19	0.0029
8:18:34	59.99741	0.000	19590	16.939	19.456	0.000	-1.176	0.000	149.263	-18.645	60.793	8:18:34	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	16.939	38591.49	0.0026
8:18:36	59.99741	0.000	19590	16.939	18.575	0.000	-2.057	0.000	148.843	-18.645	60.572	8:18:36	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	16.939	38591.49	0.0026
8:18:38	59.99741	0.000	19590	16.939	18.002	0.000	-2.630	0.000	148.423	-18.645	60.352	8:18:38	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	16.939	38591.49	0.0026
8:18:40	60.00064	0.000	19590	-4.185	10.237	0.000	-10.396	0.000	147.984	-18.645	60.133	8:18:40	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	-4.185		0.0006
8:18:42	60.00323	0.000	19590	-21.124	-0.739	0.000	-21.372	0.000	147.518	-18.645	59.915	8:18:42	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	-21.124		0.0032
8:18:44	60.00354	0.000	19590	-23.116	-8.571	0.000	-29.204	0.000	147.032	-18.645	59.699	8:18:44	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.11	-23.116		0.0035
8:18:46	60.00259	0.000	19590	-16.939	-11.500	0.000	-32.132	0.000	146.542	-18.645	59.483	8:18:46	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.11	-16.939		0.0026
8:18:48	60.00098	0.000	19590	-6.377	-9.707	0.000	-30.339	0.000	146.058	-18.645	59.269	8:18:48	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	-6.377		0.0010
8:18:50	59.99936	0.000	19590	4.185	-4.845	0.000	-25.477	0.000	145.591	-18.645	59.057	8:18:50	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	4.185		0.0006
8:18:52	59.99741	0.000	19590	16.939	2.779	0.000	-17.853	0.000	145.147	-18.645	58.845	8:18:52	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	16.939	38591.49	0.0026
8:18:54	59.99677	0.000	19590	21.124	9.200	0.000	-11.433	0.000	144.722	-18.645	58.634	8:18:54	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	21.124	25305.89	0.0032
8:18:56	59.99677	0.000	19590	21.124	13.373	0.000	-7.259	0.000	144.312	-18.645	58.425	8:18:56	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	21.124	25305.89	0.0032
8:18:58	59.9971	0.000	19590	18.932	15.319	0.000	-5.314	0.000	143.908	-18.645	58.217	8:18:58	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	18.932	30873.19	0.0029
8:19:00	59.99774	0.000	19590	14.747	15.118	0.000	-5.514	0.000	143.507	-18.645	58.009	8:19:00	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	14.747	53229.64	0.0023
8:19:02	59.99872	0.000	19590	8.370	12.756	0.000	-7.876	0.000	143.101	-18.645	57.803	8:19:02	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	8.370		0.0013
8:19:04	59.99966	0.000	19590	2.192	9.059	0.000	-11.574	0.000	142.687	-18.645	57.598	8:19:04	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.86	2.192		0.0003
8:19:06	60	0.000	19590	0.000	5.888	0.000	-14.744	0.000	142.267	-18.645	57.394	8:19:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.86	0.000		0.0000
8:19:08	60.00034	0.000	19590	-2.192	3.060	0.000	-17.572	0.000	141.842	-18.645	57.192	8:19:08	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-2.192		0.0003
8:19:10	60.00098	0.000	19590	-6.377	-0.243	0.000	-20.875	0.000	141.411	-18.645	56.990	8:19:10	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-6.377		0.0010
8:19:12	60.00226	0.000	19590	-14.747	-5.319	0.000	-25.952	0.000	140.968	-18.645	56.789	8:19:12	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-14.747		0.0023
8:19:14	60.0029	0.000	19590	-18.932	-10.084	0.000	-30.716	0.000	140.515	-18.645	56.590	8:19:14	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-18.932		0.0029
8:19:16	60.00259	0.000	19590	-16.939	-12.483	0.000	-33.115	0.000	140.058	-18.645	56.391	8:19:16	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-16.939		0.0026
8:19:18	60.00226	0.000	19590	-14.747	-13.275	0.000	-33.908	0.000	139.601	-18.645	56.194	8:19:18	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-14.747		0.0023
8:19:20	60.00226	0.000	19590	-14.747	-13.790	0.000	-34.423	0.000	139.146	-18.645	55.997	8:19:20	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-14.747		0.0023
8:19:22	60.00323	0.000	19590	-21.124	-16.357	0.000	-36.989	0.000	138.686	-18.645	55.802	8:19:22	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-21.124		0.0032
8:19:24	60.00421	0.000	19590	-27.501	-20.257	0.000	-40.890	0.000	138.218	-18.645	55.608	8:19:24	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-27.501		0.0042

8:19:26	60.00485	0.000	19590	-31.685	-24.257	0.000	-44.890	0.000	137.743	-18.645	55.414
8:19:28	60.00452	0.000	19590	-29.493	-26.090	0.000	-46.722	0.000	137.265	-18.645	55.222
8:19:30	60.00354	0.000	19590	-23.116	-25.049	0.000	-45.682	0.000	136.792	-18.645	55.031
8:19:32	60.00354	0.000	19590	-23.116	-24.373	0.000	-45.005	0.000	136.324	-18.645	54.840
8:19:34	60.00354	0.000	19590	-23.116	-23.933	0.000	-44.565	0.000	135.859	-18.645	54.651
8:19:36	60.00354	0.000	19590	-23.116	-23.647	0.000	-44.280	0.000	135.397	-18.645	54.462
8:19:38	60.00354	0.000	19590	-23.116	-23.461	0.000	-44.094	0.000	134.938	-18.645	54.275
8:19:40	60.00354	0.000	19590	-23.116	-23.341	0.000	-43.973	0.000	134.481	-18.645	54.088
8:19:42	60.00354	0.000	19590	-23.116	-23.262	0.000	-43.895	0.000	134.027	-18.645	53.903
8:19:44	60.00613	0.000	19590	-40.055	-29.140	0.000	-49.772	0.000	133.561	-18.645	53.718
8:19:46	60.00485	0.000	19590	-31.685	-30.031	0.000	-50.663	0.000	133.094	-18.645	53.535
8:19:48	60.00452	0.000	19590	-29.493	-29.843	0.000	-50.475	0.000	132.631	-18.645	53.352
8:19:50	60.00452	0.000	19590	-29.493	-29.720	0.000	-50.353	0.000	132.170	-18.645	53.170
8:19:52	60.00354	0.000	19590	-23.116	-27.409	0.000	-48.041	0.000	131.717	-18.645	52.989
8:19:54	60.0029	0.000	19590	-18.932	-24.442	0.000	-45.074	0.000	131.274	-18.645	52.809
8:19:56	60.00162	0.000	19590	-10.562	-19.584	0.000	-40.216	0.000	130.845	-18.645	52.630
8:19:58	60.00162	0.000	19590	-10.562	-16.426	0.000	-37.059	0.000	130.427	-18.645	52.452
8:20:00	60.00421	0.000	19590	-27.501	-20.302	0.000	-40.935	0.000	130.000	-18.645	52.275
8:20:02	60.00421	0.000	19590	-27.501	-22.822	0.000	-43.454	0.000	129.570	-18.645	52.098
8:20:04	60.0029	0.000	19590	-18.932	-21.460	0.000	-42.093	0.000	129.145	-18.645	51.923
8:20:06	60.00034	0.000	19590	-2.192	-14.716	0.000	-35.349	0.000	128.739	-18.645	51.748
8:20:08	59.99805	0.000	19590	12.754	-5.102	0.000	-25.734	0.000	128.358	-18.645	51.574
8:20:10	59.99646	0.000	19590	23.116	4.775	0.000	-15.858	0.000	128.004	-18.645	51.401
8:20:12	59.99515	0.000	19590	31.685	14.193	0.000	-6.439	0.000	127.675	-18.645	51.229
8:20:14	59.99387	0.000	19590	40.055	23.245	0.000	2.613	0.000	127.369	-18.645	51.058
8:20:16	59.99289	0.000	19590	46.432	31.361	0.000	10.728	0.000	127.084	-18.645	50.887
8:20:18	59.99255	0.000	19590	48.624	37.403	0.000	16.770	0.000	126.816	-18.645	50.718
8:20:20	59.99225	0.000	19590	50.617	42.028	0.000	21.395	0.000	126.560	-18.645	50.549
8:20:22	59.98965	0.000	19590	67.556	50.963	0.000	30.330	0.000	126.327	-18.645	50.381
8:20:24	59.98514	0.000	19590	97.049	67.093	0.000	46.461	0.000	126.134	-18.645	50.214
8:20:26	59.98254	0.000	19590	113.988	83.506	0.000	62.874	0.000	125.982	-18.645	50.048
8:20:28	59.97836	0.000	19590	141.289	103.730	0.000	83.098	0.000	125.879	-18.645	49.882
8:20:30	59.97641	0.000	19590	154.043	121.340	0.000	100.707	0.000	125.818	-18.645	49.717
8:20:32	59.97705	0.000	19590	149.858	131.321	0.000	110.689	0.000	125.782	-18.645	49.553
8:20:34	59.97705	0.000	19590	149.858	137.809	0.000	117.177	0.000	125.762	-18.645	49.390
8:20:36	59.97705	0.000	19590	149.858	142.026	0.000	121.394	0.000	125.751	-18.645	49.228
8:20:38	59.97803	0.000	19590	143.481	142.536	0.000	121.903	0.000	125.742	-18.645	49.066
8:20:40	59.97964	0.000	19590	132.920	139.170	0.000	118.538	0.000	125.725	-18.645	48.906
8:20:42	59.9816	0.000	19590	120.166	132.519	0.000	111.886	0.000	125.692	-18.645	48.745
8:20:44	59.98126	0.000	19590	122.358	128.962	0.000	108.330	0.000	125.651	-18.645	48.586
8:20:46	59.97931	0.000	19590	135.112	131.115	0.000	110.482	0.000	125.616	-18.645	48.428
8:20:48	59.9761	0.000	19590	156.036	139.837	0.000	119.205	0.000	125.600	-18.645	48.270
8:20:50	59.97543	0.000	19590	160.420	147.041	0.000	126.409	0.000	125.602	-18.645	48.113
8:20:52	59.97577	0.000	19590	158.228	150.957	0.000	130.324	0.000	125.613	-18.645	47.956
8:20:54	59.97675	0.000	19590	151.851	151.270	0.000	130.637	0.000	125.625	-18.645	47.801
8:20:56	59.97803	0.000	19590	143.481	148.544	0.000	127.911	0.000	125.630	-18.645	47.646
8:20:58	59.979	0.000	19590	137.104	144.540	0.000	123.908	0.000	125.626	-18.645	47.492
8:21:00	59.97964	0.000	19590	132.920	140.473	0.000	119.840	0.000	125.613	-18.645	47.338
8:21:02	59.98062	0.000	19590	126.543	135.597	0.000	114.965	0.000	125.588	-18.645	47.185
8:21:04	59.9819	0.000	19590	118.173	129.499	0.000	108.866	0.000	125.550	-18.645	47.033
8:21:06	59.98224	0.000	19590	115.981	124.767	0.000	104.135	0.000	125.501	-18.645	46.882
8:21:08	59.98254	0.000	19590	113.988	120.995	0.000	100.362	0.000	125.443	-18.645	46.731
8:21:10	59.98288	0.000	19590	111.796	117.775	0.000	97.143	0.000	125.378	-18.645	46.582
8:21:12	59.98254	0.000	19590	113.988	116.450	0.000	95.817	0.000	125.311	-18.645	46.432
8:21:14	59.98254	0.000	19590	113.988	115.588	0.000	94.956	0.000	125.242	-18.645	46.284
8:21:16	59.98288	0.000	19590	111.796	114.261	0.000	93.628	0.000	125.170	-18.645	46.136
8:21:18	59.98611	0.000	19590	90.672	106.005	0.000	85.372	0.000	125.080	-18.645	45.989
8:21:20	59.99387	0.000	19590	40.055	82.922	0.000	62.290	0.000	124.937	-18.645	45.842
8:21:22	60.00226	0.000	19590	-14.747	48.738	0.000	28.106	0.000	124.719	-18.645	45.696
8:21:24	60.01099	0.000	19590	-71.741	6.571	0.000	-14.062	0.000	124.406	-18.645	45.551
8:21:26	60.01712	0.000	19590	-111.796	-34.858	0.000	-55.490	0.000	124.002	-18.645	45.406
8:21:28	60.02069	0.000	19590	-135.112	-69.947	0.000	-90.579	0.000	123.521	-18.645	45.262
8:21:30	60.02133	0.000	19590	-139.297	-94.219	0.000	-114.852	0.000	122.988	-18.645	45.119
8:21:32	60.02133	0.000	19590	-139.297	-109.996	0.000	-130.629	0.000	122.422	-18.645	44.976
8:21:34	60.02133	0.000	19590	-139.297	-120.251	0.000	-140.884	0.000	121.835	-18.645	44.834
8:21:36	60.02325	0.000	19590	-151.851	-131.311	0.000	-151.944	0.000	121.227	-18.645	44.693
8:21:38	60.02551	0.000	19590	-166.598	-143.662	0.000	-164.294	0.000	120.594	-18.645	44.552

8:19:26	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-31.685		0.0049
8:19:28	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-29.493		0.0045
8:19:30	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:32	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:34	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:36	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:38	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:40	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:42	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:44	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-40.055		0.0061
8:19:46	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-31.685		0.0049
8:19:48	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493		0.0045
8:19:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493		0.0045
8:19:52	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-23.116		0.0035
8:19:54	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-18.932		0.0029
8:19:56	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562		0.0016
8:19:58	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562		0.0016
8:20:00	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501		0.0042
8:20:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501		0.0042
8:20:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-18.932		0.0029
8:20:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-2.192		0.0003
8:20:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	12.754	81245.24	0.0020
8:20:10	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	23.116	21741.68	0.0035
8:20:12	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	31.685	13540.87	0.0049
8:20:14	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	40.055	9895.25	0.0061
8:20:16	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	46.432	8210.95	0.0071
8:20:18	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	48.624	7757.08	0.0074
8:20:20	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	50.617	7385.93	0.0078
8:20:22	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	67.556	5250.54	0.0103
8:20:24	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	97.049	3492.44	0.0149
8:20:26	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	113.988	2929.15	0.0175
8:20:28	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	141.289	2324.79	0.0216
8:20:30	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	154.043	2120.41	0.0236
8:20:32	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858	2183.39	0.0229
8:20:34	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858	2183.39	0.0229
8:20:36	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	149.858	2183.39	0.0229
8:20:38	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	143.481	2286.90	0.0220
8:20:40	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	132.920	2481.77	0.0204
8:20:42	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	120.166	2766.41	0.0184
8:20:44	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	122.358	2712.93	0.0187
8:20:46	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	135.112	2438.64	0.0207
8:20:48	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	156.036	2091.68	0.0239
8:20:50	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	160.420	2031.13	0.0246
8:20:52	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	158.228	2060.96	0.0242
8:20:54	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	151.851	2152.94	0.0233
8:20:56	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	143.481	2286.90	0.0220
8:20:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	137.104	2400.71	0.0210
8:21:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	132.920	2481.77	0.0204
8:21:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	126.543	2616.37	0.0194
8:21:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	118.173	2816.90	0.0181
8:21:06	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	115.981	2874.60	0.0178
8:21:08	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:10	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	111.796	2991.59	0.0171
8:21:12	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:14	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:16	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	111.796	2991.59	0.0171
8:21:18	59.986	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	90.672	3765.02	0.0139
8:21:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	40.055	9895.25	0.0061
8:21:22	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	-14.747		0.0023
8:21:24	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-71.741		0.0110
8:21:26	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-111.796		0.0171
8:21:28	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-135.112		0.0207
8:21:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:34	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:36	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-151.851		0.0233
8:21:38	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-166.598		0.0255



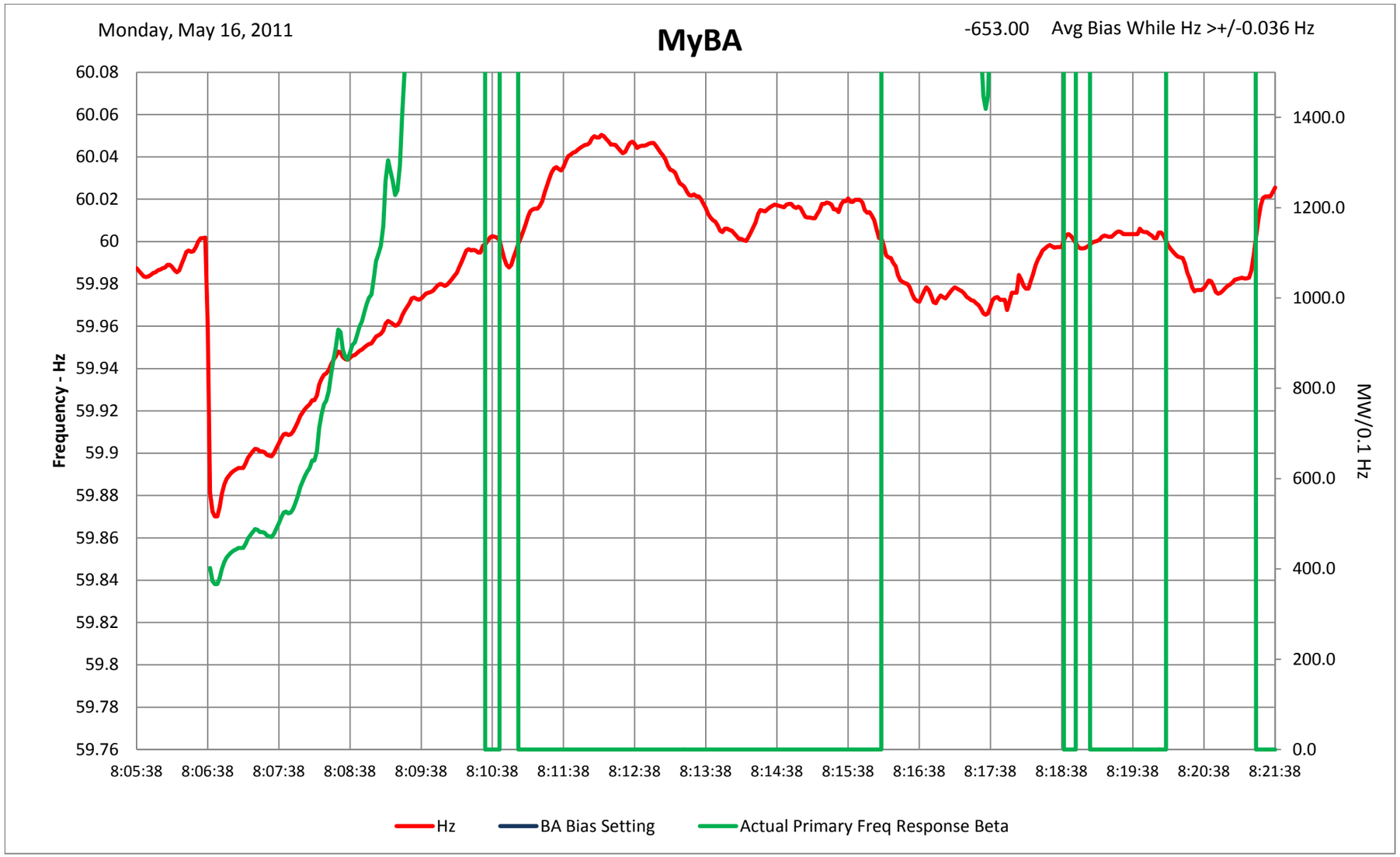
T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

"Auto" Event Detection adjustment of T(0).
# of rows to shift T(0)
1
A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.


Monday, May 16, 2011
MyBA
-653.00 Avg Bias While Hz >+/-0.036 Hz
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Bias Setting
Actual Primary Freq Response Beta

						Value A Data BA Performance												Value B 20 to 52 second Average Period Evaluation															Average	Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
Monday, May 16, 2011	8:06:38	60.002	59.999	8:06:38	59.870	59.999	471.09	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30202.74	8.97	59.897	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.711	0.711	0.738	-653.00	30136.77	671.54	-653.00	0.738	0.860	1.323	1.532	2.309	0.738	0.860	1.323	1.532	2.309	-653.00	-653.00

Steps **To be completed for each event evaluated.**

1 Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order:
Column A: Date and Time in this format, mm/dd/yy HH:MM:SS
Column B: Frequency Hz
Column C: Contingent Resouce Lost MW or Lost Load
Column D: Load Resources tripped during the event.
Column E: Non Conforming Load
Column F: Spare
Column G: Not Used
Column H: Spare
Column I: Spare
Column J: BA Bias Setting
Column K: BA Load

2 Note: Columns D & E are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.

3 Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.

4 Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data.
Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time.
If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.

5 Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet.
If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.

6 Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary.
To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).

7 If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.

8 The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events)
This value controls the end of the "Sustained Frequency Response" evaluation period.
Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.

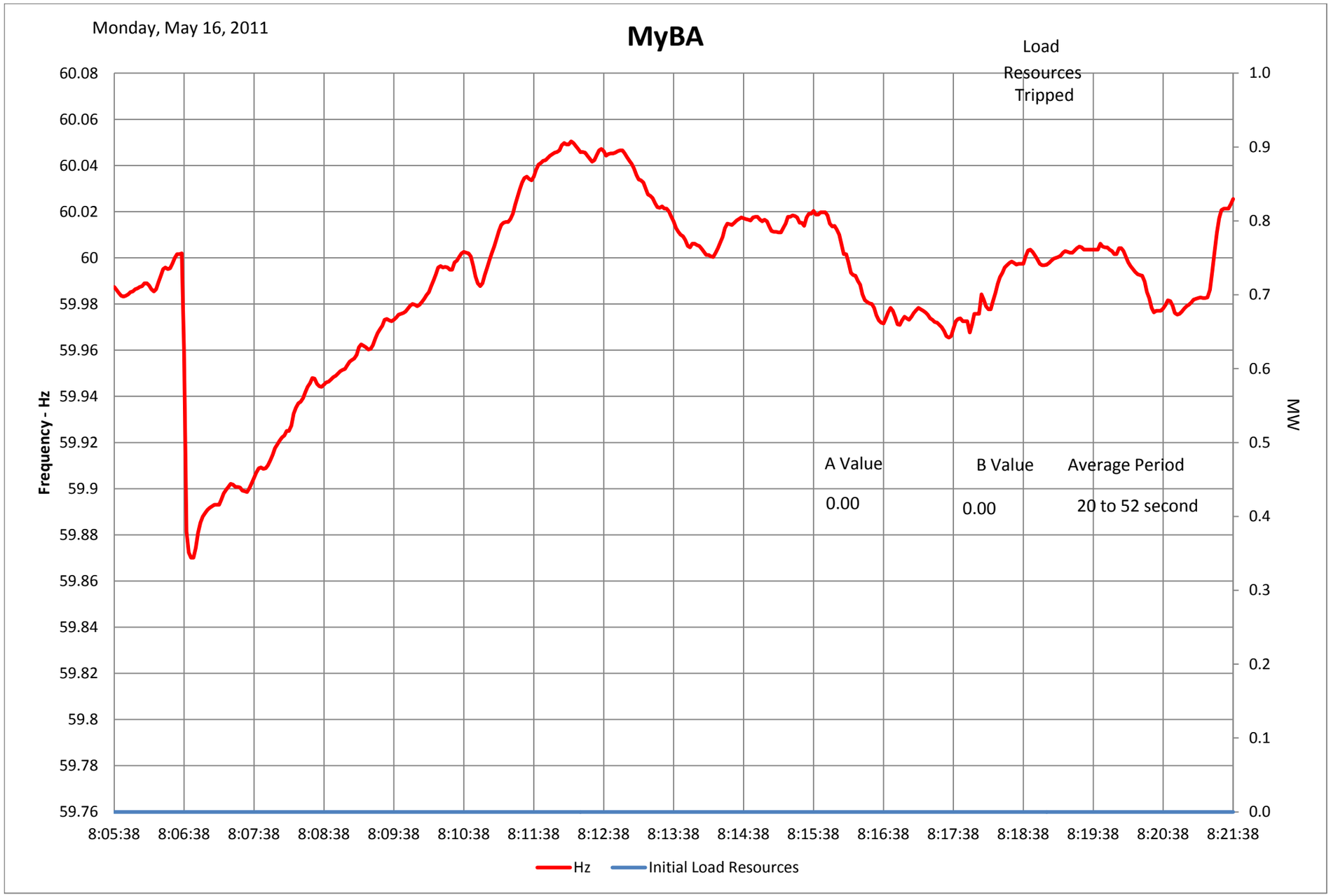
9 Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".

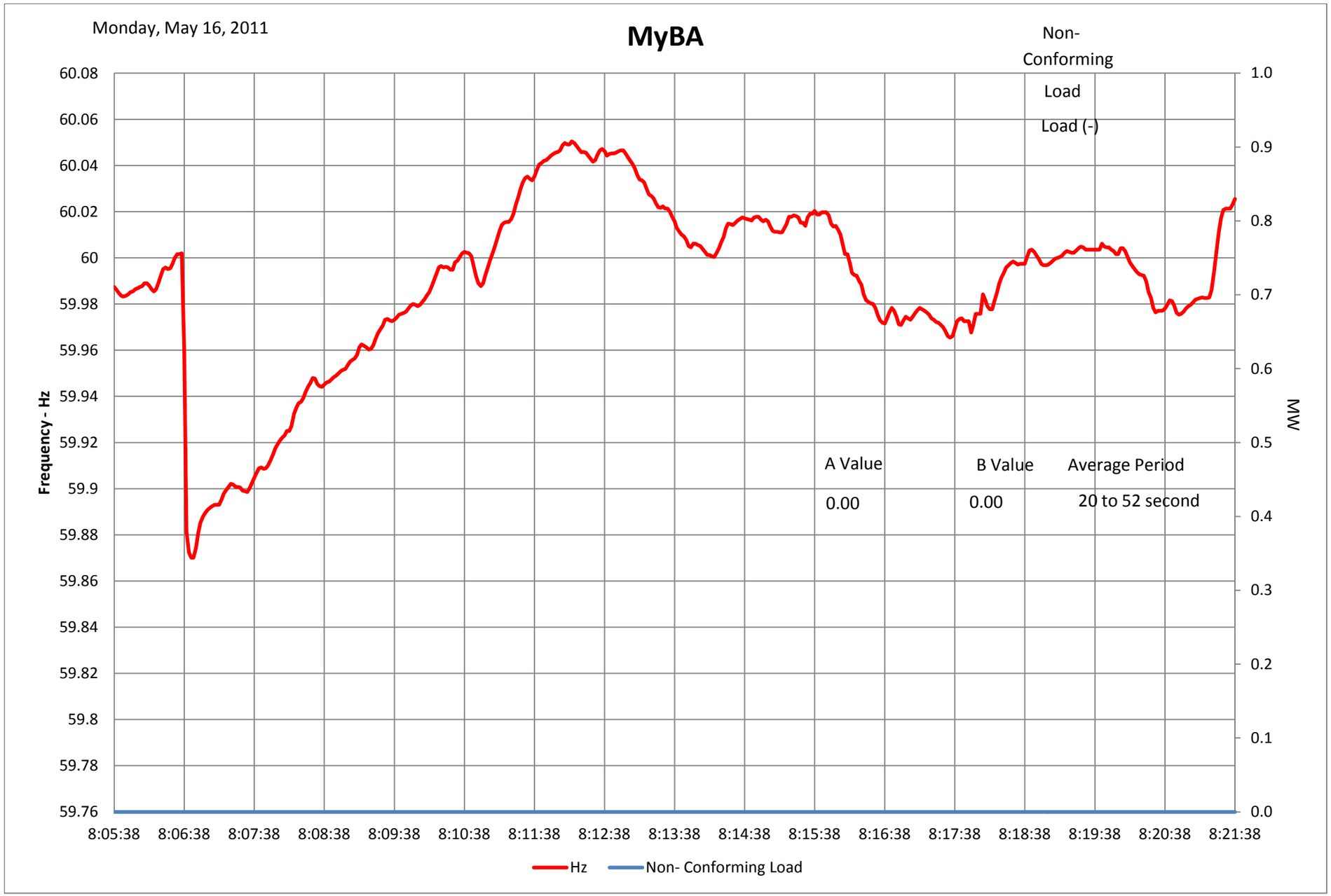
10 Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.

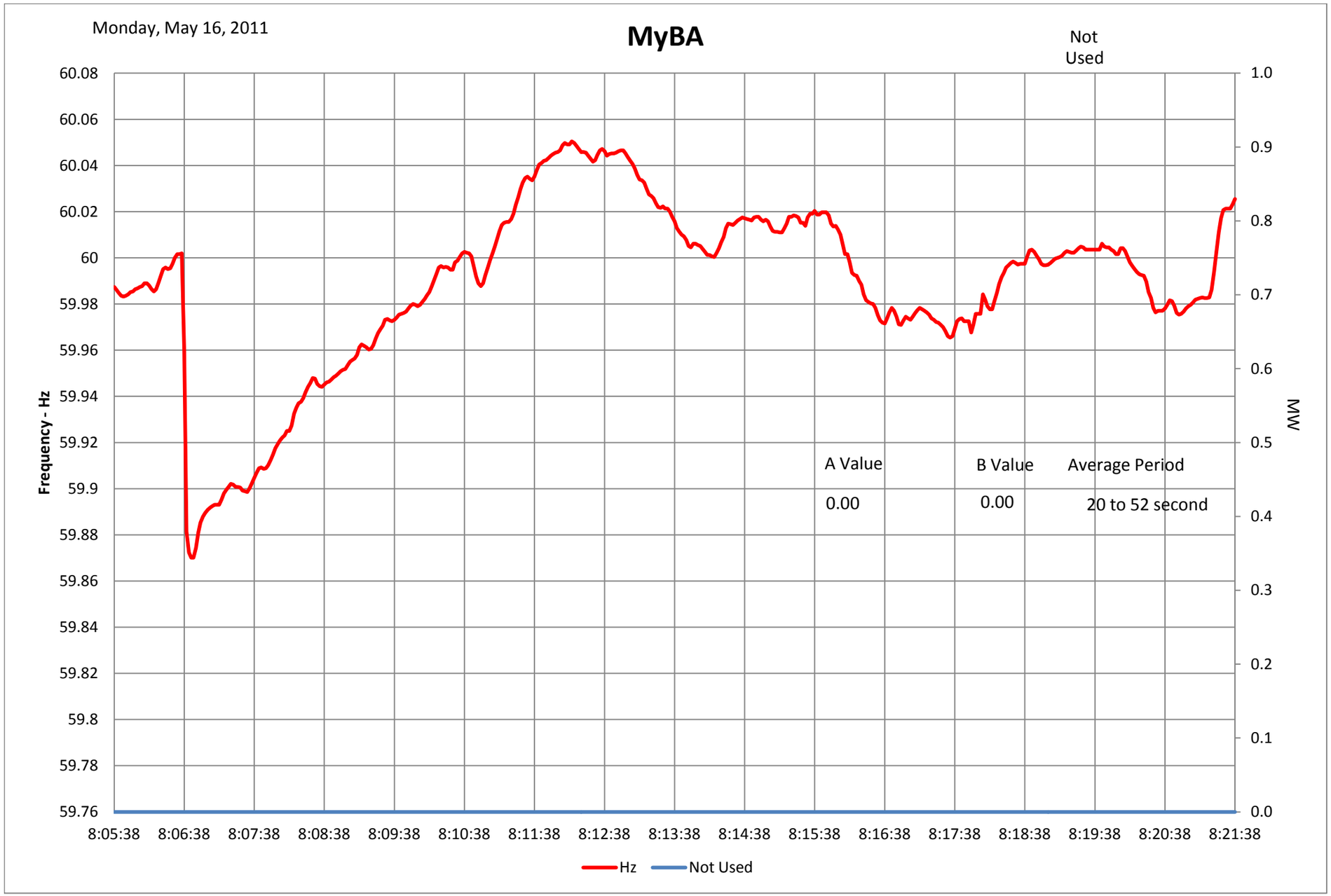
11 Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

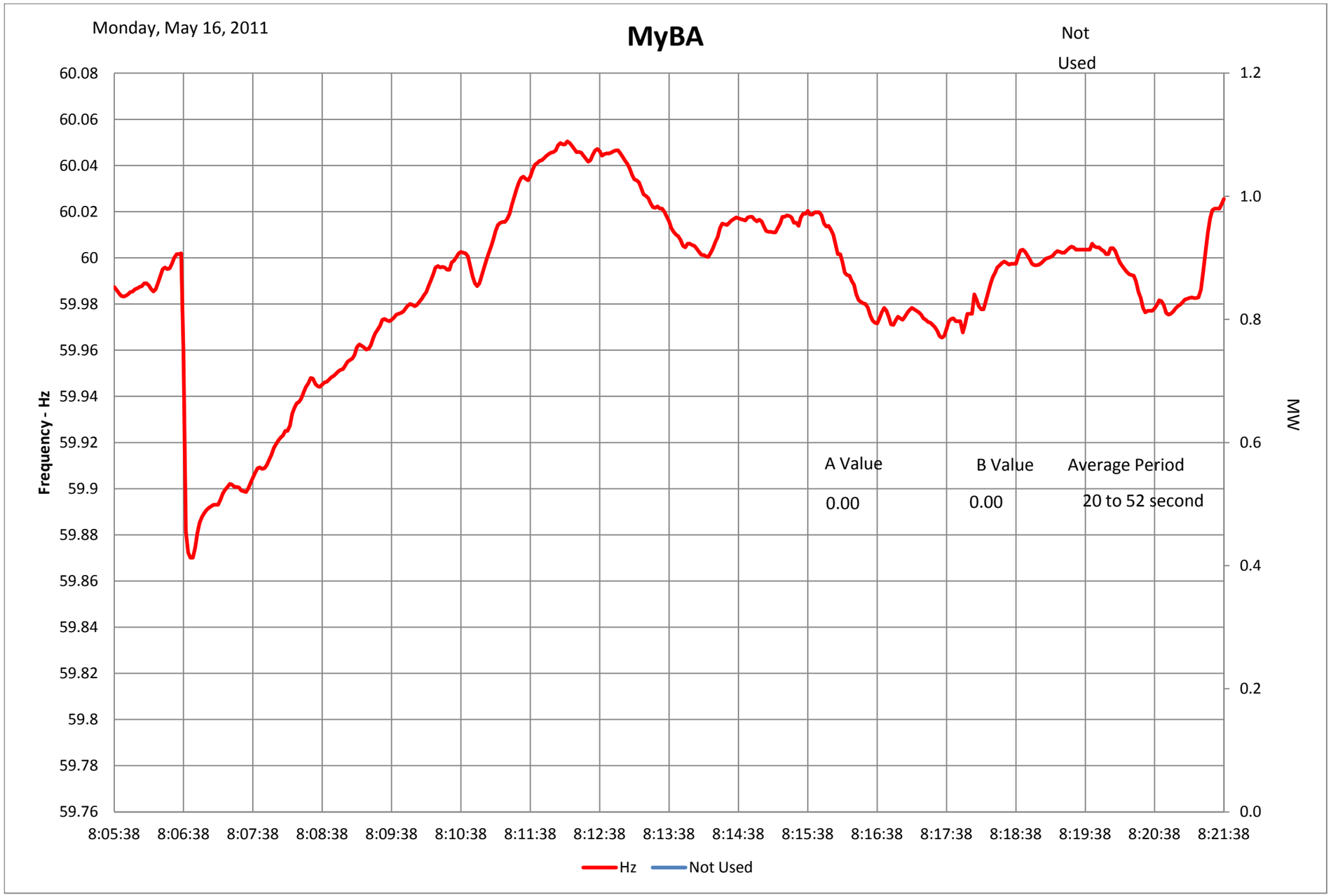
Steps **To be completed the first time you use Form 2 for your BA.**

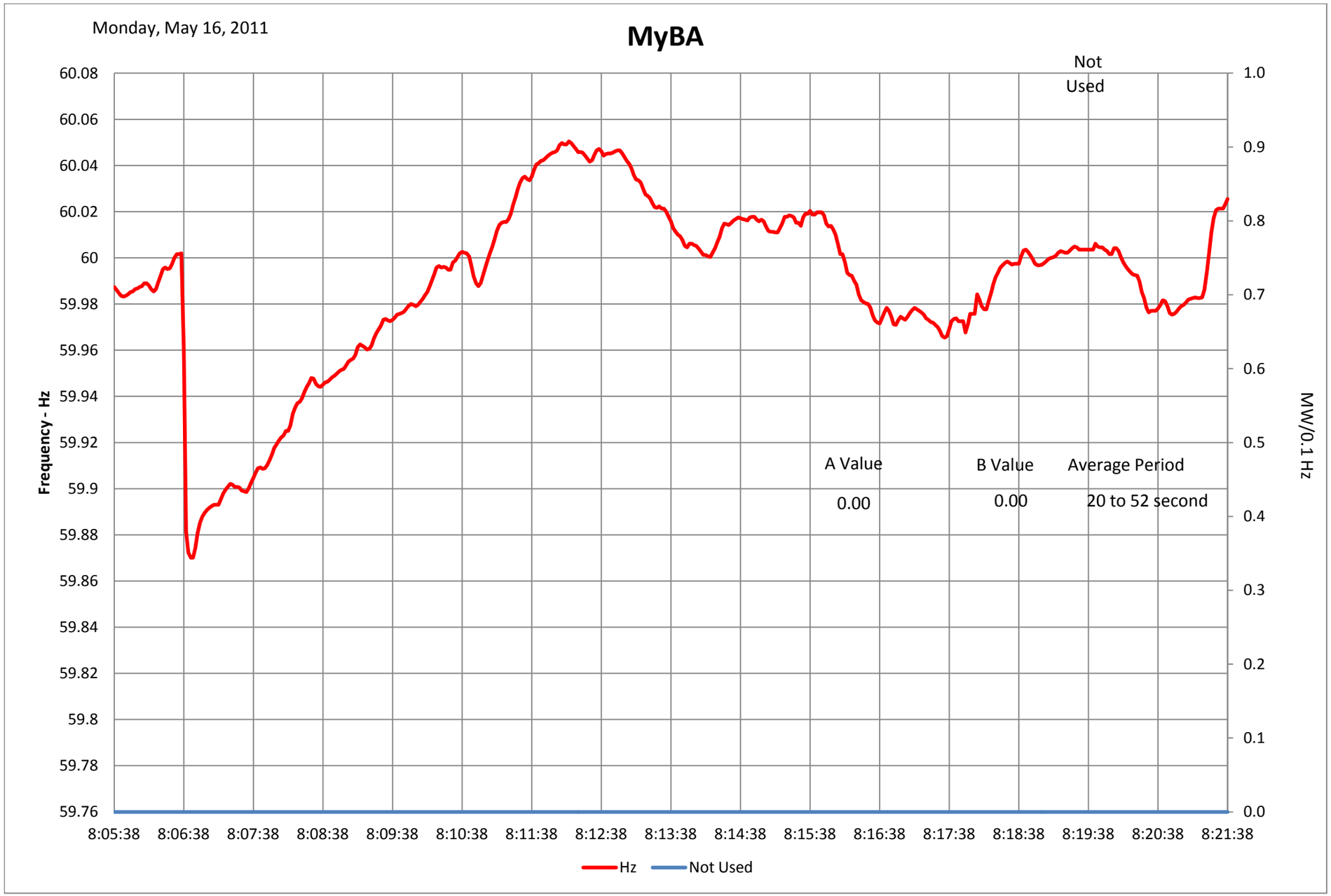
A Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "ERCOT".


Monday, May 16, 2011
MyBA
Load Resources Tripped
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Hz
Initial Load Resources


Monday, May 16, 2011
MyBA
Non-Conforming Load
Load (-)
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Non- Conforming Load

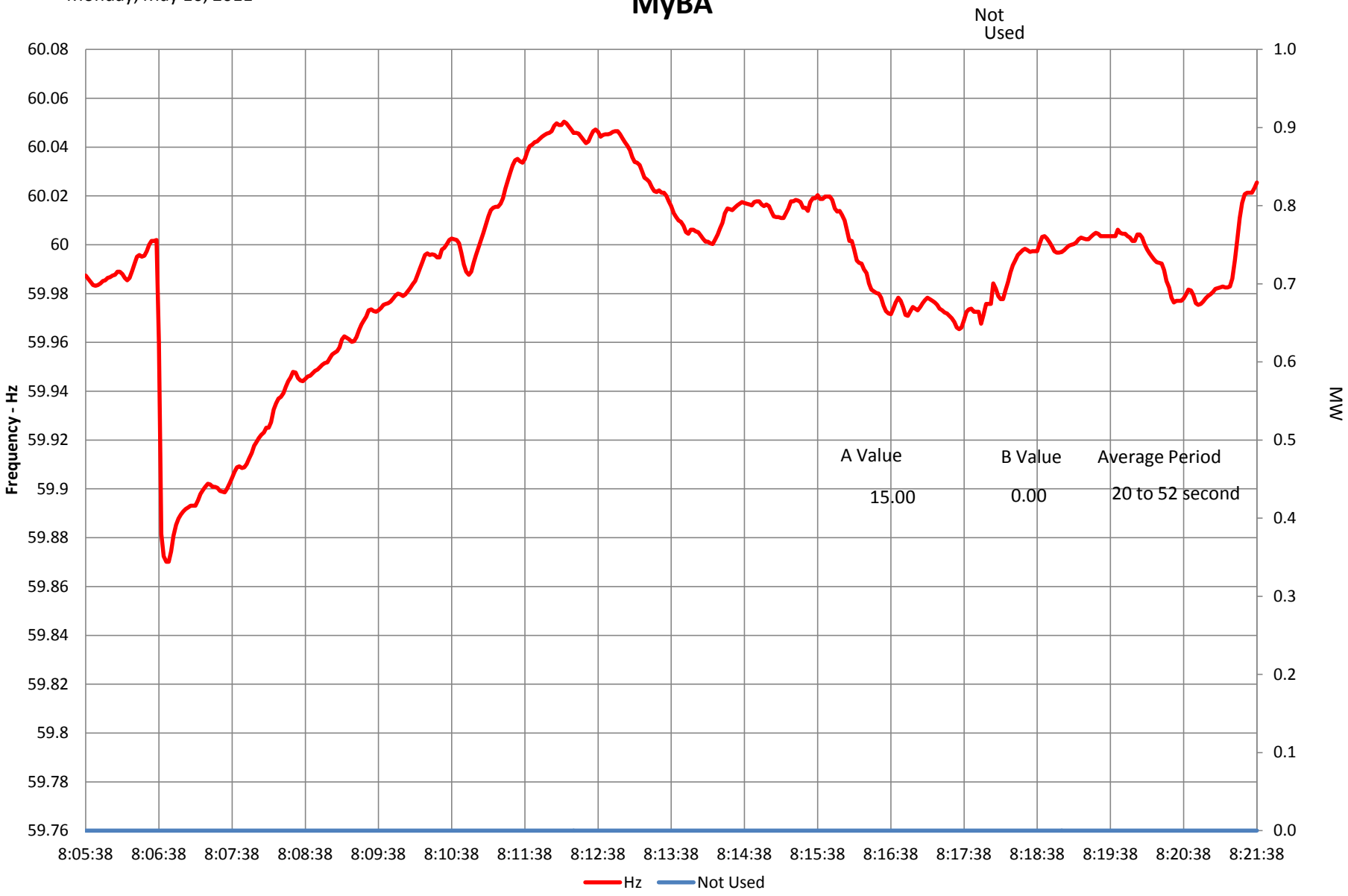

Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used

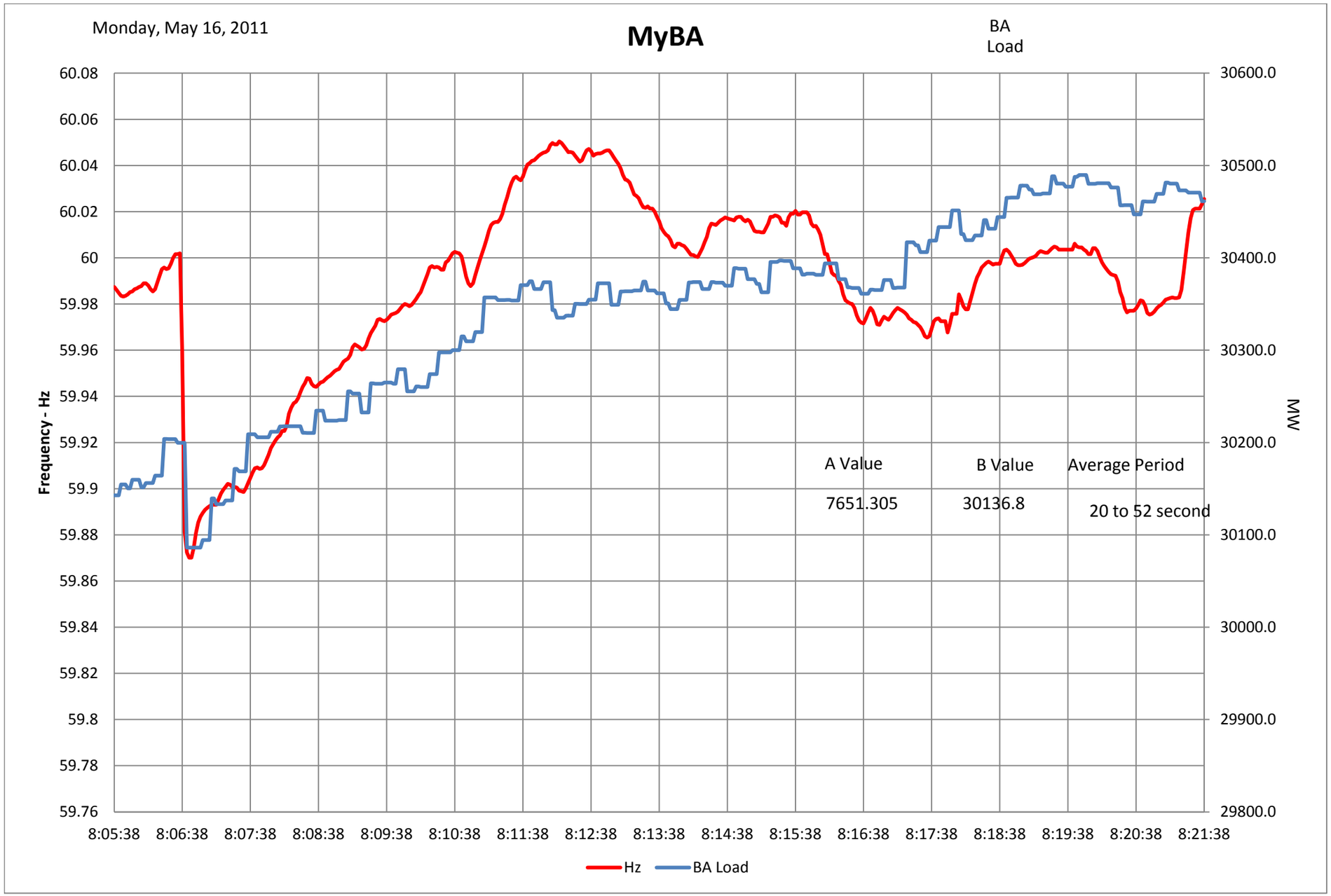

Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.2
1.0
0.8
0.6
0.4
0.2
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used

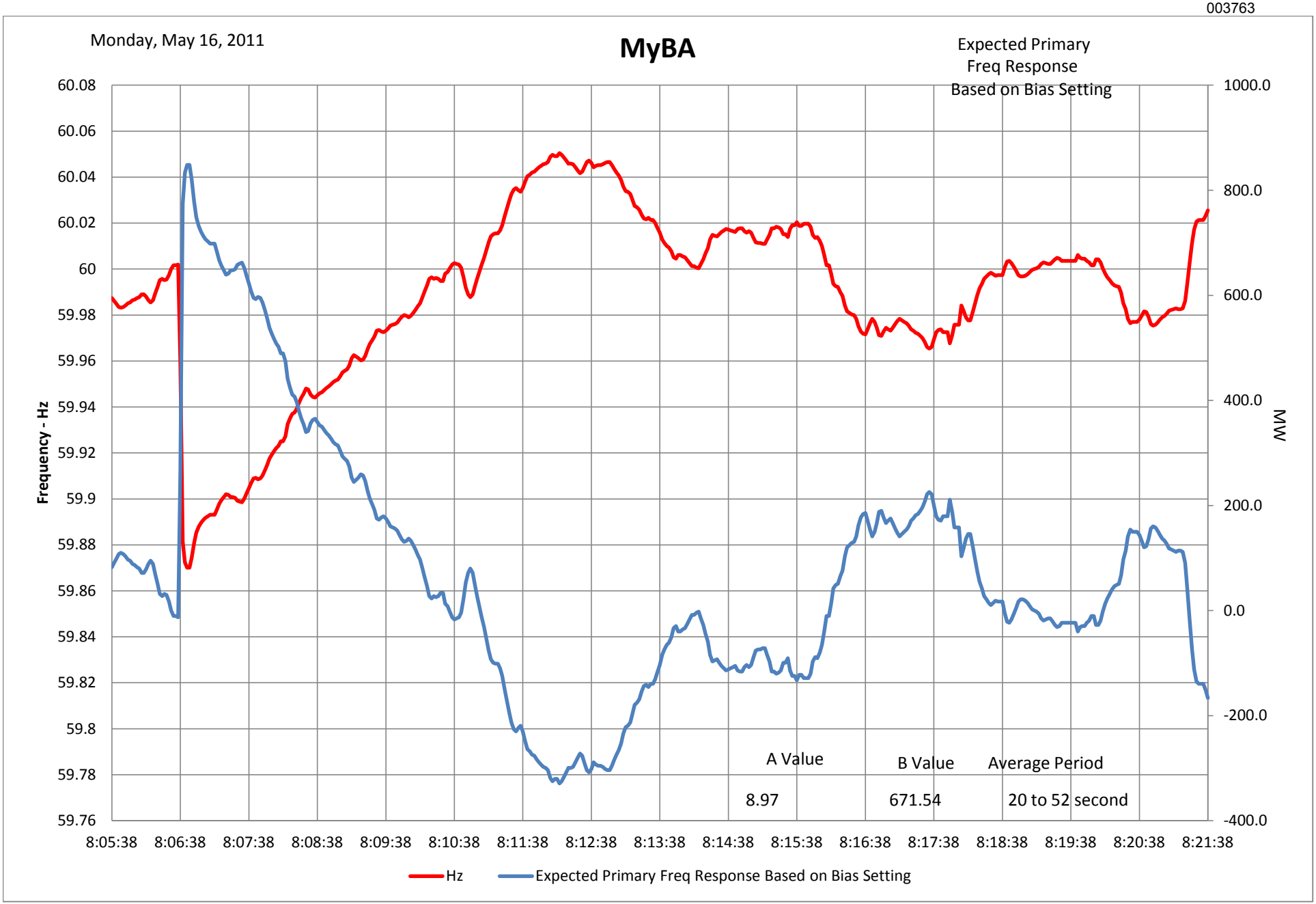

Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used

Monday, May 16, 2011

MyBA




Monday, May 16, 2011
MyBA
BA Load
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
30600.0
30500.0
30400.0
30300.0
30200.0
30100.0
30000.0
29900.0
29800.0
MW
A Value
7651.305
B Value
30136.8
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Load


Monday, May 16, 2011
MyBA
Expected Primary
Freq Response
Based on Bias Setting
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
8.97
B Value
671.54
Average Period
20 to 52 second
Hz
Expected Primary Freq Response Based on Bias Setting

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2007-12 Frequency Response

Successive Ballot and Non-Binding Poll Open Through 8 p.m. Monday, November 5, 2012

Now Available

A successive ballot of **BAL-003-1 – Frequency Response and Frequency Bias Setting** and a non-binding poll of the associated VRFs/VSLs is open through **8 p.m. Eastern on Monday, November 5, 2012.**

Instructions

Members of the ballot pools associated with this project may log in and submit their vote for the Standard and opinion in the non-binding poll of the associated VRFs and VSLs by clicking here.

Please read carefully: All stakeholders with comments (both members of the ballot pool as well as other stakeholders, including groups such as trade associations and committees) must submit comments through the electronic comment form. During the ballot window, balloters who wish to submit comments with their ballot *may no longer enter comments on the balloting screen*, but may still enter the comments through the electronic comment form. Balloters who wish to express support for comments submitted by another entity or group will have an opportunity to enter that information and are not required to answer any other questions.

Next Steps

The drafting team will consider all comments received during the formal comment period and successive ballot and, if needed, make revisions to the standards. If the comments do not show the need for significant revisions, the standard will proceed to a recirculation ballot.

Background

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. The proposed standard's intent is to collect data needed to accurately analyze existing Frequency Response, set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be analyzed, and the reasons for the decline in Frequency Response

can be identified. Once Frequency Response has been analyzed and confirmed, requirements can be modified to maintain reliability.

Additional information is available on the project page.

Standards Process

The Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate.

For more information or assistance, please contact Monica Benson, Standards Development Administrator, at monica.benson@nerc.net or at 404-446-2560.

North American Electric Reliability Corporation
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NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2007-12 Frequency Response

Formal Comment Period Open:	October 5, – November 5, 2012
Upcoming: **Successive Ballot and Non-binding Polls:**	**October 26 – November 5, 2012**

Now Available

BAL-003-1 – Frequency Response and Frequency Bias Setting, an implementation plan and several associated documents (listed below) have been posted for a parallel formal comment period and successive ballot through **8 p.m. Eastern on Monday, November 5, 2012.**

The following associated documents have been posted for stakeholder review and comment:

- **Frequency Response Standard Background Document** – Provides an explanation of each of the proposed requirements; identifies how the proposed standard proposes to address FERC directives from Order 693; and describes the decision process for use of the median as the measure for Frequency Response.
- **Attachment A** – Provides methodology for calculating Interconnection Frequency Response Obligation, Balancing Authority Frequency Response Obligation, Frequency Response Measure and the Frequency Bias Setting.
- **Procedure** – Assigns tasks to the ERO and provides instructions for the ERO to follow when carrying them out to support the BAL-003-1 standard.
- **FRS Form 1 (three versions – multiple Balancing Authority Interconnection, ERCOT and Quebec) and FRS Form 2 (three versions – multiple Balancing Authority Interconnection, ERCOT and Quebec)** used to determine each Balancing Authority's Frequency Response Measure and Frequency Bias Setting. Instructions are now on the first page of each FRS Form 1 and FRS Form 2.
- **Mapping Document** – Identifies each requirement in the already approved BAL-003-0.1b and identifies how that requirement has been treated in the revisions proposed in BAL-003-1.

Instructions for Commenting

A formal comment period is open through **8 p.m. Eastern on Monday, November 5, 2012**. Please use this electronic form to submit comments. If you experience any difficulties in using the electronic form, please contact Wendy Kinnard at wendy.kinnard@nerc.net. An off-line, unofficial copy of the comment form is posted on the project page.

Please read carefully: All stakeholders with comments (both members of the ballot pool as well as other stakeholders, including groups such as trade associations and committees) must submit comments through the electronic comment form. During the ballot window, balloters who wish to submit comments with their ballot *may no longer enter comments on the balloting screen*, but may still enter the comments through the electronic comment form. Balloters who wish to express support for comments submitted by another entity or group will have an opportunity to enter that information and are not required to answer any other questions.

Next Steps

A successive ballot and non-binding polls of the associated VRFs and VSLs will be conducted Friday, October 26, 2012 through 8 p.m. Monday, November 5, 2012.

Background

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. The proposed standard's intent is to collect data needed to accurately analyze existing Frequency Response, set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be analyzed, and the reasons for the decline in Frequency Response can be identified. Once Frequency Response has been analyzed and confirmed, requirements can be modified to maintain reliability.

Additional information is available on the project page.

Standards Process

The Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate.

For more information or assistance, please contact Wendy Kinnard, Standards Development Administrator, at wendy.kinnard@nerc.net or at 404-446-2560.

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Standards Announcement

Project 2007-12 Frequency Response

Formal Comment Period Open:	October 5, – November 5, 2012
Upcoming: **Successive Ballot and Non-binding Polls:**	**October 26 – November 5, 2012**

Now Available

BAL-003-1 – Frequency Response and Frequency Bias Setting, an implementation plan and several associated documents (listed below) have been posted for a parallel formal comment period and successive ballot through **8 p.m. Eastern on Monday, November 5, 2012.**

The following associated documents have been posted for stakeholder review and comment:

- **Frequency Response Standard Background Document** – Provides an explanation of each of the proposed requirements; identifies how the proposed standard proposes to address FERC directives from Order 693; and describes the decision process for use of the median as the measure for Frequency Response.
- **Attachment A** – Provides methodology for calculating Interconnection Frequency Response Obligation, Balancing Authority Frequency Response Obligation, Frequency Response Measure and the Frequency Bias Setting.
- **Procedure** – Assigns tasks to the ERO and provides instructions for the ERO to follow when carrying them out to support the BAL-003-1 standard.
- **FRS Form 1 (three versions – multiple Balancing Authority Interconnection, ERCOT and Quebec) and FRS Form 2 (three versions – multiple Balancing Authority Interconnection, ERCOT and Quebec)** used to determine each Balancing Authority's Frequency Response Measure and Frequency Bias Setting. Instructions are now on the first page of each FRS Form 1 and FRS Form 2.
- **Mapping Document** – Identifies each requirement in the already approved BAL-003-0.1b and identifies how that requirement has been treated in the revisions proposed in BAL-003-1.

Instructions for Commenting

A formal comment period is open through **8 p.m. Eastern on Monday, November 5, 2012**. Please use this electronic form to submit comments. If you experience any difficulties in using the electronic form, please contact Wendy Kinnard at wendy.kinnard@nerc.net. An off-line, unofficial copy of the comment form is posted on the project page.

Please read carefully: All stakeholders with comments (both members of the ballot pool as well as other stakeholders, including groups such as trade associations and committees) must submit comments through the electronic comment form. During the ballot window, balloters who wish to submit comments with their ballot *may no longer enter comments on the balloting screen*, but may still enter the comments through the electronic comment form. Balloters who wish to express support for comments submitted by another entity or group will have an opportunity to enter that information and are not required to answer any other questions.

Next Steps

A successive ballot and non-binding polls of the associated VRFs and VSLs will be conducted Friday, October 26, 2012 through 8 p.m. Monday, November 5, 2012.

Background

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. The proposed standard's intent is to collect data needed to accurately analyze existing Frequency Response, set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard requires entities to provide data so that Frequency Response in each of the Interconnections can be analyzed, and the reasons for the decline in Frequency Response can be identified. Once Frequency Response has been analyzed and confirmed, requirements can be modified to maintain reliability.

Additional information is available on the project page.

Standards Process

The Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate.

For more information or assistance, please contact Wendy Kinnard, Standards Development Administrator, at wendy.kinnard@nerc.net or at 404-446-2560.

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NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2007-12 Frequency Response

Successive Ballot and Non-Binding Poll Results

Now Available

A successive ballot of **BAL-003-1 – Frequency Response and Frequency Bias Setting** and a non-binding poll of the associated VRFs/VSLs concluded on **Tuesday, November 6, 2012.**

Voting statistics for each ballot are listed below, and the Ballots Results page provides a link to the detailed results.

Approval	Non-binding Poll Results
Quorum: 82.04%	Quorum: 76.28%
Approval: 76.08%	Supportive Opinions: 76.30 %

Next Steps

The drafting team will consider all comments received during the formal comment period and successive ballot and, if needed, make revisions to the standards. If the comments do not show the need for significant revisions, the standard will proceed to a recirculation ballot.

Background

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard would set a minimum Frequency Response obligation for each Balancing Authority, provide a uniform calculation of Frequency Response and Frequency Bias Settings that transition to values closer to natural Frequency Response, and encourage coordinated AGC operation.

Additional information is available on the project page.

Standards Process

The Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate.

For more information or assistance, please contact Monica Benson, Standards Development Administrator, at monica.benson@nerc.net or at 404-446-2560.

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Ballot Results

Ballot Name:	Project 2007-12 Successive Ballot Frequency Response Oct 2012_in
Ballot Period:	10/26/2012 - 11/6/2012
Ballot Type:	Initial
Total # Votes:	297
Total Ballot Pool:	362
Quorum:	**82.04 % The Quorum has been reached**
Weighted Segment Vote:	76.08 %
Ballot Results:	**The Standard has Passed**

Summary of Ballot Results

Segment	Ballot Pool	Segment Weight	Affirmative # Votes	Affirmative Fraction	Negative # Votes	Negative Fraction	Abstain # Votes	No Vote
1 - Segment 1.	92	1	35	0.603	23	0.397	20	14
2 - Segment 2.	11	1	5	0.5	5	0.5	1	0
3 - Segment 3.	79	1	41	0.788	11	0.212	14	13
4 - Segment 4.	28	1	15	0.938	1	0.063	6	6
5 - Segment 5.	80	1	37	0.755	12	0.245	12	19
6 - Segment 6.	48	1	24	0.774	7	0.226	7	10
7 - Segment 7.	0	0	0	0	0	0	0	0
8 - Segment 8.	9	0.8	8	0.8	0	0	1	0
9 - Segment 9.	6	0.2	0	0	2	0.2	1	3
10 - Segment 10.	9	0.7	7	0.7	0	0	2	0
Totals	**362**	**7.7**	**172**	**5.858**	**61**	**1.843**	**64**	**65**

Individual Ballot Pool Results

Segment	Organization	Member	Ballot	Comments
1	Ameren Services	Kirit Shah	Affirmative	
1	American Electric Power	Paul B. Johnson		
1	Arizona Public Service Co.	Robert Smith	Negative	
1	Associated Electric Cooperative, Inc.	John Bussman	Affirmative	
1	Austin Energy	James Armke		
1	Avista Corp.	Scott J Kinney	Negative	
1	Balancing Authority of Northern California	Kevin Smith	Affirmative	
1	Baltimore Gas & Electric Company	Gregory S Miller	Negative	

1	BC Hydro and Power Authority	Patricia Robertson	Abstain	003775
1	Beaches Energy Services	Joseph S Stonecipher		
1	Black Hills Corp	Eric Egge		
1	Bonneville Power Administration	Donald S. Watkins	Negative	
1	Brazos Electric Power Cooperative, Inc.	Tony Kroskey	Negative	
1	Central Maine Power Company	Joseph Turano Jr.	Affirmative	
1	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Chang G Choi	Affirmative	
1	Clark Public Utilities	Jack Stamper	Affirmative	
1	Colorado Springs Utilities	Paul Morland	Affirmative	
1	Consolidated Edison Co. of New York	Christopher L de Graffenried	Negative	
1	CPS Energy	Richard Castrejana	Abstain	
1	Dairyland Power Coop.	Robert W. Roddy	Abstain	
1	Dayton Power & Light Co.	Hertzel Shamash	Affirmative	
1	Dominion Virginia Power	Michael S Crowley	Abstain	
1	Duke Energy Carolina	Douglas E. Hils	Affirmative	
1	East Kentucky Power Coop.	George S. Carruba	Negative	
1	Empire District Electric Co.	Ralph F Meyer	Affirmative	
1	Entergy Services, Inc.	Edward J Davis	Negative	
1	FirstEnergy Corp.	William J Smith	Abstain	
1	Florida Keys Electric Cooperative Assoc.	Dennis Minton	Abstain	
1	Florida Power & Light Co.	Mike O'Neil	Negative	
1	Gainesville Regional Utilities	Luther E. Fair		
1	Great River Energy	Gordon Pietsch	Affirmative	
1	Hoosier Energy Rural Electric Cooperative, Inc.	Bob Solomon	Negative	
1	Hydro One Networks, Inc.	Ajay Garg	Affirmative	
1	Hydro-Quebec TransEnergie	Bernard Pelletier	Affirmative	
1	Idaho Power Company	Ronald D Schellberg	Affirmative	
1	Imperial Irrigation District	Tino Zaragoza	Abstain	
1	International Transmission Company Holdings Corp	Michael Moltane	Abstain	
1	JEA	Ted Hobson	Negative	
1	Kansas City Power & Light Co.	Michael Gammon	Negative	
1	Keys Energy Services	Stanley T Rzad	Affirmative	
1	Lakeland Electric	Larry E Watt		
1	Lee County Electric Cooperative	John W Delucca	Abstain	
1	Lincoln Electric System	Doug Bantam	Affirmative	
1	Manitoba Hydro	Joe D Petaski	Affirmative	
1	MEAG Power	Danny Dees	Affirmative	
1	MidAmerican Energy Co.	Terry Harbour	Affirmative	
1	National Grid	Saurabh Saksena		
1	Nebraska Public Power District	Cole C Brodine	Affirmative	
1	New Brunswick Power Transmission Corporation	Randy MacDonald	Negative	
1	New York State Electric & Gas Corp.	Raymond P Kinney	Affirmative	
1	Northeast Utilities	David Boguslawski		
1	Northern Indiana Public Service Co.	Kevin M Largura	Affirmative	
1	NorthWestern Energy	John Canavan	Affirmative	
1	Ohio Valley Electric Corp.	Robert Mattey	Abstain	
1	Oklahoma Gas and Electric Co.	Marvin E VanBebber	Abstain	
1	Omaha Public Power District	Doug Peterchuck	Affirmative	
1	Orlando Utilities Commission	Brad Chase		
1	PacifiCorp	Ryan Millard	Affirmative	
1	Platte River Power Authority	John C. Collins	Abstain	
1	Portland General Electric Co.	John T Walker	Negative	
1	Potomac Electric Power Co.	David Thorne	Abstain	
1	PowerSouth Energy Cooperative	Larry D Avery	Negative	
1	PPL Electric Utilities Corp.	Brenda L Truhe	Negative	
1	Progress Energy Carolinas	Brett A. Koelsch	Abstain	
1	Public Service Company of New Mexico	Laurie Williams	Affirmative	
1	Public Service Electric and Gas Co.	Kenneth D. Brown		
1	Public Utility District No. 1 of Okanogan County	Dale Dunckel	Abstain	
1	Puget Sound Energy, Inc.	Denise M Lietz	Negative	
1	Raj Rana	Rajendrasinh D Rana	Abstain	
1	Rochester Gas and Electric Corp.	John C. Allen	Affirmative	
1	Sacramento Municipal Utility District	Tim Kelley	Affirmative	

1	Salmon River Electric Cooperative	Kathryn Spence	003776	
1	Salt River Project	Robert Kondziolka	Affirmative	
1	Santee Cooper	Terry L Blackwell	Affirmative	
1	SCE&G	Henry Delk, Jr.		
1	Seattle City Light	Pawel Krupa	Abstain	
1	Sierra Pacific Power Co.	Rich Salgo	Negative	
1	Snohomish County PUD No. 1	Long T Duong	Abstain	
1	South California Edison Company	Steven Mavis	Affirmative	
1	Southern Company Services, Inc.	Robert A. Schaffeld	Affirmative	
1	Southern Illinois Power Coop.	William Hutchison	Negative	
1	Southwest Transmission Cooperative, Inc.	James Jones	Negative	
1	Southwestern Power Administration	Angela L Summer	Abstain	
1	Sunflower Electric Power Corporation	Noman Lee Williams	Negative	
1	Tampa Electric Co.	Beth Young		
1	Tennessee Valley Authority	Larry G Akens	Affirmative	
1	Tri-State G & T Association, Inc.	Tracy Sliman	Negative	
1	Tucson Electric Power Co.	John Tolo	Negative	
1	United Illuminating Co.	Jonathan Appelbaum	Abstain	
1	Westar Energy	Allen Klassen	Affirmative	
1	Western Area Power Administration	Brandy A Dunn	Affirmative	
1	Xcel Energy, Inc.	Gregory L Pieper		
2	Alberta Electric System Operator	Mark B Thompson	Negative	
2	BC Hydro	Venkataramakrishnan Vinnakota	Abstain	
2	California ISO	Rich Vine	Affirmative	
2	Electric Reliability Council of Texas, Inc.	Charles B Manning	Affirmative	
2	Independent Electricity System Operator	Barbara Constantinescu	Affirmative	
2	ISO New England, Inc.	Kathleen Goodman	Negative	
2	Midwest ISO, Inc.	Marie Knox	Affirmative	
2	New Brunswick System Operator	Alden Briggs	Negative	
2	New York Independent System Operator	Gregory Campoli	Negative	
2	PJM Interconnection, L.L.C.	Tom Bowe	Negative	
2	Southwest Power Pool, Inc.	Charles H. Yeung	Affirmative	
3	AEP	Michael E Deloach	Abstain	
3	Alabama Power Company	Richard J. Mandes	Affirmative	
3	Ameren Services	Mark Peters	Affirmative	
3	APS	Steven Norris	Affirmative	
3	Associated Electric Cooperative, Inc.	Chris W Bolick	Affirmative	
3	Atlantic City Electric Company	NICOLE BUCKMAN	Abstain	
3	BC Hydro and Power Authority	Pat G. Harrington	Abstain	
3	Bonneville Power Administration	Rebecca Berdahl	Negative	
3	City of Alexandria	Michael Marcotte		
3	City of Bartow, Florida	Matt Culverhouse		
3	City of Clewiston	Lynne Mila	Affirmative	
3	City of Green Cove Springs	Gregg R Griffin	Affirmative	
3	City of Redding	Bill Hughes	Affirmative	
3	Cleco Corporation	Michelle A Corley	Affirmative	
3	Colorado Springs Utilities	Charles Morgan	Affirmative	
3	Consolidated Edison Co. of New York	Peter T Yost	Negative	
3	Constellation Energy	CJ Ingersoll	Negative	
3	Consumers Energy	Richard Blumenstock	Affirmative	
3	CPS Energy	Jose Escamilla	Abstain	
3	Delmarva Power & Light Co.	Michael R. Mayer	Abstain	
3	Detroit Edison Company	Kent Kujala	Affirmative	
3	Dominion Resources Services	Michael F. Gildea	Abstain	
3	Duke Energy Carolina	Henry Ernst-Jr		
3	East Kentucky Power Coop.	Patrick Woods	Negative	
3	Entergy	Joel T Plessinger		
3	FirstEnergy Energy Delivery	Stephan Kern	Abstain	
3	Florida Municipal Power Agency	Joe McKinney	Affirmative	
3	Florida Power Corporation	Lee Schuster	Affirmative	
3	Georgia Power Company	Anthony L Wilson	Affirmative	
3	Georgia Systems Operations Corporation	William N. Phinney	Abstain	
3	Grays Harbor PUD	Wesley W Gray		
3	Great River Energy	Brian Glover	Affirmative	
3	Gulf Power Company	Paul C Caldwell	Affirmative	
3	Hydro One Networks, Inc.	David Kiguel	Affirmative	

3	Imperial Irrigation District	Jesus S. Alcaraz	Abstain	003777
3	JEA	Garry Baker	Negative	
3	Kansas City Power & Light Co.	Charles Locke	Negative	
3	Kissimmee Utility Authority	Gregory D Woessner	Affirmative	
3	Lakeland Electric	Norman D Harryhill		
3	Lincoln Electric System	Jason Fortik	Affirmative	
3	Los Angeles Department of Water & Power	Daniel D Kurowski	Affirmative	
3	Louisville Gas and Electric Co.	Charles A. Freibert	Negative	
3	Manitoba Hydro	Greg C. Parent	Affirmative	
3	Manitowoc Public Utilities	Thomas E Reed	Affirmative	
3	MidAmerican Energy Co.	Thomas C. Mielnik		
3	Mississippi Power	Jeff Franklin	Affirmative	
3	Modesto Irrigation District	Jack W Savage	Affirmative	
3	Municipal Electric Authority of Georgia	Steven M. Jackson	Affirmative	
3	Muscatine Power & Water	John S Bos	Negative	
3	Nebraska Public Power District	Tony Eddleman	Affirmative	
3	New York Power Authority	Marilyn Brown		
3	Niagara Mohawk (National Grid Company)	Michael Schiavone		
3	Northern Indiana Public Service Co.	William SeDoris	Affirmative	
3	Ocala Electric Utility	David Anderson	Affirmative	
3	Orlando Utilities Commission	Ballard K Mutters	Negative	
3	Owensboro Municipal Utilities	Thomas T Lyons	Abstain	
3	Pacific Gas and Electric Company	John H Hagen	Affirmative	
3	PacifiCorp	Dan Zollner	Affirmative	
3	Platte River Power Authority	Terry L Baker	Abstain	
3	PNM Resources	Michael Mertz	Affirmative	
3	Potomac Electric Power Co.	Robert Reuter	Abstain	
3	Progress Energy Carolinas	Sam Waters		
3	Public Service Electric and Gas Co.	Jeffrey Mueller		
3	Public Utility District No. 1 of Clallam County	David Proebstel		
3	Puget Sound Energy, Inc.	Erin Apperson	Negative	
3	Sacramento Municipal Utility District	James Leigh-Kendall	Affirmative	
3	Salt River Project	John T. Underhill	Affirmative	
3	Santee Cooper	James M Poston	Affirmative	
3	Seattle City Light	Dana Wheelock	Abstain	
3	Seminole Electric Cooperative, Inc.	James R Frauen	Affirmative	
3	Snohomish County PUD No. 1	Mark Oens	Abstain	
3	South Carolina Electric & Gas Co.	Hubert C Young	Affirmative	
3	Tacoma Public Utilities	Travis Metcalfe	Affirmative	
3	Tampa Electric Co.	Ronald L Donahey		
3	Tennessee Valley Authority	Ian S Grant	Affirmative	
3	Tri-State G & T Association, Inc.	Janelle Marriott	Negative	
3	Westar Energy	Bo Jones	Affirmative	
3	Wisconsin Electric Power Marketing	James R Keller	Affirmative	
3	Xcel Energy, Inc.	Michael Ibold	Affirmative	
4	Alliant Energy Corp. Services, Inc.	Kenneth Goldsmith	Affirmative	
4	American Municipal Power	Kevin Koloini	Affirmative	
4	Blue Ridge Power Agency	Duane S Dahlquist	Affirmative	
4	City of Austin dba Austin Energy	Reza Ebrahimian	Affirmative	
4	City of Clewiston	Kevin McCarthy	Affirmative	
4	City of New Smyrna Beach Utilities Commission	Tim Beyrle	Negative	
4	City of Redding	Nicholas Zettel	Affirmative	
4	City Utilities of Springfield, Missouri	John Allen	Affirmative	
4	Consumers Energy	David Frank Ronk	Affirmative	
4	Detroit Edison Company	Daniel Herring	Affirmative	
4	Flathead Electric Cooperative	Russ Schneider		
4	Florida Municipal Power Agency	Frank Gaffney	Affirmative	
4	Fort Pierce Utilities Authority	Thomas Richards		
4	Georgia System Operations Corporation	Guy Andrews	Abstain	
4	Imperial Irrigation District	Diana U Torres		
4	Indiana Municipal Power Agency	Jack Alvey	Abstain	
4	Integrys Energy Group, Inc.	Christopher Plante	Abstain	
4	LaGen	Richard Comeaux		
4	Madison Gas and Electric Co.	Joseph DePoorter	Affirmative	
4	Northern California Power Agency	Tracy R Bibb		
4	Ohio Edison Company	Douglas Hohlbaugh	Abstain	

4	Public Utility District No. 1 of Douglas County	Henry E. LuBean	Affirmative	003778
4	Public Utility District No. 1 of Snohomish County	John D Martinsen	Abstain	
4	Sacramento Municipal Utility District	Mike Ramirez	Affirmative	
4	Seattle City Light	Hao Li	Abstain	
4	South Mississippi Electric Power Association	Steven McElhaney		
4	Tacoma Public Utilities	Keith Morisette	Affirmative	
4	Wisconsin Energy Corp.	Anthony Jankowski	Affirmative	
5	AEP Service Corp.	Brock Ondayko	Abstain	
5	AES Corporation	Leo Bernier	Affirmative	
5	Amerenue	Sam Dwyer	Affirmative	
5	Arizona Public Service Co.	Edward Cambridge	Negative	
5	Avista Corp.	Edward F. Groce	Negative	
5	BC Hydro and Power Authority	Clement Ma	Abstain	
5	Boise-Kuna Irrigation District/dba Lucky peak power plant project	Mike D Kukla	Abstain	
5	Bonneville Power Administration	Francis J. Halpin	Negative	
5	BP Wind Energy North America Inc	Carla Bayer		
5	BrightSource Energy, Inc.	Chifong Thomas	Affirmative	
5	City of Austin dba Austin Energy	Jeanie Doty	Affirmative	
5	City of Redding	Paul A. Cummings	Affirmative	
5	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Max Emrick	Affirmative	
5	City of Tallahassee	Brian Horton		
5	City Water, Light & Power of Springfield	Steve Rose		
5	Colorado Springs Utilities	Jennifer Eckels	Affirmative	
5	Consolidated Edison Co. of New York	Wilket (Jack) Ng	Negative	
5	Consumers Energy Company	David C Greyerbiehl	Affirmative	
5	CPS Energy	Robert Stevens		
5	Detroit Edison Company	Christy Wicke	Affirmative	
5	Dominion Resources, Inc.	Mike Garton	Abstain	
5	Duke Energy	Dale Q Goodwine	Affirmative	
5	East Kentucky Power Coop.	Stephen Ricker	Negative	
5	Edison Mission Energy	Ellen Oswald		
5	Electric Power Supply Association	John R Cashin		
5	FirstEnergy Solutions	Kenneth Dresner	Abstain	
5	Florida Municipal Power Agency	David Schumann	Affirmative	
5	Gainesville Regional Utilities	Karen C Alford		
5	Great River Energy	Preston L Walsh	Affirmative	
5	Green Country Energy	Greg Froehling		
5	Imperial Irrigation District	Marcela Y Caballero		
5	Indeck Energy Services, Inc.	Rex A Roehl		
5	JEA	John J Babik	Negative	
5	Kissimmee Utility Authority	Mike Blough	Affirmative	
5	Lakeland Electric	James M Howard	Affirmative	
5	Liberty Electric Power LLC	Daniel Duff		
5	Lincoln Electric System	Dennis Florom	Affirmative	
5	Los Angeles Department of Water & Power	Kenneth Silver	Affirmative	
5	Lower Colorado River Authority	Tom Foreman	Affirmative	
5	Luminant Generation Company LLC	Mike Laney	Affirmative	
5	Manitoba Hydro	S N Fernando	Affirmative	
5	Massachusetts Municipal Wholesale Electric Company	David Gordon	Abstain	
5	MEAG Power	Steven Grego	Affirmative	
5	Michigan Public Power Agency	Gary Carlson		
5	MidAmerican Energy Co.	Christopher Schneider	Affirmative	
5	Muscatine Power & Water	Mike Avesing	Negative	
5	Nebraska Public Power District	Don Schmit	Affirmative	
5	New York Power Authority	Gerald Mannarino		
5	NextEra Energy	Allen D Schriver	Negative	
5	Northern California Power Agency	Hari Modi		
5	Northern Indiana Public Service Co.	William O. Thompson	Affirmative	
5	Omaha Public Power District	Mahmood Z. Safi	Affirmative	
5	Orlando Utilities Commission	Richard K Kinas	Affirmative	
5	Pacific Gas and Electric Company	Richard J. Padilla	Affirmative	
5	PacifiCorp	Sandra L. Shaffer	Affirmative	
5	Platte River Power Authority	Roland Thiel	Abstain	
5	Portland General Electric Co.	Gary L Tingley	Negative	

5	PowerSouth Energy Cooperative	Tim Hattaway	Abstain	003779
5	PPL Generation LLC	Annette M Bannon	Negative	
5	Progress Energy Carolinas	Wayne Lewis		
5	PSEG Fossil LLC	Tim Kucey	Negative	
5	Public Utility District No. 1 of Lewis County	Steven Grega	Abstain	
5	Puget Sound Energy, Inc.	Tom Flynn		
5	Sacramento Municipal Utility District	Bethany Hunter	Affirmative	
5	Salt River Project	William Alkema	Affirmative	
5	Santee Cooper	Lewis P Pierce	Affirmative	
5	Seattle City Light	Michael J. Haynes	Abstain	
5	Seminole Electric Cooperative, Inc.	Brenda K. Atkins	Affirmative	
5	Siemens PTI	Edwin Cano		
5	Snohomish County PUD No. 1	Sam Nietfeld	Abstain	
5	Southern California Edison Co.	Denise Yaffe		
5	Southern Company Generation	William D Shultz	Affirmative	
5	Tampa Electric Co.	RJames Rocha	Affirmative	
5	Tenaska, Inc.	Scott M. Helyer	Abstain	
5	Tennessee Valley Authority	David Thompson	Affirmative	
5	Tri-State G & T Association, Inc.	Barry Ingold	Negative	
5	U.S. Army Corps of Engineers	Melissa Kurtz		
5	Wisconsin Electric Power Co.	Linda Horn	Affirmative	
5	Wisconsin Public Service Corp.	Leonard Rentmeester	Affirmative	
5	Xcel Energy, Inc.	Liam Noailles	Affirmative	
6	ACES Power Marketing	Jason L Marshall	Abstain	
6	AEP Marketing	Edward P. Cox	Abstain	
6	Ameren Energy Marketing Co.	Jennifer Richardson	Affirmative	
6	APS	Randy A. Young	Negative	
6	Bonneville Power Administration	Brenda S. Anderson	Negative	
6	City of Redding	Marvin Briggs	Affirmative	
6	Cleco Power LLC	Robert Hirchak	Affirmative	
6	Colorado Springs Utilities	Lisa C Rosintoski		
6	Consolidated Edison Co. of New York	Nickesha P Carrol	Negative	
6	Constellation Energy Commodities Group	Brenda L Powell	Negative	
6	Dominion Resources, Inc.	Louis S. Slade	Abstain	
6	Duke Energy Carolina	Walter Yeager		
6	Entergy Services, Inc.	Terri F Benoit		
6	FirstEnergy Solutions	Kevin Querry	Abstain	
6	Florida Municipal Power Agency	Richard L. Montgomery	Affirmative	
6	Florida Municipal Power Pool	Thomas Washburn	Affirmative	
6	Florida Power & Light Co.	Silvia P. Mitchell	Negative	
6	Imperial Irrigation District	Cathy Bretz	Abstain	
6	Kansas City Power & Light Co.	Jessica L Klinghoffer	Negative	
6	Lakeland Electric	Paul Shipps	Affirmative	
6	Lincoln Electric System	Eric Ruskamp	Affirmative	
6	Los Angeles Department of Water & Power	Brad Packer	Affirmative	
6	Luminant Energy	Brad Jones	Affirmative	
6	Manitoba Hydro	Daniel Prowse	Affirmative	
6	MidAmerican Energy Co.	Dennis Kimm		
6	Northern Indiana Public Service Co.	Joseph O'Brien	Affirmative	
6	Omaha Public Power District	David Ried	Affirmative	
6	Orlando Utilities Commission	Claston Augustus Sunanon	Affirmative	
6	PacifiCorp	Scott L Smith	Affirmative	
6	Platte River Power Authority	Carol Ballantine	Abstain	
6	PPL EnergyPlus LLC	Mark A Heimbach		
6	Progress Energy	John T Sturgeon		
6	PSEG Energy Resources & Trade LLC	Peter Dolan	Negative	
6	Public Utility District No. 1 of Chelan County	Hugh A. Owen		
6	Sacramento Municipal Utility District	Diane Enderby	Affirmative	
6	Salt River Project	Steven J Hulet	Affirmative	
6	Santee Cooper	Michael Brown	Affirmative	
6	Seattle City Light	Dennis Sismaet	Abstain	
6	Seminole Electric Cooperative, Inc.	Trudy S. Novak		
6	Snohomish County PUD No. 1	William T Moojen		
6	South California Edison Company	Lujuanna Medina	Affirmative	
6	Southern Company Generation and Energy Marketing	John J. Ciza	Affirmative	
6	Tacoma Public Utilities	Michael C Hill	Affirmative	

6	Tampa Electric Co.	Benjamin F Smith II	003780	
6	Tennessee Valley Authority	Marjorie S. Parsons	Affirmative	
6	Westar Energy	Grant L Wilkerson	Affirmative	
6	Western Area Power Administration - UGP Marketing	Peter H Kinney	Affirmative	
6	Xcel Energy, Inc.	David F Lemmons	Affirmative	
8		Edward C Stein	Affirmative	
8		Robert Blohm	Affirmative	
8		James A Maenner	Abstain	
8		Roger C Zaklukiewicz	Affirmative	
8	Energy Mark, Inc.	Howard F. Illian	Affirmative	
8	JDRJC Associates	Jim Cyrulewski	Affirmative	
8	Power Energy Group LLC	Peggy Abbadini	Affirmative	
8	Utility Services, Inc.	Brian Evans-Mongeon	Affirmative	
8	Volkmann Consulting, Inc.	Terry Volkmann	Affirmative	
9	California Energy Commission	William M Chamberlain		
9	Commonwealth of Massachusetts Department of Public Utilities	Donald Nelson		
9	National Association of Regulatory Utility Commissioners	Diane J. Barney	Negative	
9	New York State Department of Public Service	Thomas G. Dvorsky	Negative	
9	Oregon Public Utility Commission	Jerome Murray	Abstain	
9	Public Utilities Commission of Ohio	Klaus Lambeck		
10	Florida Reliability Coordinating Council	Linda Campbell	Abstain	
10	Midwest Reliability Organization	James D Burley	Affirmative	
10	New York State Reliability Council	Alan Adamson	Affirmative	
10	Northeast Power Coordinating Council	Guy V. Zito	Affirmative	
10	ReliabilityFirst Corporation	Anthony E Jablonski	Affirmative	
10	SERC Reliability Corporation	Carter B. Edge	Affirmative	
10	Southwest Power Pool RE	Emily Pennel	Abstain	
10	Texas Reliability Entity, Inc.	Donald G Jones	Affirmative	
10	Western Electricity Coordinating Council	Steven L. Rueckert	Affirmative	

Non-binding Poll Results

Project 2007-12 Frequency Response

Non-binding Poll Results	
Non-binding Poll Name:	Project 2007-12 Non-binding Poll
Poll Period:	10/26/2012 - 11/6/2012
Total # Opinions:	254
Total Ballot Pool:	333
Summary Results:	76.28% of those who registered to participate provided an opinion or an abstention; 76.30% of those who provided an opinion indicated support for the VRFs and VSLs.

Individual Ballot Pool Results

Segment	Organization	Member	Opinions	Comments
1	Ameren Services	Kirit Shah	Abstain	
1	American Electric Power	Paul B. Johnson		
1	Associated Electric Cooperative, Inc.	John Bussman	Affirmative	
1	Avista Corp.	Scott J Kinney	Abstain	
1	Balancing Authority of Northern California	Kevin Smith	Abstain	
1	Baltimore Gas & Electric Company	Gregory S Miller		
1	BC Hydro and Power Authority	Patricia Robertson	Abstain	
1	Beaches Energy Services	Joseph S Stonecipher		
1	Bonneville Power Administration	Donald S. Watkins	Negative	
1	Brazos Electric Power Cooperative, Inc.	Tony Kroskey	Negative	
1	Central Maine Power Company	Joseph Turano Jr.	Affirmative	
1	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Chang G Choi	Affirmative	
1	Clark Public Utilities	Jack Stamper	Affirmative	
1	Colorado Springs Utilities	Paul Morland	Affirmative	
1	Consolidated Edison Co. of New York	Christopher L de Graffenried	Negative	
1	CPS Energy	Richard Castrejana	Abstain	
1	Dairyland Power Coop.	Robert W. Roddy	Abstain	
1	Dayton Power & Light Co.	Hertzel Shamash	Affirmative	
1	Deseret Power	James Tucker		
1	Dominion Virginia Power	Michael S Crowley	Abstain	
1	Duke Energy Carolina	Douglas E. Hils	Affirmative	
1	East Kentucky Power Coop.	George S. Carruba		
1	Empire District Electric Co.	Ralph F Meyer	Affirmative	
1	Entergy Services, Inc.	Edward J Davis		
1	FirstEnergy Corp.	William J Smith	Abstain	
1	Florida Keys Electric Cooperative Assoc.	Dennis Minton	Abstain	
1	Florida Power & Light Co.	Mike O'Neil	Negative	

1	Gainesville Regional Utilities	Luther E. Fair		
1	Great River Energy	Gordon Pietsch	Affirmative	
1	Hoosier Energy Rural Electric Cooperative, Inc.	Bob Solomon	Negative	
1	Hydro One Networks, Inc.	Ajay Garg	Affirmative	
1	Hydro-Quebec TransEnergie	Bernard Pelletier	Affirmative	
1	Idaho Power Company	Ronald D Schellberg	Affirmative	
1	Imperial Irrigation District	Tino Zaragoza	Abstain	
1	International Transmission Company Holdings Corp	Michael Moltane	Abstain	
1	JEA	Ted Hobson	Negative	
1	Kansas City Power & Light Co.	Michael Gammon	Negative	
1	Keys Energy Services	Stanley T Rzad	Affirmative	
1	Lakeland Electric	Larry E Watt		
1	Lee County Electric Cooperative	John W Delucca	Abstain	
1	Lincoln Electric System	Doug Bantam	Affirmative	
1	Manitoba Hydro	Joe D Petaski	Affirmative	
1	MEAG Power	Danny Dees	Affirmative	
1	MidAmerican Energy Co.	Terry Harbour	Affirmative	
1	National Grid	Saurabh Saksena		
1	Nebraska Public Power District	Cole C Brodine	Abstain	
1	New Brunswick Power Transmission Corporation	Randy MacDonald	Abstain	
1	New York State Electric & Gas Corp.	Raymond P Kinney	Abstain	
1	Northeast Utilities	David Boguslawski		
1	Northern Indiana Public Service Co.	Kevin M Largura	Affirmative	
1	NorthWestern Energy	John Canavan	Affirmative	
1	Ohio Valley Electric Corp.	Robert Mattey	Negative	
1	Omaha Public Power District	Doug Peterchuck	Affirmative	
1	Orlando Utilities Commission	Brad Chase		
1	PacifiCorp	Ryan Millard	Abstain	
1	Platte River Power Authority	John C. Collins	Abstain	
1	Portland General Electric Co.	John T Walker	Negative	
1	PowerSouth Energy Cooperative	Larry D Avery	Negative	
1	PPL Electric Utilities Corp.	Brenda L Truhe	Negative	
1	Progress Energy Carolinas	Brett A. Koelsch	Abstain	
1	Public Service Company of New Mexico	Laurie Williams	Affirmative	
1	Public Service Electric and Gas Co.	Kenneth D. Brown		
1	Public Utility District No. 1 of Okanogan County	Dale Dunckel	Abstain	
1	Puget Sound Energy, Inc.	Denise M Lietz	Negative	
1	Rochester Gas and Electric Corp.	John C. Allen	Affirmative	
1	Sacramento Municipal Utility District	Tim Kelley	Abstain	
1	Salmon River Electric Cooperative	Kathryn Spence		
1	Salt River Project	Robert Kondziolka	Affirmative	
1	Santee Cooper	Terry L Blackwell	Affirmative	
1	SCE&G	Henry Delk, Jr.		
1	Seattle City Light	Pawel Krupa	Abstain	

1	Snohomish County PUD No. 1	Long T Duong	Abstain	
1	South California Edison Company	Steven Mavis	Affirmative	
1	Southern Company Services, Inc.	Robert A. Schaffeld	Affirmative	
1	Southern Illinois Power Coop.	William Hutchison	Negative	
1	Southwest Transmission Cooperative, Inc.	James Jones	Negative	
1	Sunflower Electric Power Corporation	Noman Lee Williams	Negative	
1	Tampa Electric Co.	Beth Young		
1	Tennessee Valley Authority	Larry G Akens	Abstain	
1	Tri-State G & T Association, Inc.	Tracy Sliman	Negative	
1	Tucson Electric Power Co.	John Tolo	Affirmative	
1	United Illuminating Co.	Jonathan Appelbaum	Negative	
1	Westar Energy	Allen Klassen	Affirmative	
1	Western Area Power Administration	Brandy A Dunn	Affirmative	
1	Xcel Energy, Inc.	Gregory L Pieper		
2	Alberta Electric System Operator	Mark B Thompson		
2	BC Hydro	Venkataramakrishnan Vinnakota	Abstain	
2	California ISO	Rich Vine	Affirmative	
2	Electric Reliability Council of Texas, Inc.	Charles B Manning	Affirmative	
2	Independent Electricity System Operator	Barbara Constantinescu	Affirmative	
2	Midwest ISO, Inc.	Marie Knox	Affirmative	
2	New Brunswick System Operator	Alden Briggs	Abstain	
2	New York Independent System Operator	Gregory Campoli	Abstain	
2	PJM Interconnection, L.L.C.	Tom Bowe		
2	Southwest Power Pool, Inc.	Charles Yeung		
3	AEP	Michael E Deloach	Negative	
3	Alabama Power Company	Richard J. Mandes	Affirmative	
3	Ameren Services	Mark Peters	Abstain	
3	APS	Steven Norris	Affirmative	
3	Atlantic City Electric Company	NICOLE BUCKMAN	Abstain	
3	BC Hydro and Power Authority	Pat G. Harrington	Abstain	
3	Bonneville Power Administration	Rebecca Berdahl	Negative	
3	City of Bartow, Florida	Matt Culverhouse		
3	City of Clewiston	Lynne Mila	Affirmative	
3	City of Garland	Ronnie C Hoeinghaus		
3	City of Green Cove Springs	Gregg R Griffin	Affirmative	
3	City of Redding	Bill Hughes	Affirmative	
3	Cleco Corporation	Michelle A Corley	Negative	
3	Colorado Springs Utilities	Charles Morgan	Affirmative	
3	Consolidated Edison Co. of New York	Peter T Yost	Negative	
3	Constellation Energy	CJ Ingersoll		
3	Consumers Energy	Richard Blumenstock	Affirmative	
3	CPS Energy	Jose Escamilla	Abstain	
3	Detroit Edison Company	Kent Kujala	Affirmative	
3	Dominion Resources Services	Michael F. Gildea		
3	Duke Energy Carolina	Henry Ernst-Jr		

3	Entergy	Joel T Plessinger		
3	FirstEnergy Energy Delivery	Stephan Kern	Abstain	
3	Florida Municipal Power Agency	Joe McKinney	Affirmative	
3	Florida Power Corporation	Lee Schuster	Affirmative	
3	Georgia Power Company	Anthony L Wilson	Affirmative	
3	Georgia Systems Operations Corporation	William N. Phinney		
3	Grays Harbor PUD	Wesley W Gray		
3	Great River Energy	Brian Glover	Affirmative	
3	Gulf Power Company	Paul C Caldwell	Affirmative	
3	Hydro One Networks, Inc.	David Kiguel	Affirmative	
3	Imperial Irrigation District	Jesus S. Alcaraz	Abstain	
3	JEA	Garry Baker	Negative	
3	Kansas City Power & Light Co.	Charles Locke	Negative	
3	Kissimmee Utility Authority	Gregory D Woessner	Affirmative	
3	Lakeland Electric	Norman D Harryhill		
3	Lincoln Electric System	Jason Fortik	Affirmative	
3	Los Angeles Department of Water & Power	Daniel D Kurowski	Affirmative	
3	Louisville Gas and Electric Co.	Charles A. Freibert		
3	Manitoba Hydro	Greg C. Parent	Affirmative	
3	Manitowoc Public Utilities	Thomas E Reed	Affirmative	
3	MidAmerican Energy Co.	Thomas C. Mielnik		
3	Mississippi Power	Jeff Franklin	Affirmative	
3	Modesto Irrigation District	Jack W Savage	Affirmative	
3	Municipal Electric Authority of Georgia	Steven M. Jackson	Affirmative	
3	Muscatine Power & Water	John S Bos	Negative	
3	Nebraska Public Power District	Tony Eddleman	Abstain	
3	New York Power Authority	Marilyn Brown		
3	Niagara Mohawk (National Grid Company)	Michael Schiavone		
3	Northern Indiana Public Service Co.	William SeDoris	Affirmative	
3	Ocala Electric Utility	David Anderson	Affirmative	
3	Orlando Utilities Commission	Ballard K Mutters	Abstain	
3	Owensboro Municipal Utilities	Thomas T Lyons	Abstain	
3	Pacific Gas and Electric Company	John H Hagen	Affirmative	
3	PacifiCorp	Dan Zollner	Abstain	
3	Platte River Power Authority	Terry L Baker	Abstain	
3	PNM Resources	Michael Mertz	Affirmative	
3	Potomac Electric Power Co.	Robert Reuter	Abstain	
3	Progress Energy Carolinas	Sam Waters		
3	Public Service Electric and Gas Co.	Jeffrey Mueller		
3	Public Utility District No. 1 of Clallam County	David Proebstel		
3	Puget Sound Energy, Inc.	Erin Apperson		
3	Sacramento Municipal Utility District	James Leigh-Kendall	Abstain	
3	Salt River Project	John T. Underhill	Affirmative	
3	Santee Cooper	James M Poston	Affirmative	

3	Seattle City Light	Dana Wheelock	Abstain	
3	Seminole Electric Cooperative, Inc.	James R Frauen	Affirmative	
3	Snohomish County PUD No. 1	Mark Oens	Abstain	
3	South Carolina Electric & Gas Co.	Hubert C Young	Affirmative	
3	Tacoma Public Utilities	Travis Metcalfe	Affirmative	
3	Tampa Electric Co.	Ronald L Donahey		
3	Tennessee Valley Authority	Ian S Grant	Abstain	
3	Tri-State G & T Association, Inc.	Janelle Marriott	Negative	
3	Westar Energy	Bo Jones	Affirmative	
3	Xcel Energy, Inc.	Michael Ibold	Abstain	
4	Alliant Energy Corp. Services, Inc.	Kenneth Goldsmith	Affirmative	
4	American Municipal Power	Kevin Koloini	Affirmative	
4	Blue Ridge Power Agency	Duane S Dahlquist	Affirmative	
4	City of Austin dba Austin Energy	Reza Ebrahimian	Affirmative	
4	City of Clewiston	Kevin McCarthy	Affirmative	
4	City of New Smyrna Beach Utilities Commission	Tim Beyrle		
4	City of Redding	Nicholas Zettel	Affirmative	
4	City Utilities of Springfield, Missouri	John Allen	Affirmative	
4	Consumers Energy	David Frank Ronk	Affirmative	
4	Detroit Edison Company	Daniel Herring	Affirmative	
4	Flathead Electric Cooperative	Russ Schneider		
4	Florida Municipal Power Agency	Frank Gaffney	Affirmative	
4	Fort Pierce Utilities Authority	Thomas Richards		
4	Georgia System Operations Corporation	Guy Andrews	Abstain	
4	Imperial Irrigation District	Diana U Torres		
4	Madison Gas and Electric Co.	Joseph DePoorter	Abstain	
4	Northern California Power Agency	Tracy R Bibb		
4	Ohio Edison Company	Douglas Hohlbaugh	Abstain	
4	Public Utility District No. 1 of Douglas County	Henry E. LuBean	Affirmative	
4	Public Utility District No. 1 of Snohomish County	John D Martinsen	Abstain	
4	Sacramento Municipal Utility District	Mike Ramirez	Abstain	
4	Seattle City Light	Hao Li	Abstain	
4	South Mississippi Electric Power Association	Steven McElhaney		
4	Tacoma Public Utilities	Keith Morisette	Affirmative	
4	Wisconsin Energy Corp.	Anthony Jankowski	Affirmative	
5	AEP Service Corp.	Brock Ondayko	Negative	
5	AES Corporation	Leo Bernier	Affirmative	
5	Amerenue	Sam Dwyer	Abstain	
5	Arizona Public Service Co.	Edward Cambridge	Negative	
5	Avista Corp.	Edward F. Groce	Negative	
5	BC Hydro and Power Authority	Clement Ma	Abstain	
5	Black Hills Corp	George Tatar	Affirmative	
5	Boise-Kuna Irrigation District/dba Lucky peak power plant project	Mike D Kukla	Abstain	

5	Bonneville Power Administration	Francis J. Halpin	Negative	
5	BrightSource Energy, Inc.	Chifong Thomas	Affirmative	
5	City of Austin dba Austin Energy	Jeanie Doty	Affirmative	
5	City of Redding	Paul A. Cummings	Affirmative	
5	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Max Emrick	Affirmative	
5	City Water, Light & Power of Springfield	Steve Rose		
5	Colorado Springs Utilities	Jennifer Eckels	Affirmative	
5	Consolidated Edison Co. of New York	Wilket (Jack) Ng	Negative	
5	Consumers Energy Company	David C Greyerbiehl	Affirmative	
5	CPS Energy	Robert Stevens		
5	Detroit Edison Company	Christy Wicke	Affirmative	
5	Dominion Resources, Inc.	Mike Garton	Abstain	
5	Duke Energy	Dale Q Goodwine	Affirmative	
5	Edison Mission Energy	Ellen Oswald		
5	Electric Power Supply Association	John R Cashin		
5	FirstEnergy Solutions	Kenneth Dresner	Abstain	
5	Florida Municipal Power Agency	David Schumann	Affirmative	
5	Great River Energy	Preston L Walsh	Affirmative	
5	Green Country Energy	Greg Froehling		
5	Indeck Energy Services, Inc.	Rex A Roehl		
5	JEA	John J Babik	Negative	
5	Kissimmee Utility Authority	Mike Blough	Affirmative	
5	Lakeland Electric	James M Howard	Affirmative	
5	Liberty Electric Power LLC	Daniel Duff		
5	Lincoln Electric System	Dennis Florom	Affirmative	
5	Los Angeles Department of Water & Power	Kenneth Silver	Affirmative	
5	Luminant Generation Company LLC	Mike Laney	Affirmative	
5	Manitoba Hydro	S N Fernando	Affirmative	
5	Massachusetts Municipal Wholesale Electric Company	David Gordon	Abstain	
5	MEAG Power	Steven Grego	Affirmative	
5	MidAmerican Energy Co.	Christopher Schneider		
5	Muscatine Power & Water	Mike Avesing	Negative	
5	Nebraska Public Power District	Don Schmit	Abstain	
5	New York Power Authority	Gerald Mannarino		
5	NextEra Energy	Allen D Schriver	Negative	
5	Northern California Power Agency	Hari Modi		
5	Northern Indiana Public Service Co.	William O. Thompson	Affirmative	
5	Omaha Public Power District	Mahmood Z. Safi	Affirmative	
5	Orlando Utilities Commission	Richard K Kinas	Affirmative	
5	Pacific Gas and Electric Company	Richard J. Padilla	Affirmative	
5	PacifiCorp	Sandra L. Shaffer		
5	Platte River Power Authority	Roland Thiel	Abstain	
5	Portland General Electric Co.	Gary L Tingley		
5	PPL Generation LLC	Annette M Bannon	Negative	

5	Progress Energy Carolinas	Wayne Lewis		
5	PSEG Fossil LLC	Tim Kucey	Abstain	
5	Public Utility District No. 1 of Lewis County	Steven Grega	Abstain	
5	Puget Sound Energy, Inc.	Tom Flynn		
5	Sacramento Municipal Utility District	Bethany Hunter	Abstain	
5	Salt River Project	William Alkema	Affirmative	
5	Santee Cooper	Lewis P Pierce	Affirmative	
5	Seattle City Light	Michael J. Haynes	Abstain	
5	Seminole Electric Cooperative, Inc.	Brenda K. Atkins	Affirmative	
5	Siemens PTI	Edwin Cano		
5	Snohomish County PUD No. 1	Sam Nietfeld	Abstain	
5	Southern California Edison Co.	Denise Yaffe		
5	Southern Company Generation	William D Shultz	Affirmative	
5	Tampa Electric Co.	RJames Rocha	Affirmative	
5	Tenaska, Inc.	Scott M. Helyer	Abstain	
5	Tennessee Valley Authority	David Thompson	Abstain	
5	Tri-State G & T Association, Inc.	Barry Ingold		
5	U.S. Army Corps of Engineers	Melissa Kurtz		
5	Xcel Energy, Inc.	Liam Noailles		
6	ACES Power Marketing	Jason L Marshall	Abstain	
6	AEP Marketing	Edward P. Cox	Negative	
6	Ameren Energy Marketing Co.	Jennifer Richardson	Abstain	
6	APS	Randy A. Young	Negative	
6	Bonneville Power Administration	Brenda S. Anderson	Negative	
6	City of Redding	Marvin Briggs	Affirmative	
6	Cleco Power LLC	Robert Hirchak	Negative	
6	Colorado Springs Utilities	Lisa C Rosintoski		
6	Consolidated Edison Co. of New York	Nickesha P Carrol	Negative	
6	Constellation Energy Commodities Group	Brenda Powell		
6	Dominion Resources, Inc.	Louis S. Slade	Abstain	
6	Duke Energy Carolina	Walter Yeager		
6	Entergy Services, Inc.	Terri F Benoit		
6	FirstEnergy Solutions	Kevin Querry	Abstain	
6	Florida Municipal Power Agency	Richard L. Montgomery	Affirmative	
6	Florida Municipal Power Pool	Thomas Washburn	Affirmative	
6	Florida Power & Light Co.	Silvia P. Mitchell	Negative	
6	Imperial Irrigation District	Cathy Bretz		
6	Kansas City Power & Light Co.	Jessica L Klinghoffer	Negative	
6	Lakeland Electric	Paul Shipps	Affirmative	
6	Lincoln Electric System	Eric Ruskamp	Affirmative	
6	Los Angeles Department of Water & Power	Brad Packer	Affirmative	
6	Luminant Energy	Brad Jones	Affirmative	
6	Manitoba Hydro	Daniel Prowse	Affirmative	
6	MidAmerican Energy Co.	Dennis Kimm		
6	Northern Indiana Public Service Co.	Joseph O'Brien	Affirmative	

6	Omaha Public Power District	David Ried	Affirmative	
6	Orlando Utilities Commission	Claston Augustus Sunanon	Affirmative	
6	PacifiCorp	Scott L Smith	Abstain	
6	Platte River Power Authority	Carol Ballantine	Abstain	
6	PPL EnergyPlus LLC	Mark A Heimbach		
6	Progress Energy	John T Sturgeon		
6	PSEG Energy Resources & Trade LLC	Peter Dolan	Abstain	
6	Public Utility District No. 1 of Chelan County	Hugh A. Owen		
6	Sacramento Municipal Utility District	Diane Enderby	Abstain	
6	Salt River Project	Steven J Hulet	Affirmative	
6	Santee Cooper	Michael Brown	Affirmative	
6	Seattle City Light	Dennis Sismaet	Abstain	
6	Seminole Electric Cooperative, Inc.	Trudy S. Novak		
6	Snohomish County PUD No. 1	William T Moojen		
6	South California Edison Company	Lujuanna Medina	Affirmative	
6	Southern Company Generation and Energy Marketing	John J. Ciza	Affirmative	
6	Tacoma Public Utilities	Michael C Hill	Affirmative	
6	Tampa Electric Co.	Benjamin F Smith II		
6	Tennessee Valley Authority	Marjorie S. Parsons	Abstain	
6	Westar Energy	Grant L Wilkerson		
6	Western Area Power Administration - UGP Marketing	Peter H Kinney	Affirmative	
6	Xcel Energy, Inc.	David F. Lemmons		
8		Roger C Zaklukiewicz	Affirmative	
8		Edward C Stein	Affirmative	
8		James A Maenner	Abstain	
8	Energy Mark, Inc.	Howard F. Illian	Affirmative	
8	JDRJC Associates	Jim Cyrulewski	Affirmative	
8	Power Energy Group LLC	Peggy Abbadini		
8	Utility Services, Inc.	Brian Evans-Mongeon	Abstain	
8	Volkmann Consulting, Inc.	Terry Volkmann	Affirmative	
9	California Energy Commission	William M Chamberlain		
9	Commonwealth of Massachusetts Department of Public Utilities	Donald Nelson		
10	Florida Reliability Coordinating Council	Linda Campbell	Abstain	
10	Midwest Reliability Organization	James D Burley	Affirmative	
10	New York State Reliability Council	Alan Adamson	Affirmative	
10	Northeast Power Coordinating Council	Guy V. Zito	Affirmative	
10	ReliabilityFirst Corporation	Anthony E Jablonski	Affirmative	
10	SERC Reliability Corporation	Carter B. Edge	Abstain	
10	Southwest Power Pool RE	Emily Pennel	Abstain	
10	Texas Reliability Entity, Inc.	Donald G Jones	Abstain	
10	Western Electricity Coordinating Council	Steven L. Rueckert	Abstain	

Name (33 Responses)
Organization (33 Responses)
Group Name (17 Responses)
Lead Contact (17 Responses)
Contact Organization (17 Responses)
IF YOU WISH TO EXPRESS SUPPORT FOR ANOTHER ENTITY'S COMMENTS WITHOUT ENTERING ANY ADDITIONAL COMMENTS, YOU MAY DO SO HERE. (8 Responses)
Comments (50 Responses)
Question 1 (32 Responses)
Question 1 Comments (42 Responses)
Question 2 (31 Responses)
Question 2 Comments (42 Responses)
Question 3 (27 Responses)
Question 3 Comments (42 Responses)
Question 4 (34 Responses)
Question 4 Comments (42 Responses)
Question 5 (23 Responses)
Question 5 Comments (42 Responses)
Question 6 (24 Responses)
Question 6 Comments (42 Responses)
Question 7 (25 Responses)
Question 7 Comments (42 Responses)
Question 8 (24 Responses)
Question 8 Comments (42 Responses)
Question 9 (0 Responses)
Question 9 Comments (42 Responses)

Individual
Richard Vine
California Independent System Operator
Yes
Yes
Yes
Yes
Yes
Yes
Yes
Yes
The ISO supports the development of BAL-003-1 and would like to offer the following comments/suggestions: (1) Some BAs may have to develop a new Ancillary Service product to ensure that its FRO can be met and believes that 12 months after FERC's approval may not provide adequate time to stakeholder and modify market software applications. The ISO suggest increasing the implementation timeline by at least one more year. (2) If the implementation timeline cannot be changed, then the ISO suggests that compliance should be waived for the first year of operation

under BAL-003-1. (3) Some BAs may elect to procure a portion of its FRO through bilateral agreements for certain hours (e.g. off-peak) with a neighboring BA. Since a contingency could be in a BA other than the two BAs under a bilateral agreement, the standard or background document needs to clarify the duration of frequency response so that transmission reservation is not a requirement for frequency response. The ISO believes that the BA experiencing the contingency should have adequate arrangements in place to deal with internal contingencies.
Group
Northeast Power Coordinating Council
Guy Zito
Northeast Power Coordinating Council
Yes
Yes
No
If a BA is using a frequency bias setting and is not providing Overlap Regulation Service (supplying actual interchange, frequency response, and schedules to another BA), then it can be assumed that the BA is supplying regulation service. Was the intent of the requirement to simply state that all BA's must have a bias setting less than zero at all times? The intent of this requirement needs to be clarified.
No
This document lacks definitions of terms such as CCadj, DFcc, DFcbr, resource contingency criteria (in the attachment, this is called the "target contingency criteria"), etc. A sample calculation would be of value to entities. "The largest category C (N-2) event is used for all interconnections except the Eastern which uses the largest event in the last 10 years". All interconnections should be using the same design basis contingency. The NERC 2012 CPS2 bounds has an Eastern Interconnection frequency bias of -6,360 MW/.1Hz. Why does this attachment refer to an Interconnection frequency response obligation of -1,002MW/.1Hz.? This is a significant difference.
No
While the discussion of primary frequency response includes inertial energy, the term inertial energy is missing from the definition of "primary frequency response".
No
The purpose of BAL-003 was to calculate frequency bias in the ACE equation used in BAL-001. The Standard is currently confusing to understand, and it is unclear how the bias is calculated. It is recommended that efforts should be made to clarify the changes, especially in Attachment A.
The VSL's refer to the FRM (Frequency Response Measure). If that is the intent of the Standard, then GO's and GOP's should be included in the applicability since they are the entities responding to the AGC signals. If the intent is the FRO (Frequency Response Obligation) only, then the VSL's should be updated.
Individual
Howard F. Illian
Energy Mark, Inc.
Yes
Yes
Yes

Yes
Yes
Yes
Yes
Yes
Although I am in favor of using linear regression to determine the FRM, the standard using Median is better than not having a standard.
Group
Edison Electric Institute
Mark Gray
Edision Electric Institute (Trade Association)
Yes
No
EEI does not fully agree with the definition of a “Frequency Response Sharing Group” (FRSG). In the definition offered in the new Standard, it states that the FRSG “collectively maintain, allocate, and supply operating resources”. Of the three roles, a balancing authority only maintains load-interchange-generation balance through the allocation of resources. Therefore, EEI suggests that the definition be changed to more appropriately align with the role of a BA, which we believe would be to allocate resources in a manner that effectively allows the sharing of resources necessary to achieve a FRO within the defined sharing group, which might otherwise not be possible or practical by a BA on its own.
Yes
Yes
Yes
EEI supports the ERO’s role as defined in the procedure but is concerned that the procedure, unlike approved NERC standards, is unbounded by the current rules for developing standards. For that reason, EEI recommends that the procedure become more formalized and integrated into the standard as an addendum thereby avoiding any Industry concerns that future modification might occur outside the approved processes
Yes
EEI finds the method to be acceptable but as mentioned in our response to question No. 5 (above), we believe that the procedure should be more formally documented as an addendum. Such a change would ensure that the document would remain unchanged outside of the approved standards making process. Additionally, EEI does not support using 4500 MW loss as the basis for determining the FRO for the Eastern Interconnection for future events. However, as the calculation also includes 59.5 Hz as the basis for determining the FRO, the results is an allocation which we believe is acceptable. In the future, should the SDT decide to use 59.7 Hz as the basis for the FRO, than it will need to follow a methodology similar to the other interconnections for determining the credible multiple contingency to cover.
Yes
Yes

EEI supports the efforts and improvements made by the Standards Drafting Team (SDT) in the latest version of BAL-003 and believe those changes have been responsive to the directives in Order 693. However, we recognizes that the Industry has struggled with this standard and remains split as to how best to respond to those directives and in some cases there are those who question whether a standard is even necessary. Given the many open issues and the concerns expressed by stakeholders we anticipate that this standard will once again fail to achieve sufficient support to gain approval. Should the Standard fail to achieve ballet approval, it is our hope that NERC Staff and the NERC Board of Trustees will allow the SDT a little more time to resolve any final issues that have been identified in this latest ballet. Although we recognize that May 31, 2013 does not leave the ERO with a lot of time to comply with this FERC imposed deadline, we still remain confident that given the progress made by the SDT a standard, which is acceptable to the Industry, is still possible. To the extent EEI can help, we are committed to working with member companies to communicate the issues and exchange insights from the SDT to help as we can to achieve a positive outcome.
Individual
Thad Ness
American Electric Power
As provided in question 2 below, AEP does not agree with the definition containing the Frequency Response Sharing Group as this function does not exist at this point in time.
No
AEP does not necessarily disagree with the words of the definition. However, AEP does not believe it is appropriate to define a new function that is not in the NERC Rules of Procedure, NERC Statement of Registry Criteria, or the NERC Functional Model. It is premature to incorporate this entity without a proposed change to these governing NERC documents.
No
AEP believes this question in the comment form is incorrect. It appears that R3 and R4 are inadvertenly merged together.
No
AEP is under the impression that there are some requirements, which though not explicitly stated, are implied in Attachment A. AEP feels strongly that these “sub-requirements” should be clarified and contained within the body of the requirements of the standard.
There is no leverage for the BA to require the generator to carry their burden of addressing governor settings or droop settings, yet the BA is obligated to meet some performance measures in that regard. This revision adds new performance measure responsibilities on the BA who likely has no direct control over every resource affecting their performance within their footprint. We are not necessarily challenging the performance measures themselves, nor their underlying objectives, however AEP views this as a gap in responsibilities which potentially effects reliability. AEP suggests that GOPs be considered as part of this standard so that their performance can be factored into the process to meet the performance objectives.
Group
NREL Transmission and Grid Integration Group
Erik Ela
National Renewable Energy Laboratory
Yes
Yes
Yes

Yes
Table 1: CB_r units should be unitless, CB'adj should be Hz.
Yes
Yes
Yes
Yes
We commend the drafting team for a rigorous approach to this new and important standard. Being observers who have a strong interest in this standard as it applies to much of the research that we do, but not stakeholders of the ultimate standard, we submit our overall comments as recommendations here. We believe there are a few potential issues, that may at least need more thought before going forward. The first is the credit for LR. (1) Overfrequency can be an issue: using ERCOT as an example, with -282 MW/0.1Hz response and 1400 MW of LR all responsive at 59.7 Hz, if just meeting FRO requirements, the 1400MW LR can all be triggered with a loss of (282*3=) 846MW, causing (1400-846=)554MW of overgeneration. This can be exacerbated by further increases of LR without recognition of the triggering frequency, and the disconnect between BA and interconnection in the other interconnections. (2) With crediting LR toward the Interconnection, it will not give incentive toward BAs to provide it. We believe the LR should contribute to the BA FRO rather than discount the IFRO. (3) There is no requirement for frequency response capacity (ie MW) available to provide the FR. This is a nonissue in today's world with the amount of spinning reserve already available, but the issue could be apparent on future systems with increased reserve sharing, or reserve capacity from resources that operate in modes which do not provide frequency response. The European Interconnection requirement has two intentions: a 3,000 MW capacity requirement and a 1,500 MW/0.1Hz FRO requirement that is allocated out to its Transmission System Operators. This could solve the issue with LR and generators, where LR is in MW and generation governing is in MW/0.1Hz. (4) It is likely, and from our understanding is true in some areas like ERCOT, that the LR is selected based on market solutions, and may not be available all times of the year. This is another reason why the LR should contribute to the BA FRO rather than discount the IFRO. (5) It may be beneficial to guide frequency settings for LR or even multiple settings to mimic a droop curve for LR. Other potential issues not related to the LR. We think the SDT has done an outstanding job on reviewing the data sets and determining statistically based values to better account for different factors that may affect minimum frequency levels. We agree that there are current issues in the primary governing response, but that there may be a disconnect in fixing those issues with the static values. We also agree that there is not an easy solution. In specific: (6) The static CB ratio might not incentivize BAs to improve response with increased inertia or faster responding governing response. (7) The static withdrawal BC'adj may not incentivize BAs to improve their governing response and limit their withdrawal. Improved technology may allow for better measurement to account for these issues dynamically rather than using static numbers. Guidance on increasing inertia, increasing governing speed, and reducing withdrawal should be considered by stakeholders. We thank NERC and the SDT for the opportunity to provide comments on this important standard.
Individual
Jonathan Appelbaum
The United Illuminating Company

UI believes the VRF should be High. The VRF justification for Medium is that the prior year's bias setting would exist in the control system so the impact would not cause a Cascade. UI thinks that is an adjustment factor that is applied after non-compliance is determined. Not having settings is likely to cause cascade so the VRF is High.
Group
Arizona Public Service Company
Janet Smith, Regulatory Affairs Supervisor
Arizona Public Service Company
Yes
Yes
No
The supporting document on the standards page does not provide information on CB Ratio and why it is used. It significantly increases FRO and should be justified based upon strong technical basis and actual experience. (Please also see AZPS response to question 6, The Frequency Response Initiative Report should be on the Standards page).
NO: 1. The Frequency Response initiative report should be added to the standard as an appendix. It is not clear where to find this report. 2. The jusitification for dividing delta frequency with C to B ratio is not adequate and not clear.
NO: 1. Either do not use C to B Ratio or provide adequate rational for using it. It appears to make FRO unnecessarily too conservative and is not justified based upon experience. 2. The VRF is too complicated and hard to understand. It must be either simplified or should be followed by example. 3. The Frequency Response Obligation Methodology on Page 7 of "Procedure" does not show any formula (it is blank).
As mentioned in Item 8 above, the VRF language is too complicated and hard to follow. Even though the VRF poll is non binding, it needs to be clear and simple enough to be understood.
Individual
Travis Metcalfe
Tacoma Power
Yes
Yes
Yes
Yes
The addition to the Frequency Bias Setting definition of "and discourage response withdrawal through secondary control systems" seems incomplete. Tacoma Power does not see anything in the standard

that addresses (or measures) how a frequency bias setting will discourage response withdrawal through secondary systems. This should either be more fully addressed or removed.
Individual
Nazra Gladu
Manitoba Hydro
Yes
No comment.
Yes
No comment.
Yes
No comment.
Yes
(1) Page 2, Balancing Authority Frequency Response Obligation (FRO) and Frequency Bias Setting: States that the ERO is responsible for “annually assigning an FRO and Frequency Bias Setting to each BA.” No mention is made of FRSGs. (2) Neither R1 nor the referenced Attachment A clarifies the FRM requirements for an FRSG to comply versus a BA. In particular, compared to BAL-002-0 R1.1, which clearly states that the BA may elect to fulfill its obligation through an FRSG and that in such cases the FRSG has the same responsibilities as each BA (that is a participant in the FRSG). (3)Attachment A refers to an FRSG calculating FRM, but the standard does not.
Yes
No comment.
Yes
No comment.
Yes
No comment.
Yes
No comment.
Purpose: Is the reference to ‘Interconnection Frequency’ supposed to be ‘Frequency Response’? This would be consistent with later wording in the standard. R1: (1) The acronym ‘FRO’ is used inconsistently within the document. (2) The phrase “to ensure that sufficient Frequency Response …” should be separated from the requirement as it is (i) not descriptive of the required actions; (ii) redundant with the stated purpose at the beginning of the standard. In general, such a drafting technique should be avoided as it may allow Responsible Entities to argue that a violation has not occurred where the specific action that is described has not been taken, but the purpose referenced in the requirement has been met. M1: The reference to ‘documented formula’ is not clear. Does this imply that the FRSG or BA have a record of their calculation? In addition, there is a typo, a random ‘)’ after FRM. M2: Should include the words ‘and uses a fixed Frequency Bias Setting…’ after overlap Regulation Service to make the wording consistent within the Requirement. M3: The wording of this measure switches tenses between ‘is’ and ‘was’. For consistency, we suggest that this be corrected. NERC Glossary definition of an FRSG is a group of BAs that collectively maintain, allocate and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members. No mention is made of the agreement including the sharing or delegation of responsibility related to FRM. Accordingly, the standard should only reference a BA being able to delegate responsibility to an FRSG if the RSG Agreement allows for such delegation. Data Retention 1.3.: (1) As the standard is currently drafted, both the BA and the FRSG would be required to retain data or evidence to show compliance with requirements R1 and M1. It is unclear whether this is the intention, or whether it would be acceptable that just one or the other would maintain such records. (2) In the third paragraph, it should be clarified who is required to keep information related to non compliance if the BA belongs to an FRSG – the BA or the FRSG or both.
Individual
Alice Ireland
Xcel Energy

Yes
Yes
Yes
It is not clear however, as to if this is actually part of the standard or if it is a document that can be revised without going through the standards development process. Also, the formatting of the doucment should be modified to clearly identify where 'steps/actions' are needed from repsonsible parties, whether that be the ERO or BA/FRSG.
YES. It is not clear however, as to if this is actually part of the standard or if it is a document that can be revised without going through the standards development process. Also, the formatting of the doucment should be modified to clearly identify where 'steps/actions' are needed from repsonsible parties, whether that be the ERO or BA/FRSG.
Xcel Energy supports this proposed revision to the standard as a first step and suggests that after operating for a couple of years under the revised standard, that NERC initiates a more complete study to support any modifications to the standard.
Group
MRO NSRF
WILL SMITH
MIDWEST RELIABILITY ORGANIZATION
Yes
Yes
No
The MRO NSRF is concerned with the drafting team's exclusion of single Balancing Authority Interconnections from compliance with Requirement R3. To ensure a consistent approach in the application of the standard, recommend R3 be revised as follows: (R3). Each Balancing Authority that is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is: …
Yes
MRO NSRF AGREES
MRO NSRF AGREES
MRO NSRF AGREES
The MRO NSRF is concerned with the drafting team's exclusion of single Balancing Authority Interconnections from compliance with Requirement R2. To ensure a consistent approach in the application of BAL-003-1, recommend R2 be revised as follows: (R2). Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation …
Group
pacificorp

ryan millard
pacificorp
Yes
Yes
Yes
Yes
Yes
Yes
Yes
Yes
Group
Bonneville Power Administration
Chris Higgins
Transmission Reliability Program
Yes
Yes
Yes
BPA is responding to 3.1 and 3.2 of R3. The bullets listed in question 3 on the original comment form appear to be for Requirement R4. BPA is in support of R3.1 and R3.2.
No
BPA does not agree with the methodology in Attachment A. Please see BPA's response to question 6 as well as BPA's extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found at: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf.
No
BPA does not agree with the methodologies outlined in Attachment B. Please see BPA's response to question 6 as well as BPA's extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found at: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf
No
BPA does not have specific changes to the methodology to suggest, however, a methodology that arrives at a negative 840 MW per tenth Hz for WECC is obviously under-calculating the frequency bias obligation. Currently WECC has an interconnection bias of over 2000 MW / 0.1Hz and with this bias the frequency is steady state following point B on the frequency response curve. BPA would expect to see frequency decline after point B if the FBO is lowered by almost 60%. BPA also must reiterate that there is still a problem with the method used for modifying the FBO and frequency bias for Balancing Authorities. A high-performing Balancing Authority will have its frequency bias increased each year due to higher response during the events chosen by the ERO. Conversely, a low-performing Balancing Authority will have its frequency bias reduced each year due to lower response during the events

chosen by the ERO.
No
BPA continues to fundamentally disagree with the approach that BAL-003-1 is developing into. Please reference BPA's extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found at: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf.
No
BPA continues to fundamentally disagree with the approach that BAL-003-1 is developing into. Please reference BPA's extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found at: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf.
Individual
Shammara Hasty
Southern Company (Alabama Power Company, Georgia Power Company, Gulf Power Company, Mississippi Power Company, Southern Company Services,Inc., Southern Company Generation, Southern Company Energy Market)
Yes
Yes
Yes
Yes
No
Attachment A states that Form 1 is posted annually. The ERO support document selects events annually. The timing for the two documents needs to be aligned so that the set of selected events does not change from quarter to quarter. (If three events are selected for the first quarter those same events will be a sub-set of the 20 events selected for the annual compliance calculations.)
No
The industry needs some assurance that the calculation of the Interconnection FRO described in the report cannot be changed outside of the Standards Process for approval by the industry. We do not support using a 4500 MW loss as the basis for determining the FRO for the Eastern Interconnection for future events. However, as the calculation also includes 59.5 Hz as the basis for determining the FRO, the result is an allocation which can be supported. To the extent that the standard drafting team moves in the direction of using 59.7 Hz as the basis for the FRO, then it needs to follow a methodology similar to the other Interconnections for determining the credible multiple contingency to cover.
Yes
Yes
Please refer to comments for question 9.
The organization selecting events must ensure that the change in frequency is outside the normal dead-band of generator governors. Many of the events selected in the past have not been outside the dead-band and therefore, the frequency response was much less than expected. Southern Company proposes .07 which is consistant with WECC.
Individual
Greg Travis
Idaho Power Company
Yes

Yes
Yes
Yes
Yes
Yes
Yes
Individual
John Seelke
Public Service Enterprise Group
PSEG entities will vote “Negative” on the standard until this Project 2007-12 achieves the following: 1. It coordinates with Project 2010-14.1 Phase 1 of Balancing Authority Reliability-based Controls Reserves, specifically BAL-012-1, regarding (a) definitions and (b) requirements that address frequency response in both standards. a. Definitions that need to be coordinated: BAL-003-2 – “Frequency Response Obligation” and BAL-012-1 – “Frequency Responsive Reserve.” b. Requirements that need to be coordinated: i. BAL-003-1, per R1, states “Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation.” ii. BAL-012 requires BAs to have sufficient Frequency Responsive Reserves per R6, which requires BAs to “assess, on at least an hourly basis, that it has sufficient Regulating Reserve, Contingency Reserve, and Frequency Responsive Reserve to meet its reserve plan(s) to ensure reliable operation of the Bulk Electric System.” For Frequency Responsive Reserves, R3 in BAL-012-1 requires BAs to develop an annual plan for these reserves. BAs should not be subject to duplicative requirements for frequency response requirements in different standards that are underdevelopment. Only one standard needs to define the frequency response requirements for BAs (we suggest that be BAL-003-1), although other standards, such as BAL-012-1, may reference that obligation. However, this decision should be made by consensus between the two SDTs. 2. It coordinates with Project 2010-14.1 Phase 1 of Balancing Authority Reliability-based Controls Reserves, specifically BAL-012-1, to develop an application guide that would be attached to one of the standards and that could be referenced by each standard. The application guide would include: a. A hypothetical implementation plan for a BA that demonstrates how the BA may meet its Frequency Response Obligation or Frequency Responsive Reserve prior to an event. This is a technical issue and should not be confused with the institutional issue in #3 below. b. An explanation of the relationship between Regulating Reserve, Contingency Reserve, and Frequency Responsive Reserve contained in

BAL-012-1 so that potential double counting (and whether that is proper of improper), is addressed. 3. Project 2007-12's "Frequency Response Standard Background Document" dated October, 2012 lists several methods of obtaining Frequency Response. Most of those are extracted below. We have provided questions and commentary that we ask the team to address. a. "Regulation services." This is addressed in BAL-001-0.1a. The purpose of this standard is "To maintain Interconnection STEADY-STATE FREQUENCY within defined limits by balancing real power demand and supply in real-time. How is this related to Frequency Response for a disturbance? (The team may answer this as part of 2.b above.) b. "Through a tariff (e.g. Frequency Response and regulation service). " The team is advised to review the actual pro-forma OATT schedule for Schedule 3 "Regulation and Frequency Response Service" which is specifically limited to services providers that are "capable of providing this service as necessary to follow the moment-by-moment changes in load." Again, how is this related to Frequency Response for a disturbance? (The team may answer this as part of 2.b above.) c. "From generators through an interconnection agreement." The FERC's pro-forma Standard Large Generator Interconnection Agreement (LGIA) per Order 2003 contains no requirement for generators to provide Frequency Response service, and we are not aware on ANY interconnection agreement that does. We ask that the team point to ANY interconnection agreement with such a requirement. Modification of an interconnection agreement to incorporate such a requirement would require the consent of both parties. d. "Contract with an internal resource or loads." Since Frequency Response service would likely be considered as a necessary service to provide Transmission Service under an OATT, it would require a tariff. What existing tariff applies in the U.S.? The "methods" above that the team has listed have the factual errors described. The standard BAL-003-1 cannot be implemented until the necessary tariffs are developed that permit BAs and FRSGs to contract for Frequency Response services. Once that is done, BAL-003-1 can dictate the performance requirements of a BA or FRSG. • For context, FERC OATT schedules relevant to Frequency Response DO NOT set performance requirements. Schedule 3 (Regulation and Frequency Response Service) sets forth a tariff for the service, while BAL-001-0.1a sets forth performance requirements in aggregate for a BA or RSG. Likewise, Schedule 5 (Operating Reserve - Spinning Reserve Service) and Schedule 6 (Operating Reserve - Supplemental Reserve Service) set tariffs for both services, while BAL-002-1 sets performance requirement. Without an OATT schedule for Frequency Response service, BAs and FRSGs will have no means to contract with generators or loads to provide Frequency Response per BAL-003-1. The team should address this concern.
Individual
Michael Falvo
Independent Electricity System Operator
Yes
Not Applicable
Not Applicable
No
As indicated in our previous comments, the status of Attachment A is unclear. It is a mixture of requirements, criteria, process and guideline. Making a direct reference in the standard's requirements (R1 and R2) makes Attachment A as part of the requirement and hence is enforceable, but it contains process and guideline information that is not subject to assessment. On the other hand, the absence of a Measure to assess adherence to the criteria and process suggests that Attachment A is not enforceable. It is this ambiguity that makes it difficult for the industry to assess the extent to which they must follow the process. Again, we urge the SDT to keep only the criteria/process parts that must be adhered to in Attachment A, and extract the remaining parts and place them in a guideline document, or an appendix. In addition, the Responsible Entities are required to submit Form 1 and Form 2, but such requirements are not written explicitly as "shall", and are imbedded in the Attachement whose mandatory status is unclear. This makes the standard very confusing from an Responsible Entity's obligation and compliance perspective.
Yes

Yes
No
a. We do not support R2 as drafted, specifically the phrase “until directed to change by the ERO”. We do not agree that the ERO has any authority to “direct” a BA or FRSG, or any responsible entities, to make changes to the Frequency Bias Setting or take any operating or operations planning actions. We suggest to replace the word “directed” with “requested”. b. In R2, the words “subject to” can be interpreted differently. We suggest to replace them with “in accordance with” to parallel the intent as conveyed in R1. c. We are still concerned with the status of Attachment A, as indicated in our comments submitted under Q4 – that it is unclear if the materials in Attachment A must be adhered to or not. A standard should not have an attachment whose enforcement status is unclear as part of a requirement. d. FRS Forms 1 and 2 are referenced in Attachment 1, which itself has an unclear status on measurability and enforceability. It is also unclear if FRS Forms 1 and 2 must be used to submit the requested data. Collectively, Attachment 1, FRS Form 1 and Form 2 make the standard very confusing as to which parts must be complied with. Much better clarity is needed to clearly convey the standard ‘s requirements that are measurable, enforceable and must be complied with.
The proposed effective date for this standard conflicts with Ontario regulatory practice respecting the effective date of implementing approved standards. It is suggested that this conflict be removed by appending to each of Section A1.3 and A1.4, after “months after applicable regulatory approval”, of the standard to the following effect: “, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities.” The same change should be made to the two bullets in the proposed Implementation Plan.
Individual
Brian J Murphy
NextEra Energy
Yes
NextEra Energy does not support the changes made. It is concerned that certian changes were made to help some large East coast entities that could not comply at the expense of the FRCC region. Specifically, now on page 3 of Attachment A 4th paragraph from the bottom the statement is made “ sets its frequency bias to the greater of”. We believe that this must be changed to either Statement 1 “ Any number the BA chooses between 100% etc” Or Statement 2 “ Interconnection minimum as determined by the ERO” Without this change, NextEra beleives the FRCC will be unfiarly treated relative to others on the Eastern Interconnection. The technical reasons for this is concern was explained during the Standard Drafting Team meetings. In addition, the ERO limit which is set at 0.9% of load should be changed to read within 0.8 or 0.9% of peak load based on the BA’s choice. Also, see page 7 of the Procedure document and compare to page 1 of Attachment A. The formulae abbreviations for the variables in the Procedure are not likewise abbreviated in Attachment A. For example, “Credit for LR” on Attachment A is “CLR” in the Procedure, but it requires cross checking each document to figure this out. Or CBr in Attachment A, Table 1 is represented as DFCBR in the Procedure, Page 7. Since the same variables are being described, these should be represented the same way in both documents throughout. 2. Similarly, is “IFRO” in Table 1 of Attachment A the same as “FROInt” of the equation that follows on page 2? The same abbreviation should be used to represent this variable. The documents should be revised in general along these lines for all terms. 3. In Procedure document, page 5, paragraph 3 it should read “Table 2”, not “1”. 4. In the Procedure, it would be good to show Table 1 and Table 2 as Table 1 of Attachment A (i.e. use table lines and borders). 5. At least in the first usage, ERO in the Procedure document should be spelled out as “Electric Reliability Organization (ERO)”. 6. In Table 1 of Attachment A, the two footnotes preceded by asterisks (single and double on page 2) should be connected to the table by adding a single superscripted asterisk to the Eastern UFLS value of 59.5, and a double superscripted asterisk to the ERCOT LR value of 1,400.

Individual
Don Jones
Texas Reliability Entity
Yes
Yes
Yes
It appears that R3.2 is based on the assumption that governor dead-band settings are 0.036 Hz for all interconnections with multiple BAs. While the ERCOT region has a standard 0.036 Hz dead-band specified in the ERCOT Protocols and Operating Guides, we are not sure if this is applicable to the other regions.
Yes
1. The calculation for the FRO for ERCOT includes a credit of 1400 MW for load resources. 1400 MW is currently the maximum amount of LR that can be procured through the ERCOT ancillary service process. There can be periods during the day where 1400 MW was not procured or is not available (It was noted during the summer of 2012 that on some days, only 900 MW of LR was available through the ancillary service process). Should the calculated IFRO (-286 MW per 0.1 Hz) be modified to account for this variation? 2. Background Document says: “Attachment A proposes the following Interconnection event criteria as a basis to determine an Interconnection’s Frequency Response Obligation: • Largest category C loss-of-resource (N-2) event • Largest total generating plant with common voltage switchyard • Largest loss of generation in the interconnection in the last 10 years” For ERCOT, the largest loss of generation in the last 10 years was over 3400 MW, and does not match the 2750 MW (N-2) value used for the IFRO calculation.
Yes
1. Event Selection Criteria Item 2: Should certain events require mandatory inclusion for FRM calculation (i.e. DCS events)? 2. Event Selection Criteria Item 6: We disagree with the way this is worded. If a unit trips during this time, as it often can, measured frequency response needs to occur. We understand that the results are impacted by the grid condition and perhaps that is why the SDT decided to exclude the issue. Need to define what is intended by a “large” interchange ramp schedule or load change. May also want to consider changing the language from “will be excluded from consideration” to “MAY be excluded from consideration”.
Yes
Yes
Group
MEAG Power
Scott Miller
MEAG Powqer
Agree
Southern Company Services, Inc - Gen
Group

PPL NERC Registered Affiliates
Brent Ingebrigtson
LG&E and KU Services
No
The PPL Affiliates support the comments of the SERC OC Standards Review Group on this question.
Yes
PPL Affiliates suggest additional detail be added to the definition to ensure the members of the FRSG are all within the same interconnection. The following definition includes the suggested changes: A group whose members consist of two or more Balancing Authorities all within a single interconnection that collectively operate resources required to jointly meet the sum of the Frequency Response Obligations of its members.
No
The NERC posting did not include a redline to Attachment A, therefore, it is not clear what modifications were made. However, there are several modifications that would add clarity to the attachment. The PPL Affiliates support the comments of the SERC OC Standards Review Group on this question, additionally, the following issues should be addressed: In Attachment A, page 3 and elsewhere, clarify that temporary or small transfers of load or generation between BAs do not require notification to the ERO or changes to the FBS or CPS limits. In Attachment A, page 4, a BA should be allowed to be exempt from evaluation any single frequency event where non-conforming load performs contrary to the performance of conventional load (ie. during a frequency decline, the non-conforming load simultaneously increases significantly). By nature, non-conforming load is totally unpredictable, changes quickly, and fluctuates widely. Other than interruption, the BA has no control over the actions of such loads nor can the BA predict or assume any “normal” action by a non-conforming load during a frequency disturbance event. Setting a limit on the number of events that a BA could exempt (regardless of the reason) from FR evaluation in any given year would be more fair and effective in evaluating a BA’s frequency response performance.
No
The PPL Affiliates support the comments of the SERC OC Standards Review Group on this question
Yes
The PPL Affiliates applaud the SDT for developing this technical justification document.
No
The PPL Affiliates are concerned that the document referred to “Attachment A” is directly referenced in the proposed standard’s requirements but not actually attached to the standard itself as Attachment A. Therefore, it is not clear how the proposed document could be modified in the future. Having such material incorporated into a standard takes away from the open and transparent stakeholder drive process.
Group
PJM Interconnection, LLC
Stephanie Monzon
PJM Interconnection
Yes
Yes
No
With what periodicity does a BA’s frequency bias setting have to change to be considered variable bias? For example, if a BA changes it’s frequency bias setting monthly based on a percentage of each

month's forecast or historic load, is this considered variable bias subject to compliance with R3 in lieu of R4?
No
The target contingency protection criterion for the Eastern Interconnection is the largest event in the last 10 years (believed to be a 2007 event) which is inconsistent with the other Interconnections. Is periodic review required for this criteria? Will this criteria be revised after the referenced event is older than 10 years? Are the other three interconnection's target contingency protection criteria subject to revision if they experience an event larger than a category C? This BA believes that future periodic analysis should be defined and subsequent findings used to support changes via the standard revision process. What are the procedural requirements for revising Attachment A? This BA is concerned that the procedure for revising Attachment A is undefined and that, for example, the IFRO could be increased absent the formal standard revision process, increasing a BA's FRO and subsequently increasing a BA's compliance risk without providing BA's the opportunity to review, comment, and ballot. Related to the previous comment/question, how often are the statistically derived values in Table 1 subject to a required update? For example, the Eastern Interconnection is adjusted due to observed primary frequency response withdrawal ('lazy L' characteristic). The other Interconnections are adjusted for observed differences between point C and point B. As the frequency response characteristics of any Interconnection change, is Table 1 subject to required analysis and revision? This BA believes that future periodic analysis should be defined and subsequent findings used to support changes via the standard revision process. Attachment A indicates that a BA may exclude an event from annual Form 1 FRM evaluation only if its tie-line or frequency data is corrupt or unavailable. This exempts numerous scenarios that could result in a poor response score due to system variations. These could include, but are not limited to, changing energy schedules, changes in load, and AGC driving units up or down due to the ACE value at the time of the frequency event. This subjects the BA to undue compliance risk even though the BA may have adequate frequency responsive resources at the time. This BA suggests that the FRSDT adopt language (and Form 2 functionality) that allows the exclusion of events that are skewed by these types of situations. Attachment A and Forms 1 & 2 specify that 20 to 52 seconds will be used as the post-event B point average for FRM determination. The number of fast responding resources will increase as the technology for batteries, flywheels, and frequency controlled demand side devices moves forward over time. The 20 to 52 second interval does not adequately incentivize the devopment of these technologies.
No
The Procedure indicates that events that occur when 'large interchange schedule ramping or load change is happening' and 'events occurring within 5 minutes of the top of the hour' should be excluded from consideration. Since interchange schedule ramping and load change occurs at the BA level, this BA believes that the Procedure allows for the selection of events that occur when a BA is experiencing these conditions but Attachment A does not allow for exemption of these events. Also, the Procedure specifies that events that occur at the top of the hour be excluded, if other qualifying events exist, but this does not take into consideration energy markets that allow for sub-hourly schedule changes (e.g. 15 minutes) and the BA is not permitted to exempt these events on Form 1 subjecting the BA to undue compliance risks.
Yes
Yes
No
See previous comments. Also, this standard should be applicable to GOP's as well as BA's with, at a minimum, the following requirements added: Each GOP shall follow all directives of it's Balancing Authority pertaining to frequency responsive operation, including but not limited to the status, droop & deadband settings of their governors. Each GOP shall provide to their BA the status and droop & deadband settings of their governors, and headroom available to respond to frequency deviations, as requested.
Group

Duke Energy
Greg Rowland
Duke Energy
No
The definition reads as if the FRM is the median of all of the observations reported by the Balancing Authorities and Frequency Response Sharing Groups. Duke Energy would suggest that the definition read, “The median of all of the Frequency Response observations reported annually by a Frequency Response Sharing Group, or Balancing Authority if not a participant in a Frequency Response Sharing Group, for frequency events specified by the ERO. The Frequency Response Measure is calculated as MW/0.1Hz.”
No
As a Balancing Authority may not be the entity maintaining or supplying resources, but would be responsible for utilizing applicable resources within its BA Area, Duke Energy would suggest the following definition, “A group whose members consist of two or more Balancing Authorities that collectively utilize operating resources required to achieve a group FRM equal to or more negative than the sum of the Frequency Response Obligations of its members.”
No
Duke Energy agrees with allowing single-BA Interconnections to utilize a variable Frequency Bias Setting (FBS). Duke Energy disagrees with NERC allowing Balancing Authorities in a multiple-BA Interconnection to change the ACE and bounds by which the Balancing Authorities are measured under BAL-001 and BAL-002 by operating to a variable FBS. It is desired that a Balancing Authority be capable of recognizing the amount of primary response available in real-time operation, such information can be included among other information in the generation control algorithm; however, the obligation to support the Interconnection frequency under the secondary control standards, and the amount provided for any given frequency, should be based on the same criteria across all Balancing Authorities of the same size. Nathan Cohn in his comments on Union Electric’s use of a variable FBS expressed similar concern regarding the equitable sharing of the obligation to support Interconnection frequency in a multiple-BA Interconnection. Take for example two Balancing Authorities with equal total generation and load, but one operating under a fixed FBS and the other operating under a variable FBS. To the extent that a Balancing Authority is not providing Frequency Response comparable to its fixed Frequency Bias Setting, its ACE will reflect the difference to be covered with secondary control and the Balancing Authority will be measured in a manner similar to other BAs of its “size” based upon the FBS. To the extent that the other BA using a variable FBS is not providing Frequency Response comparable to what it would be allocated using a fixed FBS, its ACE will not reflect the difference or any further obligation to support Interconnection frequency at that time with secondary control. Duke Energy’s concern regarding non-comparable treatment of all BAs is further amplified by the lack of scrutiny placed on the BA algorithm used to determine the real-time variable FBS, to ensure that compliance cannot be gamed by such use.
No
As indicated in our comments in the past, Duke Energy is certain that as the Interconnection Frequency Bias Setting (FBS) is set closer to the actual Frequency Response in a multi-BA Interconnection, most BAs will be challenged in meeting CPS2, while CPS1 and the proposed Balancing Authority ACE Limit (BAAL) will be more achieveable bounds, and in some cases CPS1 performance will improve. Though probably most of the BAs may welcome a FBS set as high in magnitude as allowed to address the potential compliance risk, there are some which may desire to set their FBS closer to their required minimum allocation rather than have to take on a larger obligation in frequency support under the secondary control measures. Duke Energy believes that this proposed standard should incent BAs to provide more than their share of Frequency Response to the Interconnection and allow that good performance to be recognized; however the requirements described in Attachment A for determining the minimum Frequency Bias Setting (FBS), which requires that the FBS be set no lower in magnitude than the FRM, will leave certain over-performing BAs with no choice but to reduce their actual Frequency Response (still well-above their FRO) if they want to operate with a FBS set closer to the Interconnection Minimum allocation and be relieved of the associated increased obligation for frequency support under the secondary control measures. The FBS is embedded within the secondary control measures of CPS1, CPS2 and the draft Balancing Authority

ACE Limit (BAAL). Comparable treatment of similarly-sized BAs (based upon the FRO allocation) is only possible if all BAs are provided the same minimum FBS requirement. To the extent that a BA provides more than its share of response to events, it's over-performance will only be recognized if its ACE is allowed to reflect a FBS comparable to its peers, allowing its over-performance to be reflected in ACE in support of bringing frequency closer to 60 Hz. Generation control algorithms implemented today to optimize CPS1 will allow non-zero ACE when in support Interconnection frequency within bounds determined by the BA – there should be no concern of "response withdrawal" with such algorithms in place, the BA will simply get credit for such performance. As depicted in the current document, the over-performing BA would be required to set its minimum FBS at its FRM (or greater in magnitude), taking away what should be considered over-performance, erasing it in ACE, and turning it into an obligation under the secondary control measures. Based upon the draft, the only way that the BA could be treated comparably to other similarly sized BAs held only to operating to the Interconnection Minimum allocation, would be to reduce its actual response in FRM to a value less in magnitude than its Interconnection Minimum allocation. Duke Energy believes that BAs should be incented to provide more than their share of Frequency Response, and be given the opportunity to report performance on a basis comparable to similar-sized BAs. Our opinion is that Attachment A ensures that the Interconnection Frequency Bias Setting will remain at some margin above the actual Interconnection Frequency Response in magnitude – the reliability of the Interconnection will not be at risk by allowing over-performing BAs to operate and report performance on a comparable basis to other similarly-sized BAs based upon the Interconnection Minimum allocation if they choose to do so – to that extent, Duke Energy suggests that the language on page 3 be changed to: "A BA using a fixed Frequency Bias Setting may set its Frequency Bias Setting to any number the BA chooses up to 125% of its Frequency Response Measure as calculated on FRS Form 1, but no less in magnitude than its Interconnection Minimum allocation as determined by the ERO." Regarding the argument which could be offered that a larger FBS in magnitude will also allow wider bounds for control performance, Duke Energy agrees that a large portion of the BA operation will be around 60 Hz where such a benefit could be realized, however it would also come at the cost of a larger obligation than other comparably-sized BAs in sustained support of frequency during the more critical times of significant deviation from 60 Hz where the BA's compliance could be at risk. Below 59.95 Hz in the Eastern Interconnection (the Frequency Trigger Limit under BAAL), the additional MWs needed to be compliant for any given frequency are greater than the MWs of imbalance allowed by the larger BAAL bound – comparably-sized BAs will not be comparably judged if the standard forces over-performing BAs to assume a larger FBS (in magnitude) than their peers – that should be the decision of the BA. We believe that the proposed language above will create the proper incentive for a Balancing Authority to provide more than its minimum allocation of Frequency Response, and allow it to choose if it wants to make that performance part of a larger FBS (in magnitude), knowing the associated risks and benefits of that decision. Duke Energy supports this standard allowing for Frequency Response Sharing Groups, however the requirements and supporting documents need to clearly allow the FRSG to be treated no differently than if it was a Balancing Authority and shield the participating BAs from compliance scrutiny when all scrutiny should be placed on the FRSG performance as a whole. At the top of Page 3, the standard attachment allows the FRSG to "calculate a group NIA and measure the group response to all events in the reporting year on a single FRS Form 1", however at the bottom of page 3, the standard attachment still requires the FRSG BAs to individually fill out Form 1 and Form 2 for the purposes of determining the minimum Frequency Bias Setting. Duke Energy believes that the standard language in Attachment A, and the supporting form(s), should allow the FRSG, if it chooses, to also report the split of the group FRM which the BAs will use to individually determine their Frequency Bias Setting, rather than require each BA in an FRSG to still maintain Form 1 and Form 2 data. Form 1 could be modified for the FRSG to report the group's FRM along with the split of the FRM among the members, and another form could be developed for each FRSG BA to fill out, replicating only the section of Form 1 (column S) where each BA could provide values for its FRM allocation, its desired FBS, its minimum FBS allocation, and so on.

No

Duke Energy agrees with allowing the ERO to perform this function, however the industry needs some assurance that this Procedure cannot be changed outside of the Standards Process for approval by the industry. In the sixth line of the third paragraph on page 5, the statement should reference Table 2. Page 5 reads as if the BAs will submit their data based upon Form 1 which includes an adjustment to the Interconnection peak load (initially 0.9), and then the ERO will determine whether the Interconnection minimum FBS is still more than 20% above the measured response – if so, the

minimum FBS will be adjusted, requiring the BAs to reassess their new minimum FBS based upon a different factor, and decide whether to use that value or choose a value up to 125% of their FRM, resulting in another iteration of values being submitted to the ERO. If the ERO is going to do an independent assessment of Interconnection Frequency Response to the events, on an annual basis prior to gathering data from the BAs, the ERO could compare the total FBS being used by the BAs against the estimated Frequency Response over that period to determine if an adjustment is warranted, and then the ERO could include the appropriate adjustment factor (0.9, 0.8, etc..) in Form 1 for the BAs to use. If the ERO is not going to estimate the Frequency Response aside from the BAs, multiple iterations will be likely. Duke Energy suggests the following language to cover the point above: "On an annual basis, the ERO will review the Interconnection total minimum Frequency Bias Setting for the prior period and compare it against the Interconnection's total natural Frequency Response determined for that period. If an Interconnection's total minimum Frequency Bias Setting exceeds (in absolute value) the Interconnection's total natural Frequency Response by more (in absolute value) than 0.2 percentage points of the Interconnection non-coincident peak load (expressed in MW/0.1Hz), the minimum Frequency Bias Setting for BAs within that Interconnection may be reduced (in absolute value) based on the technical evaluation and consultation with the regions affected by 0.1 percentage point of Interconnection non-coincident peak load (expressed in MW/0.1Hz) to better match that Frequency Bias Setting and natural Frequency Response. The ERO will include the adjustment factor in the Interconnection Form 1 used by the Balancing Authorities for the calculation of the new minimum Frequency Bias Setting. The Form 1 information from the Balancing Authorities will be gathered by the ERO in coordination with the regions of each Interconnection to determine the final Interconnection Frequency Bias Setting for the next period."
No
Similar to our earlier concern, the industry needs some assurance that the calculation of the Interconnection FRO described in the report cannot be changed outside of the Standards Process for approval by the industry. Duke Energy does not support using a 4500 MW loss as the basis for determining the FRO for the Eastern Interconnection for future events. However, as the calculation also includes 59.5 Hz as the basis for determining the FRO, the result is an allocation which can be supported. To the extent that the standard drafting team moves in the direction of using 59.7 Hz as the basis for the FRO, then it needs to follow a methodology similar to the other Interconnections for determining the credible multiple contingency to cover.
Yes
Though Duke Energy does not agree with some of the points in the Background Document, it does justify the rationale used by the SDT. Additional comments: at the top of page 23, it states that the basic Frequency Response Obligation is based on non-coincident peak load and generation data reported in FERC Form 714, however the actual calculation is missing and should be based upon the reported MWh, not the peak load as stated. At the bottom of page 23, it states that Attachment A proposes the three options for event criteria, however doesn't clarify why it was chosen that the Eastern Interconnection would be held to the largest event over the last 10 years, while others will be based upon the largest category C loss-of-resource (N-2) event.
No
Given the FERC deadline approaching for NERC to deliver a Frequency Response standard, Duke Energy supports the adoption of this standard with some reservations. We believe that the proposed standard addresses the FERC directive to NERC, however it also introduces some longer-term issues related to secondary control and related costs that may have not been anticipated by the FERC. To that point, Duke Energy believes that if this standard is adopted, the industry will have the time and opportunity through the NERC standards development process to mitigate some of the concerns presented in our comments."
The concern raised in Duke Energy's comments in item 4 will not be a factor for a few years, but will be an issue as more and more BAs are in the position of their FRM being better than the Interconnection Minimum allocation. We believe that the language that we proposed for calculating the minimum FBS in a multiple-BA Interconnection allows for the proper incentives for BAs to maintain FRM much better than required, and allows for comparable measurement of secondary control performance between similarly-sized BAs, while presenting no risk to reliability.
Individual
Don Schmit

Nebraska Public Power District
Agree
MRO NSRF [Midwest Reliability Organization - NERC Standards Review Forum]
Group
ACES Power Marketing Standards Collaborators
Jason Marshall
ACES Power Marketing
Yes
We believe that refinements to the definition were needed.
No
We agree that a definition is needed and thank the drafting team for writing one. However, we believe additional refinement of the definition is necessary. Although the definition appears to be written to parallel the Reserve Sharing Group definition, we think the definition needs to be simplified. For one, it encompasses actions that are not necessary. For instance, the proposed definition includes the action to “maintain operating resources”. This could literally include generating plant maintenance. We do not agree that a Frequency Response Sharing Group would jointly perform maintenance on their plants. In fact, since the definition applies to BAs, it is entirely possible within the functional model that the BAs do not even own the plants and could not perform joint maintenance. We assume the purpose of including “maintain” was to recognize that maintenance of generating resources would need to be coordinated to ensure that there was sufficient frequency response reserve. We do not believe this needs to be explicitly identified in the definition. Furthermore, we find the use of “operating resource” as a source of potential confusion. While we understand operating resource is intended to mean a facility that provides the ability to increase or decrease MW output based on the frequency deviation, resource has various meanings throughout the standards and its use here could be confusing and contradictory. For instance, TOP-006-2 R1 discusses transmission resources. Furthermore, if an “operating resource” is capable of increasing or decreasing MW output based on frequency deviation, what is a “resource”? In other words, why is “operating” added to the term “resource”? We think it is best to avoid use of the term operating resource and, thus, recommend changing the definition to: “A group of two or more Balancing Authorities that share frequency response reserves and are required to jointly meet the Frequency Response Obligations of its members.”
Yes
No
(1) Frequency Response Obligation (FRO) is used inconsistently with the proposed definition in the document. The document uses the term “Interconnection Frequency Response Obligation” in many locations. However, FRO specifically is defined as the BA’s “share of the required Frequency Response”. It does not apply to the Interconnection. How can the Interconnection have a share of the required frequency response? A new term may need to be defined for the Interconnection required Frequency Response. (2) On page 3 Attachment A states the ERO will post the Frequency Bias Setting for each BA along with their Frequency Response Obligation. Later on the same page, the document states that the BA shall set its Frequency Bias Setting to 100% to 125% of it Frequency Response Measure or Interconnection Minimum. What is the purpose of the ERO determining Frequency Bias Settings if the settings are not going to be used by the BA? What are we missing in the explanation? (3) Late on page 3, the document states that BAs are encouraged to notify NERC if load or generation is transferred. Section 4(a) on page 8 of the Rules of Procedure Appendix 5A – Organization Registration and Certification Manual indicates that changes to a Registered Entity’s footprint actually triggers a potential certification audit. Since BAs are required to be certified and moving generation or load from the metered boundaries of one BA to another BA would represent a change in footprint, we suggest removing the word “encouraged” and stating affirmatively that BAs must notify NERC of such changes and referencing the appropriate section of the Rules of Procedure. Otherwise, BAs may not realize notification is actually required.
Yes

Overall, we agree. However, we suggest the document clarify that the ERO shall perform these tasks in coordination with the Resources Subcommittee. It consists of industry experts that can be an extra resource to NERC. Furthermore, NERC staff working with the Resources Subcommittee will provide additional transparency to the process.
Yes
We agree that this method will provide sufficient frequency response. However, we believe Interconnection Frequency Response Obligation is used inconsistentently with the definition of Frequency Response Obligation as documented in our response to other comments.
No
(1) The formula for calculating Frequency Response Obligation appears to be missing on page 23. (2) We are confused by the varying sample rates for the different scan rates in the Definitions of Frequency Values for Frequency Response Calculation table on page 13. It would appear that the time range of values for the average B value varies more than necessary by scan rate. For example, for 2-second scan rates, sampling would start at 20 seconds and end at 52 seconds. However, for the 4-second scan rates, sampling starts at 24 seconds and ends at 48 seconds. Why would it not also cover 20 and 52 seconds for a 4-second scan rate?
No
(1) We believe that the drafting team work has demonstrated that the standard is unnecessary. The data presented in the posting shows that all of the interconnections easily exceed the required Frequency Response necessary to avoid actuating UFLS relays. Since one of the main purposes of the standard is to provide sufficient Frequency Response, it would seem the purpose is already met without implementing and enforceable standard. So why is a standard needed to compel required Frequency Response if it is already provided? (2) Even though we believe the supporting data for the posting demonstrates the standard is unnecessary, we understand NERC is required by a FERC directive to provide a standard. Given this requirement, we do believe the drafting team has largely provided a reasonable standard and supporting documents that only require a few additional adjustments (see our comments in other questions for these adjustments) to finalize the standard. As a result, we will likely end up supporting the standard once these final adjustments are made.
(1) Please strike “that is a member of a multiple BA Interconnection” in R2 and R3. The language makes the requirements difficult to read. We understand this is trying to clarify that these requirements should not apply to BAs such as ERCOT since changing its Frequency Bias Setting does not need to be coordinated with other BAs among other issues, and we do not have an issue with this intent. However, there is an easier way to address this issue without creating a confusing requirement. The SDT should include seeking a variance for the ERCOT area in conjunction with developing the standard. (2) Please strike “in order to represent the Frequency Bias Setting for the combined Balancing Authority Area” in Requirement R4 as it is superfluous and incorrect. First, the two bullets provide the necessary information making the statement unnecessary. Second, the BA Areas are not combined into a single BA Area as implied with the statement “combined Balancing Authority Area”. They are still in fact two distinct BA Areas. (3) The data retention period for R1, R2, R3, and R4 is not consistent with the NERC Rules of Procedure. Section 3.1.4.2 of Appendix 4C – Compliance Monitoring and Enforcement Program states that the compliance audit will cover the period from the day after the last compliance audit to the end date of the current compliance audit. The data retention section states that data shall be kept for the current calendar year plus the three previous calendar years. This could be up to four years which exceeds the BA audit period of three years. It is unnecessary for a BA to maintain evidence that was already verified in a prior audit. We recommend changing the evidence retention period to three years. (4) Has the drafting team coordinated the addition of the Frequency Response Sharing Group (FRSG) with the Functional Model Working Group and the NERC staff responsible for organizational registration? If not, please do so as NERC will need to be willing to register entities as a FRSG if it is to be utilized. Furthermore, the Functional Model Working Group should document the purpose and intent of the FRSG. (5) We disagree with the VSLs for R1. The VSLs are structured such that a BA’s or FRSG’s violation is dependent upon the rest of the interconnection to determine the severity level of the violation. If the BAs collectively fail to achieve the Interconnection Frequency Response obligation, a 2% violation of the Frequency Response Measure jumps from a Lower VSL to a High VSL. This should never be the case. No violation by a registered entity should become potentially more or less severe based on the violation of another entity. We encourage the drafting team to work with NERC Legal department in reviewing this VSL further as FERC has already allowed ISO/RTO violations investigation to draw in

third parties that potentially contributed to the ISO/RTO violation to ensure the appropriate party is fined. The principal is similar here in ensuring the appropriate BA is fined for its violation not the violations/failures of other BAs. The background document mentions on page 31 that the motivation for structuring the VSL in this manner was to prevent BAs in multiple BA interconnections from being sanctioned disproportionately. We appreciate the drafting team considering this issue but believe there is a simpler solution. Four VSLs could simply be written based on the percentage the BA misses its own Frequency Response Obligation. Furthermore, the compliance enforcement process already considers if the violation impacted reliability when assessing a sanction. (6) The Frequency Response Obligation (FRO) term is used inconsistently with the definition in the VSLs for R1. The first part of each BA implies that the Interconnection has an FRO. However, the definition specifically states that FRO is the BA's "share of the required Frequency Response". It does not apply to the Interconnection. How can the Interconnection have a share of the required frequency response? A new term may need to be defined for the Interconnection. (7) The implementation plan still references Requirement R5. There is no such requirement. (8) Requirement R1 is not consistent with the recent direction NERC has taken to refocus on reliability and looking forward during compliance audits rather than backwards. For instance, NERC has proposed monitoring internal controls of registered entities because this will provide a reasonable assurance that the registered entity is prepared to comply in the future. Current compliance audits focus mostly on past performance and provide no indication of future reliability. How does Requirement R1 support this forward looking vision when it is a lagging indicator that looks at historical performance? (9) Requirement R4 appears to be inconsistent with Requirement R1 and Attachment A. On page 3, Attachment A states the BA shall set its Frequency Bias Setting to 100% to 125% of it Frequency Response Measure or Interconnection Minimum. However, Requirement R4 states that the BA providing Overlap Regulation Service shall set its Frequency Bias Setting to the sum of its Frequency Bias Settings on FRS Form 1 and FRS Form 2 of its own BA and the BA to which its provides Overlap Regulation Service. For simplicity let's call the BA providing Overlap Regulation Service BA X and the BA receiving the service BA Y. Why would the BA X not set its Frequency Bias Setting to 100% to 125% of the sum of BA X's and BA Y's Frequency Response Measure? This would make Requirement R4 parallel with R2. (10) We do not understand the difference between the two bullets in Requirement R4. They appear to say essentially the same thing and the background document provides no discussion to distinguish their differences. Please provide further explanation.
Group
SERC OC Standards Review Group
Gerry Beckerle
Ameren
No
The definition reads as if the FRM is the median of all of the observations reported by the Balancing Authorities and Frequency Response Sharing Groups. We agree with the Duke Energy suggestion that the definition read, "The median of all of the Frequency Response observations reported annually by a Frequency Response Sharing Group, or Balancing Authority if not a participant in a Frequency Response Sharing Group, for frequency events specified by the ERO. The Frequency Response Measure is calculated as MW/0.1Hz."
No
A Balancing Authority may not be the entity maintaining or supplying resources, but would be responsible for utilizing applicable resources within its BA Area. We would modify the Duke Energy suggestion to read as follows: "A group whose members consist of two or more Balancing Authorities that collectively utilize operating resources with a goal to achieve a group FRM equal to or more negative than the sum of the Frequency Response Obligations of its members."
No
It is important for NERC to monitor the interaction between the deployment of this standard and its impact on CPS1, CPS2, and BAAL. If performance in the CPS criteria is degraded, there should be a halt in the reduction of the minimum bias setting allowed. There is also concern that we are providing the correct incentives to the entities to provide the appropriate amount of frequency response. We also suggest that clarification be made so that changes in the BA's footprint that would necessitate

changes in the bias setting or the FRO be permanent changes, not just temporary. It is unclear how performance would be measured for a BA versus a frequency response sharing group.
No
We believe the industry needs some assurance that the calculation of the interconnection FRO cannot be changed without rigorous review and input from the industry. In addition the clarification should be made how the one in ten year loss for the Eastern Interconnection (4500 MW) would change after 10 years. Would the same methodology be used or would the largest Category C (n-2) be used?
Yes
We agree with the Duke Energy comments on this question.
The comments expressed herein represent a consensus of the views of the above named members of the SERC OC Standards Review Group only and should not be construed as the position of SERC Reliability Corporation, its board, or its officers.
Individual
Brett Holland
Kansas City Power & Light
Yes
Yes
Yes
No
The Standard proposes a calculation that overstates the frequency response obligation (FRO) for Balancing Authorities.
No
Criteria 3 - Why are frequency thresholds different between regions when generator governor reaction is supposed to be the same between regions? Criteria 5 - What is the reasoning that multiple events that are not stabilized within 18 seconds not being considered? Criteria 6 - How are "changes in scheduled interchange" or load change determined in regions with interconnections with multiple BAs with different time zones?
Yes
Yes
No
The Standard does not consider instances for smaller BAs that operate generation for peak conditions and acquire energy for most of the operating year.
Individual
Angela P Gaines
Portland General Electric Company

The issue with proposed Reliability Standard BAL-003-1, requirement R1, is that the Annual Frequency Response Measure (FRM) is determined after the fact with an entity unable to identify or monitor compliance (on non-compliance) along the way. Also, the requirement seems to go the opposite direction of NERC's risk based initiatives where collecting historic compliance information become unsustainable.
Individual
Kathleen Goodman
ISO New England Inc.
Agree
Last submitted comments of ISO-NE which have not been addressed and, for efficiency sake, do not believe we should be requested to re-submit.
Individual
RoLynda Shumpert
South Carolina Electric and Gas
Agree
SERC OC Standards Review Group
Individual
Oliver Burke
Entergy Services, Inc. (Transmission)
Agree
Entergy is in agreement with comments submitted by SERC on 11/5/0212.
Group
Associated Electric Cooperative, Inc. - JRO00088
David Dockery, NERC Reliability Compliance Coordinator
Associated Electric Cooperative, Inc. - NCR01177
Agree
SERC OC Standards Review Group
Individual
Chris de Graffenried
Consolidated Edison Co. of NY, Inc.
Yes
Yes
No
If a BA is using a frequency bias setting and is not providing Overlap Regulation Service (supplying actual interchange, frequency response, and schedules to another BA), then we can assume it is supplying regulation service. Was the intent of the requirement to simply state that all BA's must have a bias setting less than zero at all times? Please clarify the intent of this requirement.
No
(1) This document lacks definitions of terms such as CCadj, DFcc, DFcbr, resource contingency criteria (in the attachment, this is called the "target contingency criteria"), etc. (2) Of value to entities would be a sample calculation. (3) "The largest category C (N-2) event is used for all interconnections except the Eastern which uses the largest event in the last 10 years". Why aren't all interconnections using the same design contingency design basis? (4) The NERC 2012 CPS2 bounds has an Eastern Interconnection frequency bias of -6,360 MW/.1Hz. Can the DT explain why this attachment refers to an Interconnection frequency response obligation of -1,002MW/.1Hz. This is a significant difference.

No
While the discussion of primary frequency response includes inertial energy, the term inertial energy is missing from the definition of “primary frequency response”.
No
The purpose of BAL-003 was to calculate frequency bias in the ACE equation used in BAL-001. The Standard is currently confusing to understand and it is unclear how the bias is calculated. It is recommended that efforts should be made to clarify the changes, especially Attachment A.
The VSL’s refer to the FRM (Frequency Response Measure). If that is the intent of the Standard, then GO’s and GOP’s should be included in the applicability since they are the entities responding to the AGC signals. If the intent is the FRO (Frequency Response Obligation) only, then the VSL’s should be updated.
Individual
David Jendras
Ameren
Yes
Yes
The word "jointly" may add confusion and we believe it is unessassry.
Yes
No
We disagree on having different methodologies for determining the targets, and would like clarity added for when those targets may change, such as what will happen after the largestest event in the last 10 years rolls off the books for the EI?
Yes
Yes
Yes
While we support this draft, we believe that this might only be a starting point and as additional knowledge and experience is gained through the implementation of this standard and other efforts such as the FRI, that the improvements can be embraced by all parties, even if those improvements result in relaxed requirements.
Individual
Maggy Powell
Exelon Corporation and its affiliates
Yes
Please see response to question 8. The FRM definition is acceptable within the context of the attachment description; however, without clarifying the terms under which the ERO specifies which events are to be measured, the FRM definition is too variable.
Yes
No
Please see response to question 8.

No
Exelon is troubled by the approach of having requirements that rely so heavily on the attachment to the standard. The use of both of the documents is required to be compliant and this makes it difficult to determine what the obligations are and increases the chance for error in interpretation. The suggested changes below in response to question 8 take information from the Attachment and establish requirements so that an entity does not have to go back and forth between the two documents to identify its obligations. Attachment A should then be modified to include examples of Forms 1 and 2 and instructions for completing the form for Balancing Authorities and Frequency Response Sharing Groups.
No
Please see response to question 8.
No
Exelon checked "no" because it does not support the current draft standard. Exelon's position is that efforts to modify frequency monitoring and control should be directed at the existing standards. Since Frequency Bias is already a component of ACE, and ACE performance is tracked by both CPS 1 and CPS 2, it seems evident that NERC already has in place mechanisms for evaluating frequency response. NERC already has in place mechanisms for ensuring sustained frequency response during a contingency, through the Disturbance Control Standard (DCS) and its requirement for the contingent Balancing Authority to deploy resources. Under the current BAL-003-0.1b language, Balancing Authorities are given a consistent means for determining frequency bias, via the minimum requirement of 1% peak generation or 1% peak load. Together with the above references to existing CPS 1 performance measurements, current standards meet the objectives outlined in BAL-003-1. This proposed draft BAL-003-1 complicates the setting of Frequency Bias and attempts to go beyond that purpose into frequency response performance, without clear rules for how to perform. Exelon is also concerned with moving this standard forward while there is an ongoing field trial that could impact whether this standard should be put into place. For example, waivers are in place for CPS 2 for participating Balancing Authorities and there is ongoing effort with the BAAL field trial set of standards that will establish performance metrics around frequency control. As an alternate approach to waiting to move forward on the standard, Exelon recommends the following BAL-003-1 Requirement language: R1. The ERO shall identify up to five [5] system frequency events in each Interconnection that will be included in the Form 1 and 2 data requests for Balancing Authorities by April 30th each year. R2. Each Balancing Authority shall submit the following data to the ERO annually by July 15: R2.1 The total annual net output of generating plants inside the Balancing Authority Area. R2.2 The total annual load with losses inside the Balancing Authority Area. R3. Each Balancing Authority shall calculate its Frequency Response Measure using Forms 1 and 2 as posted by the ERO. (See Attachment A_Form 1 and Form 2) R4. Each Balancing Authority or Frequency Response Sharing Group shall submit Forms 1 and 2 to contacts designated by the ERO before the expiration of ERO established deadlines, which shall be no earlier than 30 days after posting of Forms 1 and 2. R5. The ERO shall post the following information: R5.1. Each Interconnection's Frequency Response Obligation R5.2 Each Balancing Authorities Frequency Response Obligation R5.3 Each Balancing Authorities Frequency Bias Setting R6. Each Balancing Authority shall implement in its ACE equation its ERO established Frequency Bias Setting during the ERO established three-day implementation period. No further adjustments can be implemented outside of the parameters established below in the upcoming year unless a Balancing Authority coordinates with the Regional Entity and the affected Balancing Authorities. R6.1 A Balancing Authority using a fixed Frequency Bias Setting sets its Frequency Bias Setting to the greater of (in absolute value): R6.1.1. The number the BA chooses between 100% and 125% of its Frequency Response Measure as calculated on FRS Form 1. R6.1.2. The Balancing Authorities share of the Interconnection Minimum as determined by the ERO. R6.2 A Balancing Authority using a variable Frequency Bias Setting shall maintain a setting that is: R6.2.1 Less than zero at all times, and R6.2.2 Equal to or greater in magnitude than its Frequency Response Obligations when Frequency varies from 60 Hz by more than +/-0.036 Hz. R7. Each Frequency Response Sharing Group or Balancing Authority that is not a member of a FRSG shall monitor its Frequency Response Obligation and work with generating facilities or demand response resources to provide sufficient Frequency Response to meet the Frequency Response Obligation assigned by the ERO. R8. Each Balancing Authority that adds or removes generation or load, including through the

use of dynamic transfers, shall notify the ERO to ensure that any needed adjustments to the Interconnection Frequency Response Obligation or Balancing Authority Frequency Response Obligation and Bias can be calculated. R8.1. The ERO shall notify all affected Balancing Authorities of modifications to the Frequency Response Obligation due to the addition or removal of generation or load. R9. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent of the sum of the Frequency Bias Setting as communicated by the ERO for the participating Balancing Authorities.

Individual

Janelle Marriott Gill

Tri-State Generation and Transmission Assn., Inc.

No

It is our opinion that there has not been enough justification to merit creating a new standard. If additional justification is provided then frequency responsive reserves should be a subset of spinning reserves much like spinning reserves are a subset of operating reserves.

We are concerned with the tariff implictations associated with this standard. Will this standard create the need for an additional ancillary service under the FERC pro forma OATT?

Individual

Denise M Lietz

Puget Sound Energy

In reviewing the Consideration of Comments document, it is clear that the standard drafting team does not wish for the administrative elements of Attachment A to become items addressed during compliance evaluations (“There is no intent to require filing on a certain date and to have the BA prove to the auditor that a filing was made on that date.” This quote appears at several places in the Consideration of Comments documents, but first at page 113). However, because Attachment A is referenced in the standard, its provisions, including the timing table, are all mandatory and enforceable. This result is emphasized by the language of requirement R1, which states that entities “…shall achieve an annual Frequency Response Measure (FRM) as calculated and reported in accordance with Attachment A….” This language means that a failure to file a document on a date specified in the attachment would be a potential compliance violation. Because Attachment A is mandatory and enforceable, the standard drafting team should carefully review its provisions and clarify which elements are requirements and which elements are background statements or guidance. In addition, the use of additional headings and section numbers would add in clarifying the document (for example, at the top of page 3, there is a discussion of how an FRSG would calculate its FRM; however, there is an entire section beginning on page 4 addressing FRM where that discussion should instead appear).

No
See comment in response to question 4 above for a discussion of Attachment A concerns. Appendix 1 of the Frequency Response Standard Background Document contains a discussion about why the use of net actual interchange to calculate an entity's Frequency Response Measure might introduce inaccuracies into that calculation. That discussion ends with the following statement: "The frequency response is buried within the typical hour to hour operational cacophony superimposed on actual net interchange values. The choice of metrics will be important to artfully extract frequency response from the noise and other unrepresentative error." Based on these statements, it is very difficult to support the standard's approach to calculating the Frequency Response Measure. At Puget Sound Energy (PSE), though, we believe that there is another factor to add to the "operational cacophony" listed in Appendix 1. PSE is a comparatively small BA with limited internal generation. We are embedded between two of the largest energy exporters in the Western Interconnection and, when there is a frequency event, their response flows through PSE's system. As a result, PSE will experience transmission losses associated with the two BAs' frequency response as it flows through our system. When PSE's frequency response is measured using net actual interchange, these losses obscure, at least in part, our system's frequency response. As a result, we ask the standard drafting team to consider specifying a process that would allow us to propose and use an equivalent measure of frequency response. For example, while we understand the concerns and difficulties associated with measuring frequency response at the generator as the default measure for all BAs, in our case, a choice to use that measurement option might prove to be a more-feasible way to comply with the standard.
The definition of "Frequency Response Obligation" applies only to a Balancing Authority. However, requirement R1 applies to both FRSGs and BAs and includes a Frequency Response Obligation that applies to each of those entities. As a result, the definition must also address an FRSG's Frequency Response Obligation. The acronym for Balancing Authority is not included following the first reference to the term in requirement R1 (looks like an inadvertent deletion). Requirement R1 states that an entity "… shall achieve an annual Frequency Response Measure (FRM)…." However, the definition of Frequency Response Measure already includes the concept of annual. As a result, the word "annual" should be removed from the requirement. Requirement R1 includes the language "… to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation." This language is a purpose statement rather than a requirement applicable to a FRSG or a BA and should be excluded from the requirement. So long as an FRSG or BA achieves the FRM calculated in accordance with Attachment A, it has done everything necessary to comply with the standard. There are discrepancies between the implementation plan and the proposed standard: - The definitions of "Frequency Response Measure" and "Frequency Response Obligation" in the Implementation Plan are different from those proposed in the draft standard. - The Implementation Plan references "Reserve Sharing Group" rather than "Frequency Response Sharing Group". - The Implementation Plan does not include a definition for the term "Frequency Response Sharing Group". - The Implementation Plan continues to reference R5 in the discussion of the standard's proposed effective date. The annual process dates listed on page 32 of the Background document appear to be inconsistent with those listed in Attachment A.
Individual
Rich Salgo
NV Energy
Yes
Yes
Yes
Yes
This document is improved, and satisfactorily addresses comments from the prior posting.
Yes

Yes
Yes
No
While I support the concept of a Frequency Response Standard with minimum performance obligations, this Standard places the entire obligation for performance on the Balancing Authority (and Frequency Reserve Sharing Group). Requirements R2-R4 are properly assigned to the BA, as this is the entity that is responsible for the configuration and parameters in the ACE equation, including the provision of a frequency bias setting. Requirement 1, however, is a performance requirement over which the BA in the Functional Model has virtually no control or ability to influence. Only a Generator Owner or Generator Operator is in a position of control over the performance under this requirement through the operational control and configuration of the responding generating units. In most BA's, the host BA entity also owns a fair amount, even a vast majority in many cases, of the generation within the BA. However, even in the event that the host BA owned 100% of the generation within its metered boundary, it is the action of the entity exercising its GO/GOP function that impacts the frequency response performance within the Balancing Area. Assignment of R1 to the BA is inappropriate from the standpoint that reliability requirements are to be assigned to the Reliability Functions who are capable of causing compliance to occur. A BA has limited ability to influence the outcome of the R1 performance metric. This is unlike other BA-assigned requirements, such as those related to DCS or CPS compliance. For those, the BA does have considerable influence regarding the curtailment of transactions to restore ACE, the direction of plant loading so as to distribute operating reserve, etc. In contrast, performance under this proposed R1 of BAL-003-1 is dependent upon the actions of the GO/GOP in such things as governor settings, generator control system configuration and other operatinal or maintenance activities conducted at the generating plant site. For this reason, it is inappropriate to assign this performance requirement to the BA. Rather, the requirements should be allocated among the GO/GOP's of the on-line generation in some fashion. In further support of this notion, refer to the NERC Functional Model, where it is provided that one of the tasks for Generator Operation is to support Interconnection frequency.
Individual
John Tolo
Tucson Electric Power
Yes
however, the number of observations to be used in calculating an entity's FRM is not clear.
Yes
Yes
N/A
Yes
No
I think it should be more clear or better defined that an interconnection does have some input into what events are selected.
No
I believe that the frequency bias obligation of the Western Interconnection is understated.
Yes
No
I feel that a BA's frequency bias for the upcoming year should not be related to present performance.

A BA may have a good response one year and not good response another year and therefore the threshold keeps moving around. I feel it should be related to BA size and therefore somewhat standardized. E.g. a high-performing Balancing Authority will have its frequency bias increased each year due to higher response during the events chosen by the ERO. Conversely, a low-performing Balancing Authority will have its frequency bias reduced each year due to lower response during the events chosen by the ERO.
This is an important task and the efforts of the drafting team are appreciated.
Group
Avista
Scott Kinney
Avista Corp
Agree
Bonneville Power Administration
Individual
Ken Gardner
AESO
1. The AESO disagrees with using a non-authoritative background document that has definitions/description of terms used in the reliability standard. It is the opinion of the AESO that these definitions/descriptions need to be authoritative. 2. The AESO has previously submitted comments to the SDT that for the purpose of the FRM calculation, BAs should be able to exclude or include events based on specific conditions or consideration, such as data quality or event suitability (e.g. BA separation from the Interconnection). The revisions made by the SDT do not enable the inclusion of other relevant events in the FRM calcualtion by a BA. The AESO would like to to see these type of events to be permitted in the FRM calculation by a BA.
Individual
Patricia Robertson
BC Hydro
Yes
Additionally, there should be language to clarify that this is a negative value (the same should apply to the definitions of FRO and Frequency Bias). It is fairly obvious that these values should be negative when reading elsewhere in the proposed Standard and its related document but not in their definitions.
Yes
Additionally, there should be language to clarify that the BAs must belong to the same Interconnections to form the FRSG
Yes
BC Hydro applauds the STD's efforts to recognize a more suitable bound for Variable Frequency Bias settings
No
BC Hydro agrees with the principles outlined in the Attachment A but has some concerns as follows: 1.Attachment A is no longer recognized as one of the associated document of the proposed Standard

in its currently posted version. We believe this was removed by mistake. 2.There is no clarity as to how certain factors used in determining the Interconnection FRO such as CCADJ, CBR and BC'ADJ were determined. There is no apparent provision to re-assess any potential changes to these factors over the future years. If such provision is needed or has been provided then consideration should be given to averaging the adjustment over a longer duration (i.e., using the average of the factor observed over a number of years rather than just the year being assessed). 3.The method used for the allocation of the Interconnection FRO to BAs seems to not recognize the fact that frequency response from Load is much less than frequency response from Generation of an equal MW size. 4.If this Attachment A is considered an integral part of the standard then there should be some enforceable measures to ensure applicable entities adhering to the prescribed time line.
No
BC Hydro agrees in principle that the ERO should perform these tasks related to BAL-003-1 but has the following concerns: 1.There is no clear indication whether the Interconnection FRO will be calculated every year, and if yes, how each of the factors involved will be determined. 2.It is not clear whether data gathered in these procedures are only for the determination of annual FRO and FBS, or also to determine whether the BA or the FRSG was in compliance to BAL-003-1 for the assessed year. Since the ERO in this Document seems to be the NERC Resources Subcommittee and its Frequency Work Group, we think this fact should be made clear. The Background document should also be reviewed to ensure its alignment in this regard.
No Comment
Yes
BC Hydro respectfully submits these additional comments/observations: 1.The proposed standard seems to indicate that it is applicable to the identified responsible entities at all times. There might be circumstances where a BA that belongs to a multiple-BA Interconnection became isolated and has to operate in restorative mode which might require adjusting the frequency bias to a value less negative than the minimum FBS setting value in order to follow the much reduced load/generation level in the area. We suggest adding some language in either the Applicability section or in individual Requirements to recognize these circumstances. 2.Effective Dates: the proposed standard specifies a fixed period (12-month or 24-month) following Regulatory Approval which may fall in the middle of the year while the calculation and implementation are performed on an annual basis. Does this represent any conflicts? 3.The proposed standard does not clearly specify whether a BA must chose between using fixed bias or variable bias for the entire year. Should BAs be allowed to switched back and forth between the two methods? If yes, more details may be needed to account for the FRM and minimum FBS. 4.The proposed standard does not clearly specify whether a BA can be part of a FRSG for only part of the year or must be the whole year. 5.The definition of FRO, FRM, FBS, etc. should all include language to indicate the "negative" nature of the value. 6.Measure M2 should have "and uses a fixed bias" added for clarity purpose. 7.In the Additional Compliance Information section of the proposed standard the following info still exists: For Interconnections that are also Balancing Authorities, Tie Line Bias control and fFlat Ffrequency control are equivalent and either is acceptable. Since all reference to AGC Modes have been removed from the Requirements, this additional info should also be removed.
Individual
Grergory Campoli
New York Independent System Operator
Yes
Yes
With a new process we are concerned that the interconnection minimum will initially move from 1.0% to 0.9%.

Yes
No
The drafting team should consider some method for discounting outliers, that may not be explainable.
No
In general we support the work of the DT, and the proposal to measure the systems response to frequency events, along with the method to determine the FRO. My outstanding concern is with enforcement on an entity that does not own the resources that provides the frequency response or the lack of obligation for the entity with the information to provide to the BA to make the assessment of expected frequency response. BA's should at a minimum be given assurance that resources will provide data that BA's could use to forecast frequency response and take corrective actions.
Individual
Robert Blohm
Keen Resources Asia Ltd.
Yes
Yes
Yes
Yes
No
As a professionally trained published statistical expert never compensated by any balloting participant, I consider event selection criterion 7 to be unacceptable because it violates the fundamental statistical procedure of sampling statistical data "as is" and not pre-selecting the data (to fit some preferred even-distribution over time) and therefore biasing it before applying any statistical procedure to the data. Event criterion 6 is also unacceptable for being an an "ad hoc" explicit exclusion, from the definition of the frequency response being measured, of response to frequency events that occur during a specific kind of scheduled generation and load changes. Said exclusion needs to be written into the definition of the Frequency Response that is being measured. It is procedurally improper and unacceptable to bias the sampling procedure by explicit exclusion of data as an alternative to redefining the thing being sampled. In that case it's not generic Frequency Response that is being sampled, but some specific Frequency-Response-less-Response-to-Excluded-Events that is being measured. It is non-transparent and subterfuge to avoid instead accordingy reworking/narrowing the definition of Frequency Response, especially as said reworking requires a clear technical justification that is absent from this standard, and modifying the existing NERC Glossary definition of Frequency Response which Criterion 6 therefore stands in flat violation of.
No
This question is falsely worded. The SDT is specifically NOT using the method detailed in the Frequency Response Initiative Report dated September 30, 2012. So the term "this method" is practically meaningless in this question because it is not clear if it means "the SDT's method" or "the FRI's method". The Background Document specifically states on page 29: "The NERC Frequency Response Initiative Report addressed the relative merits of using the median versus linear regression for aggregating single event frequency response samples into a frequency response measurement score for compliance evaluation. This report provided 11 evaluation criteria as a basis for recommending the use of linear regression instead of the median for the frequency response measurement aggregation technique. The FRSDT made its own assessment on the basis of these evaluation criteria on September 20, 2012, but concluded that the median would be the best aggregation technique to use initially when the relative importance of each criterion was considered."

What needs to be changed, besides properly wording this question? The FRI method of linear regression should be adopted, and the SDT method of median should be rejected, in the standard to change the first sentence of this question into a true statement from a false statement and to, in answer to the question, provide for the proper amount of Frequency Response.
No
See reply to Question 6. Also, the Background Document is seriously deficient in the discussion of inertial response and therefore how imbalances "cause" frequency deviation. The Background Document is overflowing in discussion of how frequency deviation causes frequency response. In other words, the Background Document is "reactive" and not "proactive". The Background Document lacks any discussion of the internal dynamics of rotating machines, beginning with any definition of what Inertial Response is. Inertial Response is the instantaneous power produced by the lag ("inertia") in the ability of the generator's rotor to slow down to the frequency of the magnetic field in the generator's fixed stator whose frequency is instantaneously lowered by a change in phase angle between voltage and current that is due to a sudden loss of interconnected generation to meet load. Adjustments by voltage response within milliseconds and near the location of the loss are sometimes possible to avert rapid spread of a loss to the frequency of the entire interconnection, and constitute the ongoing work of the Phasor Project long ago initiated by the DOE in the persistent absence of NERC interest or work in this area. NERC and drafting team members under advisement by NERC staff studiously resisted so much as any mention of frequency deviation causation in discussions or in the Background Document. An inexplicable technical Cold War and Berlin Wall built in the 1970s and today separating the DOE Phasor Project from NERC Frequency Response standard development and NERC's so-called Frequency Response "Initiative" needs to be ended and torn down. My document http://www.robertblohm.com/Inertia.doc provides missing technical support and explanation for graphs 1-7 on pages 4-10 of the Background Document, on the basis of an exact understanding of Inertial Response.
A probabilistic/statistical basis needs to be developed for the FRM that assesses for usage of frequency response (causation of frequency error) and not just for provision of it. This would also overcome NERC's singular focus on reaction, and NERC's color-blindness to proaction, pointed out in my reply to question 7.
Group
SPP Standards REview Group
Robert Rhodes
Southwest Power Pool
Yes
Yes
Yes
Yes
Delete the 2nd 'that' in the 2nd bullet at the top of page 3.
Yes
Yes
Yes
We like the document and feel that it provides a primer on the frequency response standard. The following are typos in and suggested corrections to the document: -The blue lines referenced in the paragraph under Figure 2 on page 14 are green (A) and red (B). -Insert an 'a' in the 3rd line of the 2nd paragraph in the Sustained Response section on page 19 between 'provides' and 'greater'. -Insert a 'for' in the 2nd line of the 1st paragraph on page 21 between 'resource' and 'all'. -Change 'provide'

to ‘provided’ in the 3rd line from the bottom line of the 1st paragraph in the Single Event Frequency Response Data section on page 24. -Change the ‘east’ to ‘Eastern Interconnection’ in the 4th line of the 1st paragraph in the Median as the Standard’s Measure of Balancing Authority Performance section on page 27. -Delete the ‘put’ in the 3rd bullet on page 29. Also, replace the ‘put’ in the 5th bullet with ‘gave’.
We support the standard as proposed.
Additional typos: Change the ‘)’ to a ‘(‘ in the 4th line of M1 of the standard. No further comment
Individual
Marie Knox
MISO
Yes
Yes
No
We agree with the general obligation but believe that the requirement should apply to single BA Interconnections as well. This is supposed to be a North American standard. What other standards shouldn’t apply to a single BA Interconnection? We have the same concern with Requirement 2.
Yes
Yes
The first hyperlink on page 3 of the Procedure for ERO Support does not work.
Yes
Yes
Yes
Group
JEA
Thomas McElhinney
JEA
R1 places the burden for compliance on the BA but the BA does not control generation assets and should not be solely responsible for maintaining frequency response. While the standard can still define the amount of Frequency Response for each BA, there needs to be an obligation on the GO/GOP to provide that service as directed by the BA and they should also be held accountable for compliance. Finally, we do not believe that a sufficient study has been conducted to determine the impact of this standard. We are concerned that a substantial number of compliance issues could result and that the resulting cost to maintain compliance could be excessive and we suggest it be put

through the Cost Effective Analysis Process (CEAP). We suggest that the proposed values be evaluated on a sample size within each region to determine the number of compliance issues and for those issues that are found determine what the BA would have to do be compliant.
Individual
Tony Kroskey
Brazos Electric Power Cooperative, Inc.
Agree
ACES Power Marketing
Individual
Mauricio Guardado
Los Angeles Department of Water and Power
Spinning reserves are intended to support the interconnection response to the loss of a resource. If BAL-003-1 is adopted through this Project, the LADWP recommends that the spinning reserve requirements of BAL-002-0.1b and BAL-STD-002-0 be removed, as the Spinning reserve requirement would require utilities to reserve resources in excess of the reserves required in BAL-003-1. LADWP recognizes that this recommendation may be handled through a separate NERC Project, but wanted to submit this comment to bring light to this potential conflict in Reliability Standards.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Consideration of Comments

Project 2007-12 Frequency Response (BAL-003-1)

The Project 2007-12 Drafting Team thanks all commenters who submitted comments on the proposed standard, BAL-003-1 which was posted for a 30-day formal comment period from October 5, 2012 through November 6, 2012. Stakeholders were asked to provide feedback on the standard and associated documents through a special electronic comment form. There were 50 sets of comments, including comments from approximately 144 different people from approximately 100 companies representing 8 of the 10 Industry Segments as shown in the table on the following pages.

Based on industry comments the drafting team made the following clarifying modifications to the proposed standard and associated documents.

- Made clarifying changes to the proposed standard including replacing the term "…subject to…: with "…in accordance with…" in Requirement R2.
- Clarified the description of the calculation for the Interconnection IFRO in Attachment A.
- Modified Attachment A and the Procedure to provide consistency with the use of the term "resource contingency criteria".
- Corrected typographical errors in all documents.

All comments submitted may be reviewed in their original format on the standard's project page.

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process! If you feel there has been an error or omission, you can contact the Vice President and Director of Standards, Mark Lauby, at 404-446-2560 or at mark.lauby@nerc.net. In addition, there is a NERC Reliability Standards Appeals Process.[1]

[1] The appeals process is in the Standard Processes Manual: http://www.nerc.com/files/Appendix_3A_StandardsProcessesManual_20120131.pdf

Index to Questions, Comments, and Responses

The Industry Segments are:

1 — Transmission Owners
2 — RTOs, ISOs
3 — Load-serving Entities
4 — Transmission-dependent Utilities
5 — Electric Generators
6 — Electricity Brokers, Aggregators, and Marketers
7 — Large Electricity End Users
8 — Small Electricity End Users
9 — Federal, State, Provincial Regulatory or other Government Entities
10 — Regional Reliability Organizations, Regional Entities

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
1.	Group	Guy Zito	Northeast Power Coordinating Council										X

	Additional Member	Additional Organization	Region	Segment Selection
1.	Alan Adamson	New York State Reliability Council, LLC	NPCC	10
2.	Carmen Agavriloai	Independent Electricity System Operator	NPCC	2
3.	Greg Campoli	New York Independent System Operator	NPCC	2
4.	Sylvain Clermont	Hydro-Quebec TransEnergie	NPCC	1
5.	Chris de Graffenried	Consolidated Edison Co. of New York, Inc.	NPCC	1
6.	Gerry Dunbar	Northeast Power Coordinating Council	NPCC	10
7.	Mike Garton	Dominion Resources Services, Inc.	NPCC	5
8.	Peter Yost	Consolidated Edison Co. of New York, Inc.	NPCC	3
9.	Michael Jones	National Grid	NPCC	1

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10
10. David Kiguel	Hydro One Networks Inc.	NPCC	1									
11. Michael Lombardi	Northeast Utilities	NPCC	1									
12. Randy Macdonald	New Brunswick Power Transmission	NPCC	9									
13. Bruce Metruck	New York Power Authority	NPCC	6									
14. Silvia Parada Mitchell	NextEra Energy, LLC	NPCC	5									
15. Lee Pedowcz	Northeast Power Coordinating Council	NPCC	10									
16. Wayne Sipperly	New York Power Authority	NPCC	5									
17. Robert Pellegrini	The United Illuminating Company	NPCC	1									
18. Si-Truc Phan	Hydro-Quebec TransEnergie	NPCC	1									
19. David Ramkalawan	Ontario Power Generation, Inc.	NPCC	5									
20. Brian Robinson	Utility Services	NPCC	8									
21. Brian Shanahan	National Grid	NPCC	1									
22. Donald Weaver	New Brunswick System Operator	NPCC	2									
23. Ben Wu	Orange and Rockland Utilities	NPCC	1									
24. Christina Koncz	PSEG Power LLC	NPCC	5									
2. Group	Erik Ela	NREL Transmission and Grid Integration Group										

	Additional Member	Additional Organization	Region	Segment Selection
1.	Vahan Gevorgian	NREL	NA - Not Applicable	NA
2.	Brendan Kirby	Consultant	NA - Not Applicable	NA
3.	Yingchen Zhang	NREL	NA - Not Applicable	
4.	Mohit Singh	NREL	NA - Not Applicable	

3. Group	WILL SMITH	MRO NSRF	X	X	X	X	X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	MAHMOOD SAFI	OPPD	MRO	1, 3, 5, 6
2.	CHUCK LAWRENCE	ATC	MRO	1
3.	TOM BREENE	WPS	MRO	3, 4, 5, 6
4.	JODI JENSON	WAPA	MRO	1, 6
5.	KEN GOLDSMITH	ALTW	MRO	4
6.	ALICE IRELAND	XCEL	MRO	1, 3, 5, 6
7.	DAVE RUDOLPH	BEPC	MRO	1, 3, 5, 6

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10

8.	ERIC RUSKAMP	LES	MRO	1, 3, 5, 6
9.	JOE DEPOORTER	MGE	MRO	3, 4, 5, 6
10.	SCOTT NICKELS	RPU	MRO	4
11.	TERRY HARBOUR	MEC	MRO	5, 6, 1, 3
12.	MARIE KNOX	MISO	MRO	2
13.	LEE KITTELSON	OTP	MRO	1, 3, 5
14.	SCOTT BOS	MPW	MRO	1, 3, 5, 6
15.	TONY EDDLEMAN	NPPD	MRO	1, 3, 5
16.	MIKE BRYTOWSKI	GRE	MRO	1, 3, 5, 6
17.	DAN INMAN	MPC		1, 3, 5, 6

4.	Group	Chris Higgins	Bonneville Power Administration	X		X		X	X					

	Additional Member	Additional Organization	Region	Segment Selection
1.	Bart McManus	Technical Operations	WECC	1
2.	Kristy Humphrey	Technical Operations	WECC	1
3.	Ayodele Idowu	Technical Operations	WECC	1
4.	Rebecca Berdahl	Policy Development & Analysis	WECC	3

5.	Group	Scott Miller	MEAG Power	X		X		X						

	Additional Member	Additional Organization	Region	Segment Selection
1.	Steve Jackson	MEAG Power	SERC	3
2.	Danny Dees	MEAG Power	SERC	1
3.	Steve Grego	MEAG Power	SERC	5

6.	Group	Brent Ingebrigtson	PPL NERC Registered Affiliates	X		X		X	X					

	Additional Member	Additional Organization	Region	Segment Selection
1.	Brenda L. Truhe	PPL Electric Utilities Corporation`	RFC	1
2.	Annette M. Bannon	PPL Generation, LLC on behalf of Supply NERC Registered Affiliates	RFC	5
3.			WECC	5
4.	Elizabeth A. Davis	PPL EnergyPlus, LLC	MRO	6

Group/Individual		Commenter	Organization		Registered Ballot Body Segment									
					1	2	3	4	5	6	7	8	9	10
5.			NPCC	6										
6.			SERC	6										
7.			SPP	6										
8.			RFC	6										
9.			WECC	6										
10.	Brent Ingebrigtson	LG&E and KU Services	SERC	3										
7.	Group	Greg Rowland	Duke Energy		X		X		X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	Doug Hils	Duke Energy	RFC	1
2.	Lee Schuster	Duke Energy	FRCC	3
3.	Dale Goodwine	Duke Energy	SERC	5
4.	Greg Cecil	Duke Energy	RFC	6

8.	Group	Jason Marshall	ACES Power Marketing Standards Collaborators						X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	John Shaver	Arizona Electric Power Cooperative/Southwest Transmission Cooperative, Inc.	WECC	1, 4, 5
2.	Bill Hutchison	Southern Illinois Power Cooperative	SERC	1
3.	Megan Wagner	Sunflower Electric Power Corporation	SPP	1

9.	Group	Gerry Beckerle	SERC OC Standards Review Group		X		X							

	Additional Member	Additional Organization	Region	Segment Selection
1.	Jeff Harrison	AECI	SERC	1, 3, 5, 6
2.	Robert Thomasson	Big Rivers Electric Corp.	SERC	1
3.	Dan Roethemeyer	Dynegy	SERC	5
4.	Adam Guinn	Duke Energy	SERC	1, 3, 5, 6
5.	Brad Young	LGE-KU	SERC	1, 3, 5, 6
6.	Wayne Van Liere	LGE-KU	SERC	1, 3, 5, 6
7.	Marie Knox	MISO	SERC	2
8.	Terry Bilke	MISO	SERC	2

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10

9.	Troy Blalock	SCE&G	SERC	1, 3, 5, 6
10.	Cindy Martin	Southern Co. Services	SERC	1, 5
11.	Todd Lucas	Southern Co. Services	SERC	1, 5
12.	Kelly Casteel	TVA	SERC	6, 1, 3, 5
13.	Joel Wise	TVA	SERC	1, 3, 5, 6
14.	Stuart Goza	TVA	SERC	1, 3, 5, 6
15.	Steve Corbin	SERC Reliability Corp	SERC	10

10.	Group	David Dockery, NERC Reliability Compliance Coordinator	Associated Electric Cooperative, Inc. - JRO00088	X		X		X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	Central Electric Power Cooperative		SERC	1, 3
2.	KAMO Electric Cooperative		SERC	1, 3
3.	M & A Electric Power Cooperative		SERC	1, 3
4.	Northeast Missouri Electric Power Cooperative		SERC	1, 3
5.	N.W. Electric Power Cooperative, Inc.		SERC	1, 3
6.	Sho-Me Power Electric Cooperative		SERC	1, 3

11.	Group	Scott Kinney	Avista	X		X		X					

	Additional Member	Additional Organization	Region	Segment Selection
1.	Scott	Kinney	WECC	1
2.	Bob	Lafferty	WECC	3
3.	Ed	Groce	WECC	5

12.	Group	Robert Rhodes	SPP Standards REview Group		X							

	Additional Member	Additional Organization	Region	Segment Selection
1.	John Allen	City Utililties of Springfield	SPP	1, 4
2.	Lisa Duffey	Cleco Power	SPP	1, 3, 5
3.	Tiffany Lake	Westar Energy	SPP	1, 3, 5, 6
4.	Greg McAuley	Oklahoma Gas & Electric	SPP	1, 3, 5
5.	Stephen McGie	City of Coffeyville	SPP	NA

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
6.	Terry Petzoldt	Kansas City Board of Public Utilities	SPP 3										
7.	Valerie Pinamonti	American Electric Power	SPP 1, 3, 5										
8.	Randy Root	Grand River Dam Authority	SPP 1, 3, 5										
9.	Katie Shea	Westar Energy	SPP 1, 3, 5, 6										
10.	Bryan Taggart	Westar Energy	SPP 1, 3, 5, 6										
13.	Group	Thomas McElhinney	JEA	X		X		X					
	Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1.	Ted Hobson		FRCC	1									
2.	Garry Baker		FRCC	3									
3.	John Babik		FRCC	5									
14.	Individual	Mark Gray	Edison Electric Institute	X		X		X	X				
15.	Individual	Janet Smith, Regulatory Affairs Supervisor	Arizona Public Service Company	X		X		X	X				
16.	Individual	ryan millard	pacificorp	X		X		X	X				
17.	Individual	Stephanie Monzon	PJM Interconnection, LLC		X								
18.	Individual	Richard Vine	California Independent System Operator		X								
19.	Individual	Howard F. Illian	Energy Mark, Inc.								X		
20.	Individual	Thad Ness	American Electric Power	X		X		X	X				
21.	Individual	Jonathan Appelbaum	The United Illuminating Company	X									
22.	Individual	Travis Metcalfe	Tacoma Power	X		X	X	X	X				
23.	Individual	Nazra Gladu	Manitoba Hydro	X		X		X	X				
24.	Individual	Alice Ireland	Xcel Energy	X		X		X	X				
25.	Individual	Shammara Hasty	Southern Company	X		X		X	X				
26.	Individual	Greg Travis	Idaho Power Company	X		X							
27.	Individual	John Seelke	Public Service Enterprise Group	X		X		X	X				
28.	Individual	Michael Falvo	Independent Electricity System Operator		X								
29.	Individual	Brian J Murphy	NextEra Energy	X		X		X	X				

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
30.	Individual	Don Jones	Texas Reliability Entity										X
31.	Individual	Don Schmit	Nebraska Public Power District	X		X		X					
32.	Individual	Brett Holland	Kansas City Power & Light	X		X		X	X				
33.	Individual	Angela P Gaines	Portland General Electric Company	X		X		X	X				
34.	Individual	Kathleen Goodman	ISO New England Inc.		X								
35.	Individual	RoLynda Shumpert	South Carolina Electric and Gas	X		X		X	X				
36.	Individual	Oliver Burke	Entergy Services, Inc. (Transmission)	X									
37.	Individual	Chris de Graffenried	Consolidated Edison Co. of NY, Inc.	X		X		X	X				
38.	Individual	David Jendras	Ameren	X		X		X	X				
39.	Individual	Maggy Powell	Exelon Corporation and its affiliates	X		X	X	X	X				
40.	Individual	Janelle Marriott Gill	Tri-State Generation and Transmission Assn., Inc.	X		X		X					
41.	Individual	Denise M Lietz	Puget Sound Energy	X		X		X					
42.	Individual	Rich Salgo	NV Energy	X		X		X					
43.	Individual	John Tolo	Tucson Electric Power	X									
44.	Individual	Ken Gardner	AESO		X								
45.	Individual	Patricia Robertson	BC Hydro	X	X	X		X					
46.	Individual	Grergory Campoli	New York Independent System Operator		X								
47.	Individual	Robert Blohm	Keen Resources Asia Ltd.								X		
48.	Individual	Marie Knox	MISO		X								
49.	Individual	Tony Kroskey	Brazos Electric Power Cooperative, Inc.	X									
50.	Individual	Mauricio Guardado	Los Angeles Department of Water and Power	X		X		X	X				

If you support the comments submitted by another entity and would like to indicate you agree with their comments, please select "agree" below and enter the entity's name in the comment section (please provide the name of the organization, trade association, group, or committee, rather than the name of the individual submitter).

Summary Consideration:

Organization	Supporting Comments of "Entity Name"
MEAG Power	Southern Company Services, Inc - Gen
Associated Electric Cooperative, Inc. - JRO00088	SERC OC Standards Review Group
Avista	Bonneville Power Administration
Nebraska Public Power District	MRO NSRF [Midwest Reliability Organization - NERC Standards Review Forum]
ISO New England Inc.	Last submitted comments of ISO-NE which have not been addressed and, for efficiency sake, do not believe we should be requested to re-submit.
South Carolina Electric and Gas	SERC OC Standards Review Group
Entergy Services, Inc. (Transmission)	Entergy is in agreement with comments submitted by SERC on 11/5/0212.
Brazos Electric Power Cooperative, Inc.	ACES Power Marketing

1. The SDT has made minor modifications to the proposed definition for Frequency Response Measure based on industry comments. Do you agree that these modifications provide sufficient clarity? If not, please explain in the comment area.

Summary Consideration: A few of the commenters felt that the definition applied to all of the observations for both the BA and the FRSG. The drafting team stated that although they understood their concern they did not agree with them. They felt that the present definition provided sufficient clarity and decided to not make any modifications.

One commenter felt that the definition should state that it is a negative value. The drafting team explained that while the desired value would be negative it is mathematically feasible for the actual value to be positive but that value would by definition mean that the entity failed the measurement for Requirement R1.

Another commenter did not believe that there was sufficient clarity as to the number of observations that would be used to calculate FRM. The drafting team stated that the number of observations would vary from year to year. The basis for determining events is outlined in the Procedure attached to this standard.

Organization	Yes or No	Question 1 Comment
Duke Energy	No	The definition reads as if the FRM is the median of all of the observations reported by the Balancing Authorities and Frequency Response Sharing Groups. Duke Energy would suggest that the definition read, "The median of all of the Frequency Response observations reported annually by a Frequency Response Sharing Group, or Balancing Authority if not a participant in a Frequency Response Sharing Group, for frequency events specified by the ERO. The Frequency Response Measure is calculated as MW/0.1Hz."
Response: The drafting team thanks you for your comment. However, the drafting team believes that the present definition provides sufficient clarity and has decided to not make any changes.		
SERC OC Standards Review Group	No	The definition reads as if the FRM is the median of all of the observations reported by the Balancing Authorities and Frequency Response Sharing Groups. We agree with the Duke Energy suggestion that the definition read, "The median of all of the Frequency Response observations reported annually by a Frequency Response Sharing Group, or Balancing

Organization	Yes or No	Question 1 Comment
		Authority if not a participant in a Frequency Response Sharing Group, for frequency events specified by the ERO. The Frequency Response Measure is calculated as MW/0.1Hz."
Response: The drafting team thanks you for your comment. However, the drafting team believes that the present definition provides sufficient clarity and has decided to not make any changes.		
PPL NERC Registered Affiliates	No	The PPL Affiliates support the comments of the SERC OC Standards Review Group on this question.
Response: The drafting team thanks you for your comment. However, the drafting team believes that the present definition provides sufficient clarity and has decided to not make any changes.		
BC Hydro	Yes	Additionally, there should be language to clarify that this is a negative value (the same should apply to the definitions of FRO and Frequency Bias). It is fairly obvious that these values should be negative when reading elsewhere in the proposed Standard and its related document but not in their definitions.
Response: While the desired value would be negative it is mathematically feasible for the actual value to be positive but that value would by definition mean that the entity failed the measurement for Requirement R1.		
Tucson Electric Power	Yes	however, the number of observations to be used in calculating an entity's FRM is not clear.
Response: Thank you for your affirmative response and clarifying comment. The number of observations will vary from year to year. The basis for determining events is outlined in the Procedure attached to this standard.		
Exelon Corporation and its affiliates	Yes	Please see response to question 8. The FRM definition is acceptable within the context of the attachment description; however, without clarifying the terms under which the ERO specifies which events are to be measured, the FRM definition is too variable.
Response: Thank you for your affirmative response and clarifying comment. The criteria used to determine the events to be used are outlined in the Procedure attached to this standard. Please refer to our response to Question #8.		

Organization	Yes or No	Question 1 Comment
ACES Power Marketing Standards Collaborators	Yes	We believe that refinements to the definition were needed.
Response: Thank you for your affirmative response and clarifying comment.		
Manitoba Hydro	Yes	No comment.
Northeast Power Coordinating Council	Yes	
NREL Transmission and Grid Integration Group	Yes	
MRO NSRF	Yes	
Bonneville Power Administration	Yes	
SPP Standards REview Group	Yes	
Edison Electric Institute	Yes	
Arizona Public Service Company	Yes	
pacificorp	Yes	
PJM Interconnection, LLC	Yes	
California Independent	Yes	

Organization	Yes or No	Question 1 Comment
System Operator		
Energy Mark, Inc.	Yes	
Tacoma Power	Yes	
Xcel Energy	Yes	
Southern Company	Yes	
Idaho Power Company	Yes	
Independent Electricity System Operator	Yes	
Texas Reliability Entity	Yes	
Kansas City Power & Light	Yes	
Consolidated Edison Co. of NY, Inc.	Yes	
Ameren	Yes	
NV Energy	Yes	
New York Independent System Operator	Yes	
Keen Resources Asia Ltd.	Yes	

Organization	Yes or No	Question 1 Comment
MISO	Yes	
American Electric Power		As provided in question 2 below, AEP does not agree with the definition containing the Frequency Response Sharing Group as this function does not exist at this point in time.
Response: Thank you for your comments. The term Frequency Response Sharing Group is defined at the beginning of the standard. Once this standard is approved by the industry, NERC BOT and FERC the definition will be removed from the standard and added to the NERC Glossary of Terms.		

2. The SDT has created a definition for Frequency Response Sharing Group. The definition is as follows: A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members. Do you agree with this definition? If not, please explain in the comment area.

Summary Consideration: Almost all of the commenters wanted to modify the definition. The drafting team explained that they believed that the proposed definition should remain unchanged. The drafting team developed the definition to be essentially the same as that currently used for contingency Reserve Sharing Groups. This will help ensure that the different types of reserve groups are comparable as we move forward with this new type of group.

One commenter did not agree believe it was appropriate to define a new function that was not in the NERC ROP, NERC Statement of Registry Criteria or the NERC Functional Model. The drafting team stated that they had discussed this issue with NERC. NERC staff will add this entity to the registered entity list in the same manner as the existing Reserve Sharing Group. While this is not in the current version available online, NERC will have at least 24 months from the time of regulatory approval to add the entity to the list of registered entities.

Organization	Yes or No	Question 2 Comment
SERC OC Standards Review Group	No	A Balancing Authority may not be the entity maintaining or supplying resources, but would be responsible for utilizing applicable resources within its BA Area. We would modify the Duke Energy suggestion to read as follows: "A group whose members consist of two or more Balancing Authorities that collectively utilize operating resources with a goal to achieve a group FRM equal to or more negative than the sum of the Frequency Response Obligations of its members."
Response: Thank you for your comments. After review of suggested changes, the drafting team believes that the proposed definition should remain unchanged. The drafting team developed the definition to be essentially the same as that currently used for contingency Reserve Sharing Groups. This will help ensure that the different types of reserve groups are comparable as we move forward with this new type of group.		
American Electric Power	No	AEP does not necessarily disagree with the words of the definition. However, AEP does

Organization	Yes or No	Question 2 Comment
		not believe it is appropriate to define a new function that is not in the NERC Rules of Procedure, NERC Statement of Registry Criteria, or the NERC Functional Model. It is premature to incorporate this entity without a proposed change to these governing NERC documents.
Response: Thank you for your comments. The drafting team has discussed this issue with NERC. NERC staff will add this entity to the registered entity list in the same manner as the existing Reserve Sharing Group. While not in the current version available online, NERC will have at least 24 months from the time of regulatory approval to add the entity to the list of registered entities.		
Duke Energy	No	As a Balancing Authority may not be the entity maintaining or supplying resources, but would be responsible for utilizing applicable resources within its BA Area, Duke Energy would suggest the following definition, "A group whose members consist of two or more Balancing Authorities that collectively utilize operating resources required to achieve a group FRM equal to or more negative than the sum of the Frequency Response Obligations of its members."
Response: Thank you for your comments. After review of suggested changes, the drafting team believes that the proposed definition should remain unchanged. The drafting team developed the definition to be essentially the same as that currently used for contingency Reserve Sharing Groups. This will help ensure that the different types of reserve groups are comparable as we move forward with this new type of group.		
Edison Electric Institute	No	EEI does not fully agree with the definition of a "Frequency Response Sharing Group" (FRSG). In the definition offered in the new Standard, it states that the FRSG "collectively maintain, allocate, and supply operating resources". Of the three roles, a balancing authority only maintains load-interchange-generation balance through the allocation of resources. Therefore, EEI suggests that the definition be changed to more appropriately align with the role of a BA, which we believe would be to allocate resources in a manner that effectively allows the sharing of resources necessary to achieve a FRO within the defined sharing group, which might otherwise not be possible or practical by a BA on its own.
Response: After review of suggested changes, the drafting team believes that the proposed definition should remain unchanged. The drafting team developed the definition to be essentially the same as that currently used for contingency Reserve Sharing Groups. This		

Organization	Yes or No	Question 2 Comment
will help ensure that the different types of reserve groups are comparable as we move forward with this new type of group.		
ACES Power Marketing Standards Collaborators	No	We agree that a definition is needed and thank the drafting team for writing one. However, we believe additional refinement of the definition is necessary. Although the definition appears to be written to parallel the Reserve Sharing Group definition, we think the definition needs to be simplified. For one, it encompasses actions that are not necessary. For instance, the proposed definition includes the action to "maintain operating resources". This could literally include generating plant maintenance. We do not agree that a Frequency Response Sharing Group would jointly perform maintenance on their plants. In fact, since the definition applies to BAs, it is entirely possible within the functional model that the BAs do not even own the plants and could not perform joint maintenance. We assume the purpose of including "maintain" was to recognize that maintenance of generating resources would need to be coordinated to ensure that there was sufficient frequency response reserve. We do not believe this needs to be explicitly identified in the definition. Furthermore, we find the use of "operating resource" as a source of potential confusion. While we understand operating resource is intended to mean a facility that provides the ability to increase or decrease MW output based on the frequency deviation, resource has various meanings throughout the standards and its use here could be confusing and contradictory. For instance, TOP-006-2 R1 discusses transmission resources. Furthermore, if an "operating resource" is capable of increasingor decreasing MW output based on frequency deviation, what is a "resource"? In other words, why is "operating" added to the term "resource"? We think it is best to avoid use of the term operating resource and, thus, recommend changing the definition to: "A group of two or more Balancing Authorities that share frequency response reserves and are required to jointly meet the Frequency Response Obligations of its members."
Response: After review of suggested changes, the drafting team believes that the proposed definition should remain unchanged. The drafting team developed the definition to be essentially the same as that currently used for contingency Reserve Sharing Groups. This will help ensure that the different types of reserve groups are comparable as we move forward with this new type of group.		
BC Hydro	Yes	Additionally, there should be language to clarify that the BAs must belong to the same

Organization	Yes or No	Question 2 Comment
		Interconnections to form the FRSG
Response: After review of suggested changes, the drafting team believes that the proposed definition should remain unchanged. The drafting team developed the definition to be essentially the same as that currently used for contingency Reserve Sharing Groups. This will help ensure that the different types of reserve groups are comparable as we move forward with this new type of group.		
PPL NERC Registered Affiliates	Yes	PPL Affiliates suggest additional detail be added to the definition to ensure the members of the FRSG are all within the same interconnection. The following definition includes the suggested changes: A group whose members consist of two or more Balancing Authorities all within a single interconnection that collectively operate resources required to jointly meet the sum of the Frequency Response Obligations of its members.
Response: After review of suggested changes, the drafting team believes that the proposed definition should remain unchanged. The drafting team developed the definition to be essentially the same as that currently used for contingency Reserve Sharing Groups. This will help ensure that the different types of reserve groups are comparable as we move forward with this new type of group.		
Ameren	Yes	The word "jointly" may add confusion and we believe it is unessassry.
Response: After review of suggested changes, the drafting team believes that the proposed definition should remain unchanged. The drafting team developed the definition to be essentially the same as that currently used for contingency Reserve Sharing Groups. This will help ensure that the different types of reserve groups are comparable as we move forward with this new type of group.		
Manitoba Hydro	Yes	No comment.
Northeast Power Coordinating Council	Yes	
NREL Transmission and Grid Integration Group	Yes	
MRO NSRF	Yes	
Bonneville Power	Yes	

Organization	Yes or No	Question 2 Comment
Administration		
SPP Standards REview Group	Yes	
Arizona Public Service Company	Yes	
pacificorp	Yes	
PJM Interconnection, LLC	Yes	
California Independent System Operator	Yes	
Energy Mark, Inc.	Yes	
Tacoma Power	Yes	
Xcel Energy	Yes	
Southern Company	Yes	
Idaho Power Company	Yes	
Texas Reliability Entity	Yes	
Kansas City Power & Light	Yes	
Consolidated Edison Co. of NY, Inc.	Yes	

Organization	Yes or No	Question 2 Comment
Exelon Corporation and its affiliates	Yes	
NV Energy	Yes	
Tucson Electric Power	Yes	
Keen Resources Asia Ltd.	Yes	
MISO	Yes	
Independent Electricity System Operator		Not Applicable

3. The SDT has added Requirement R3 for entities using variable Frequency Bias. R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is:

3.1 Less than zero at all times, and

3.3 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/-0.036 Hz.

Summary Consideration: A couple of commenters felt that the intent of the requirement needed to be clarified. The drafting team explained that Requirement R3 is only applicable to a BA using a variable bias and does require a BA to maintain a bias less than zero. Bullet R3.2 extends the requirement to ensure that BAs using variable bias have a bias at least equal to the FRO when frequency is outside the bandwidth of +/- 0.036 Hz. The BAs using a fixed bias are addressed in Requirement R2.

A few commenters expressed concern with excluding a single BA interconnection from compliance with Requirement R3. The drafting team stated that they had discussed the applicability of variable bias requirements to single BA Interconnections extensively. The consensus of the drafting team was that single BA Interconnections inherently have strong incentives to accurately represent their frequency response characteristic. Any adverse consequences of misrepresenting the frequency response characteristic will be borne solely by that BA and cannot affect other BAs in other Interconnections adversely.

One commenter disagreed with allowing the use of variable Frequency Bias in a multi-BA interconnection. The drafting team believes that this concern may be better addressed within BAL-001. Variable frequency bias settings allow a Balancing Authority to better match their frequency bias setting in use with the actual frequency response occurring at any instant in time. If it is meeting its FRO for larger frequency deviations and the frequency bias setting in use at that time meets or exceeds its FRO, then the BA is doing its part to support frequency and AGC will not be withdrawing that frequency response.

Another commenter question the periodicity of a BA changing its Frequency Bias Setting to be considered using variable Frequency Bias. They gave an example of an entity changing its FBS monthly. The drafting team stated that they had not defined the periodicity for changing their bias to be variable. The example given would be a form of variable bias and would trigger all rules related to variable bias. Requirement R3 is separate from Requirement R4. Requirement R4 is related

to those entities providing Overlap Regulation Service. It is possible for an entity to provide Overlap Regulation Service and have a variable bias setting therefore an entity may be subject to compliance for both Requirement R3 and Requirement R4.

Organization	Yes or No	Question 3 Comment
American Electric Power	No	AEP believes this question in the comment form is incorrect. It appears that R3 and R4 are inadvertenly merged together.
Response: The drafting team is not sure of the point you are trying to make. The question only contains the Requirement R3 from the standard. The drafting team did notice that the numbering of the sub-bullets was incorrect.		
Duke Energy	No	Duke Energy agrees with allowing single-BA Interconnections to utilize a variable Frequency Bias Setting (FBS). Duke Energy disagrees with NERC allowing Balancing Authorities in a multiple-BA Interconnection to change the ACE and bounds by which the Balancing Authorities are measured under BAL-001 and BAL-002 by operating to a variable FBS. It is desired that a Balancing Authority be capable of recognizing the amount of primary response available in real-time operation, such information can be included among other information in the generation control algorithm; however, the obligation to support the Interconnection frequency under the secondary control standards, and the amount provided for any given frequency, should be based on the same criteria across all Balancing Authorities of the same size. Nathan Cohn in his comments on Union Electric's use of a variable FBS expressed similar concern regarding the equitable sharing of the obligation to support Interconnection frequency in a multiple-BA Interconnection. Take for example two Balancing Authorities with equal total generation and load, but one operating under a fixed FBS and the other operating under a variable FBS. To the extent that a Balancing Authority is not providing Frequency Response comparable to its fixed Frequency Bias Setting, its ACE will reflect the difference to be covered with secondary control and the Balancing Authority will be measured in a manner similar to other BAs of its "size" based upon the FBS. To the extent that the other BA using a variable FBS is not providing Frequency Response

Organization	Yes or No	Question 3 Comment
		comparable to what it would be allocated using a fixed FBS, its ACE will not reflect the difference or any further obligation to support Interconnection frequency at that time with secondary control. Duke Energy's concern regarding non-comparable treatment of all BAs is further amplified by the lack of scrutiny placed on the BA algorithm used to determine the real-time variable FBS, to ensure that compliance cannot be gamed by such use.
Response: The drafting team believes that this concern may be better addressed within BAL-001. Variable frequency bias settings allow a Balancing Authority to better match their frequency bias setting in use with the actual frequency response occurring at any instant in time. If it is meeting its FRO for larger frequency deviations and the frequency bias setting in use at that time meets or exceeds its FRO, then the BA is doing its part to support frequency and AGC will not be withdrawing that frequency response.		
Northeast Power Coordinating Council	No	If a BA is using a frequency bias setting and is not providing Overlap Regulation Service (supplying actual interchange, frequency response, and schedules to another BA), then it can be assumed that the BA is supplying regulation service. Was the intent of the requirement to simply state that all BA's must have a bias setting less than zero at all times? The intent of this requirement needs to be clarified.
Response: The drafting team is not sure if we understand your first comment. A BA not providing Overlap Regulation Service may or may not be providing Supplemental Regulation Service. Requirement R3 is only applicable to a BA using a variable bias and does require a BA to maintain a bias less than zero. Bullet R3.2 extends the requirement to ensure that BAs using variable bias have a bias at least equal to the FRO when frequency is outside the bandwidth of +/- 0.036 Hz. The BAs using a fixed bias are addressed in Requirement R2.		
Consolidated Edison Co. of NY, Inc.	No	If a BA is using a frequency bias setting and is not providing Overlap Regulation Service (supplying actual interchange, frequency response, and schedules to another BA), then we can assume it is supplying regulation service. Was the intent of the requirement to simply state that all BA's must have a bias setting less than zero at all times? Please clarify the intent of this requirement.
Response: The drafting team is not sure if we understand your first comment. A BA not providing Overlap Regulation Service may or may not be providing Supplemental Regulation Service. Requirement R3 is only applicable to a BA using a variable bias and		

Organization	Yes or No	Question 3 Comment
does require a BA to maintain a bias less than zero. Bullet R3.2 extends the requirement to ensure that BAs using variable bias have a bias at least equal to the FRO when frequency is outside the bandwidth of +/- 0.036 Hz. The BAs using a fixed bias are addressed in Requirement R2.		
Exelon Corporation and its affiliates	No	Please see response to question 8.
Response: Please refer to the drafting team response to Question #8.		
MRO NSRF	No	The MRO NSRF is concerned with the drafting team's exclusion of single Balancing Authority Interconnections from compliance with Requirement R3. To ensure a consistent approach in the application of the standard, recommend R3 be revised as follows:(R3). Each Balancing Authority that is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is: ...
Response: The drafting team discussed the applicability of variable bias requirements to single BA Interconnections extensively. The consensus of the drafting team was that single BA Interconnections inherently have strong incentives to accurately represent their frequency response characteristic. Any adverse consequences of misrepresenting the frequency response characteristic will be borne solely by that BA and cannot affect other BAs in other Interconnections adversely.		
MISO	No	We agree with the general obligation but believe that the requirement should apply to single BA Interconnections as well. This is supposed to be a North American standard. What other standards shouldn't apply to a single BA Interconnection? We have the same concern with Requirement 2.
Response: The drafting team discussed the applicability of variable bias requirements to single BA Interconnections extensively. The consensus of the drafting team was that single BA Interconnections inherently have strong incentives to accurately represent their frequency response characteristic. Any adverse consequences of misrepresenting the frequency response characteristic will be borne solely by that BA and cannot affect other BAs in other Interconnections adversely.		
PJM Interconnection, LLC	No	With what periodicity does a BA's frequency bias setting have to change to be

Organization	Yes or No	Question 3 Comment
		considered variable bias? For example, if a BA changes it's frequency bias setting monthly based on a percentage of each month's forecast or historic load, is this considered variable bias subject to compliance with R3 in lieu of R4?
Response: The drafting team has not defined the periodicity for changing their bias to be variable. The example given would be a form of variable bias and would trigger all rules related to variable bias. Requirement R3 is separate from Requirement R4. Requirement R4 is related to those entities providing Overlap Regulation Service. It is possible for an entity to provide Overlap Regulation Service and have a variable bias setting therefore an entity may be subject to compliance for both Requirement R3 and Requirement R4.		
BC Hydro	Yes	BC Hydro applauds the STD's efforts to recognize a more suitable bound for Variable Frequency Bias settings
Response: Thank you for your affirmative response and clarifying comment.		
Bonneville Power Administration	Yes	BPA is responding to 3.1 and 3.2 of R3. The bullets listed in question 3 on the original comment form appear to be for Requirement R4. BPA is in support of R3.1 and R3.2.
Response: Thank you for your affirmative response and clarifying comment.		
Texas Reliability Entity	Yes	It appears that R3.2 is based on the assumption that governor dead-band settings are 0.036 Hz for all interconnections with multiple BAs. While the ERCOT region has a standard 0.036 Hz dead-band specified in the ERCOT Protocols and Operating Guides, we are not sure if this is applicable to the other regions.
Response: Thank you for your affirmative response and clarifying comment. In addition, as to the deadband setting, this number was also considered to be within the frequency deviation range of the event determination criteria as defined in the Procedure document.		
Tucson Electric Power	Yes	N/A

Organization	Yes or No	Question 3 Comment
Manitoba Hydro	Yes	No comment.
NREL Transmission and Grid Integration Group	Yes	
ACES Power Marketing Standards Collaborators	Yes	
SPP Standards REview Group	Yes	
Edison Electric Institute	Yes	
pacificorp	Yes	
California Independent System Operator	Yes	
Energy Mark, Inc.	Yes	
Tacoma Power	Yes	
Southern Company	Yes	
Idaho Power Company	Yes	
Kansas City Power & Light	Yes	
Ameren	Yes	
NV Energy	Yes	

Organization	Yes or No	Question 3 Comment
Keen Resources Asia Ltd.	Yes	
Independent Electricity System Operator		Not Applicable

4. Based on Industry comments the SDT has modified "Attachment A- Supporting Document" to provide additional clarity. Do you agree with the modifications? If not, what modifications do you disagree with?

Summary Consideration: A few commenters felt that there were requirements stated within Attachment A. The drafting team explained that the requirement stated in the standard was the only requirement related to FRM. Attachment A is there to provide uniformity in the calculation of the FRM. The drafting team conscientiously included only reliability objectives in the requirements and put procedural steps in the attachment and procedure.

Several commenters expressed concern over the use of the largest event in the last 10 years for the Eastern Interconnection while all of the other Interconnections used the Category C (N-2). The drafting team stated that the results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. Further details are provided on pages 52 through 55 of the Frequency Response Initiative paper.

A couple of commenters questioned the difference between the present frequency bias of -6,360 MW/0.1 Hz and the proposed of -1,002 MW/0.1 Hz. The drafting team explained that the -6,630 MW/0.1 Hz represents a summation of the Frequency Bias Settings of all Balancing Authorities in the Eastern Interconnection, most of which use the 1% default minimum as required in the current BAL-003-0 standard, which far exceeds their real response. The IFRO of -1002 MW/0.1 Hz is the response determined to avoid the first step of Underfrequency load shedding in the Interconnection for a 4,500 MW generation loss.

A few commenters felt that clarification was need concerning changes in a BAs footprint and changes to the bias setting or FRO. The drafting team felt that this was a problem that would take care of itself. If two BAs change footprint but do not raise the issue the impact is transparent to the Interconnection. If one BA believes that its limits need to be adjusted the process will adjust the limits of both BAs accordingly.

A couple of commenters requested clarity as to how changes to the process in Attachment A would be handled. The drafting team explained that any change to the methodology described in Attachment A would have to go through the Standards Development Process prior to being implemented.

Two commenters felt that there should be an exemption for non-conforming load performing contrary to the performance of conventional load. The drafting team stated that they did not agree that there should be an exemption but has designed the forms to allow for adjustments for non-conforming load. However the BA may find that no adjustment for non-conforming load may be needed due to the measurement over multiple events rather than individual events.

Organization	Yes or No	Question 4 Comment
ACES Power Marketing Standards Collaborators	No	**(1)** Frequency Response Obligation (FRO) is used inconsistently with the proposed definition in the document. The document uses the term "Interconnection Frequency Response Obligation" in many locations. However, FRO specifically is defined as the BA's "share of the required Frequency Response". It does not apply to the Interconnection. How can the Interconnection have a share of the required frequency response? A new term may need to be defined for the Interconnection required Frequency Response. **(2)** On page 3 Attachment A states the ERO will post the Frequency Bias Setting for each BA along with their Frequency Response Obligation. Later on the same page, the document states that the BA shall set its Frequency Bias Setting to 100% to 125% of it Frequency Response Measure or Interconnection Minimum. What is the purpose of the ERO determining Frequency Bias Settings if the settings are not going to be used by the BA? What are we missing in the explanation? **(3)** Late on page 3, the document states that BAs are encouraged to notify NERC if load or generation is transferred. Section 4(a) on page 8 of the Rules of Procedure Appendix 5A - Organization Registration and Certification Manual indicates that changes to a Registered Entity's footprint actually triggers a potential certification audit. Since BAs are required to be certified and moving generation or load from the metered boundaries of one BA to another BA would represent a change in footprint, we suggest removing the word "encouraged" and stating affirmatively that BAs must notify NERC of such changes and referencing the appropriate section of the Rules of Procedure. Otherwise, BAs may not realize notification is actually required.
Response: (1) The drafting team believes the IFRO and FRO terms are used appropriately in Attachment A. Interconnection Frequency Response Obligation is not defined in the standard nor is it a performance obligation. The drafting team has clarified Attachment A in instances when using the terms to address your comments.		

Organization	Yes or No	Question 4 Comment
(2) The ERO is not determining the FBS but is only validating the FBS provided by the BA on FRS Form 1. **(3) The SDT believes these are two coordinated but separate processes. If the Rules of Procedure apply, as worded this document provides the avenue to make the necessary changes to Frequency Bias Setting.**		
Consolidated Edison Co. of NY, Inc.	No	**(1)** This document lacks definitions of terms such as CCadj, DFcc, DFcbr, resource contingency criteria (in the attachment, this is called the "target contingency criteria"), etc. **(2)** Of value to entities would be a sample calculation. **(3)** "The largest category C (N-2) event is used for all interconnections except the Eastern which uses the largest event in the last 10 years". Why aren't all interconnections using the same design contingency design basis? **(4)** The NERC 2012 CPS2 bounds has an Eastern Interconnection frequency bias of -6,360 MW/.1Hz. Can the DT explain why this attachment refers to an Interconnection frequency response obligation of -1,002MW/.1Hz. This is a significant difference.
Response: (1) As stated in Attachment A these terms are defined in the Procedure. The drafting team clarified the use of multiple terms of "resource contingency criteria" throughout both Attachment A and the Procedure documents. **(2) The drafting team will provide a sample calculation of the BA FRO and FRM and post this information on the NERC RS website. The calculation of the IFRO is shown in the Attachment A with the formulas shown in the Procedure document.** **(3) The results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. Further details are provided on pages 52 through 55 of the Frequency Response Initiative paper.** **(4) The -6,630 MW/0.1 Hz represents a summation of the Frequency Bias Settings of all Balancing Authorities in the Eastern Interconnection, most of which use the 1% default minimum as required in the current BAL-003-0 standard, which far exceeds their real response. The IFRO of -1002 MW/0.1 Hz is the response determined to avoid the first step of Underfrequency load shedding in the Interconnection for a 4,500 MW generation loss.**		

Organization	Yes or No	Question 4 Comment
American Electric Power	No	AEP is under the impression that there are some requirements, which though not explicitly stated, are implied in Attachment A. AEP feels strongly that these "sub-requirements" should be clarified and contained within the body of the requirements of the standard.
Response: The requirement stated in the standard is the only requirement related to FRM. Attachment A is there to provide uniformity in the calculation of the FRM.		
Duke Energy	No	As indicated in our comments in the past, Duke Energy is certain that as the Interconnection Frequency Bias Setting (FBS) is set closer to the actual Frequency Response in a multi-BA Interconnection, most BAs will be challenged in meeting CPS2, while CPS1 and the proposed Balancing Authority ACE Limit (BAAL) will be more achieveable bounds, and in some cases CPS1 performance will improve. Though probably most of the BAs may welcome a FBS set as high in magnitude as allowed to address the potential compliance risk, there are some which may desire to set their FBS closer to their required minimum allocation rather than have to take on a larger obligation in frequency support under the secondary control measures. Duke Energy believes that this proposed standard should incent BAs to provide more than their share of Frequency Response to the Interconnection and allow that good performance to be recognized; however the requirements described in Attachment A for determining the minimum Frequency Bias Setting (FBS), which requires that the FBS be set no lower in magnitude than the FRM, will leave certain over-performing BAs with no choice but to reduce their actual Frequency Response (still well-above their FRO) if they want to operate with a FBS set closer to the Interconnection Minimum allocation and be relieved of the associated increased obligation for frequency support under the secondary control measures. The FBS is embedded within the secondary control measures of CPS1, CPS2 and the draft Balancing Authority ACE Limit (BAAL). Comparable treatment of similarly-sized BAs (based upon the FRO allocation) is only possible if all BAs are provided the same minimum FBS requirement. To the extent that a BA provides more than its share of response to events, it's over-performance will only

Organization	Yes or No	Question 4 Comment
		be recognized if its ACE is allowed to reflect a FBS comparable to its peers, allowing its over-performance to be reflected in ACE in support of bringing frequency closer to 60 Hz. Generation control algorithms implemented today to optimize CPS1 will allow non-zero ACE when in support Interconnection frequency within bounds determined by the BA - there should be no concern of "response withdrawal" with such algorithms in place, the BA will simply get credit for such performance. As depicted in the current document, the over-performing BA would be required to set its minimum FBS at its FRM (or greater in magnitude), taking away what should be considered over-performance, erasing it in ACE, and turning it into an obligation under the secondary control measures. Based upon the draft, the only way that the BA could be treated comparably to other similarly sized BAs held only to operating to the Interconnection Minimum allocation, would be to reduce its actual response in FRM to a value less in magnitude than its Interconnection Minimum allocation. Duke Energy believes that BAs should be incented to provide more than their share of Frequency Response, and be given the opportunity to report performance on a basis comparable to similar-sized BAs. Our opinion is that Attachment A ensures that the Interconnection Frequency Bias Setting will remain at some margin above the actual Interconnection Frequency Response in magnitude - the reliability of the Interconnection will not be at risk by allowing over-performing BAs to operate and report performance on a comparable basis to other similarly-sized BAs based upon the Interconnection Minimum allocation if they choose to do so - to that extent, Duke Energy suggests that the language on page 3 be changed to:"A BA using a fixed Frequency Bias Setting may set its Frequency Bias Setting to any number the BA chooses up to 125% of its Frequency Response Measure as calculated on FRS Form 1, but no less in magnitude than its Interconnection Minimum allocation as determined by the ERO."Regarding the argument which could be offered that a larger FBS in magnitude will also allow wider bounds for control performance, Duke Energy agrees that a large portion of the BA operation will be around 60 Hz where such a benefit could be realized, however it would also come at the cost of a larger obligation than other comparably-sized BAs in sustained support of frequency during the more critical times of significant deviation from 60 Hz where the BA's compliance could be at risk. Below 59.95 Hz in the Eastern Interconnection (the

Organization	Yes or No	Question 4 Comment
		Frequency Trigger Limit under BAAL), the additional MWs needed to be compliant for any given frequency are greater than the MWs of imbalance allowed by the larger BAAL bound - comparably-sized BAs will not be comparably judged if the standard forces over-performing BAs to assume a larger FBS (in magnitude) than their peers - that should be the decision of the BA. We believe that the proposed language above will create the proper incentive for a Balancing Authority to provide more than its minimum allocation of Frequency Response, and allow it to choose if it wants to make that performance part of a larger FBS (in magnitude), knowing the associated risks and benefits of that decision.Duke Energy supports this standard allowing for Frequency Response Sharing Groups, however the requirements and supporting documents need to clearly allow the FRSG to be treated no differently than if it was a Balancing Authority and shield the participating BAs from compliance scrutiny when all scrutiny should be placed on the FRSG performance as a whole. At the top of Page 3, the standard attachment allows the FRSG to "calculate a group NIA and measure the group response to all events in the reporting year on a single FRS Form 1", however at the bottom of page 3, the standard attachment still requires the FRSG BAs to individually fill out Form 1 and Form 2 for the purposes of determining the minimum Frequency Bias Setting. Duke Energy believes that the standard language in Attachment A, and the supporting form(s), should allow the FRSG, if it chooses, to also report the split of the group FRM which the BAs will use to individually determine their Frequency Bias Setting, rather than require each BA in an FRSG to still maintain Form 1 and Form 2 data. Form 1 could be modified for the FRSG to report the group's FRM along with the split of the FRM among the members, and another form could be developed for each FRSG BA to fill out, replicating only the section of Form 1 (column S) where each BA could provide values for its FRM allocation, its desired FBS, its minimum FBS allocation, and so on.
Response: The drafting team has chosen to reduce the minimum Frequency Bias Settings for individual BAs on a controlled basis on each Interconnection. Your suggestion would eliminate the ability of the drafting team to coordinate the reduction of the minimum Frequency Bias Settings for the BAs. Other commenters have stated that they disagree with reducing the minimum		

Organization	Yes or No	Question 4 Comment
Frequency Bias Setting. The drafting team is attempting to balance between the two positions stated in previous postings. **The drafting team understands your concern regarding the treatment of FRSG and the minimum Frequency Bias Setting. However, the drafting team believes that this allocation of Frequency Bias among the FRSG members on a basis different from the measured response could be detrimental to reliability under system separation conditions. Future consideration of this issue may be possible once additional information is available.**		
Independent Electricity System Operator	No	As indicated in our previous comments, the status of Attachment A is unclear. It is a mixture of requirements, criteria, process and guideline. Making a direct reference in the standard's requirements (R1 and R2) makes Attachment A as part of the requirement and hence is enforceable, but it contains process and guideline information that is not subject to assessment. On the other hand, the absence of a Measure to assess adherence to the criteria and process suggests that Attachment A is not enforceable. It is this ambiguity that makes it difficult for the industry to assess the extent to which they must follow the process. Again, we urge the SDT to keep only the criteria/process parts that must be adhered to in Attachment A, and extract the remaining parts and place them in a guideline document, or an appendix.In addition, the Responsible Entities are required to submit Form 1 and Form 2, but such requirements are not written explicitly as "shall", and are imbedded in the Attachement whose mandatory status is unclear. This makes the standard very confusing from an Responsible Entity's obligation and compliance perspective.
Response: The requirement stated in the standard is the only requirement related to FRM. Attachment A is there to provide uniformity in the calculation of the FRM. The drafting team conscientiously included only reliability objectives in the requirements and put procedural steps in the attachment and procedure.		
BC Hydro	No	BC Hydro agrees with the principles outlined in the Attachment A but has some concerns as follows: 1.Attachment A is no longer recognized as one of the associated document of the proposed Standard in its currently posted version. We believe this was removed by mistake.

Organization	Yes or No	Question 4 Comment
		2.There is no clarity as to how certain factors used in determining the Interconnection FRO such as CCADJ, CBR and BC'ADJ were determined. There is no apparent provision to re-assess any potential changes to these factors over the future years. If such provision is needed or has been provided then consideration should be given to averaging the adjustment over a longer duration (i.e., using the average of the factor observed over a number of years rather than just the year being assessed). 3.The method used for the allocation of the Interconnection FRO to BAs seems to not recognize the fact that frequency response from Load is much less than frequency response from Generation of an equal MW size. 4.If this Attachment A is considered an integral part of the standard then there should be some enforceable measures to ensure applicable entities adhering to the prescribed time line.
Response: **(1) The drafting team disagrees that Attachment A is not one of the associated documents of the standard. It is included by reference in Requirements R1 and R2 and will be attached to the standard upon final approval.** **(2) If the data inputs change then the number will change but the methodology used to calculate the number cannot change without going through the standards process.** **(3) The drafting team agrees with your conclusion. The source of the Frequency Response is not related to the distribution of the obligation.** **(4) The requirement stated in the standard is the only requirement related to FRM. Attachment A is there to provide uniformity in the calculation of the FRM. The drafting team conscientiously included only reliability objectives in the requirements and put procedural steps in the attachment and procedure.**		
Bonneville Power Administration	No	BPA does not agree with the methodology in Attachment A. Please see BPA's response to question 6 as well as BPA's extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found at: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf.

Organization	Yes or No	Question 4 Comment
Response: Please refer to our response to Question #6 and our responses to your comments submitted on 12/8/11.		
Exelon Corporation and its affiliates	No	Exelon is troubled by the approach of having requirements that rely so heavily on the attachment to the standard. The use of both of the documents is required to be compliant and this makes it difficult to determine what the obligations are and increases the chance for error in interpretation. The suggested changes below in response to question 8 take information from the Attachment and establish requirements so that an entity does not have to go back and forth between the two documents to identify its obligations. Attachment A should then be modified to include examples of Forms 1 and 2 and instructions for completing the form for Balancing Authorities and Frequency Response Sharing Groups.
Response: The requirement stated in the standard is the only requirement related to FRM. Attachment A is there to provide uniformity in the calculation of the FRM. The drafting team conscientiously included only reliability objectives in the requirements and put procedural steps in the attachment and procedure. **The drafting team will provide a sample calculation of the BA FRO and FRM and post this information on the NERC RS website. The calculation of the IFRO is shown in the Attachment A with the formulas shown in the Procedure document.**		
SERC OC Standards Review Group	No	It is important for NERC to monitor the interaction between the deployment of this standard and its impact on CPS1, CPS2, and BAAL. If performance in the CPS criteria is degraded, there should be a halt in the reduction of the minimum bias setting allowed. There is also concern that we are providing the correct incentives to the entities to provide the appropriate amount of frequency response. We also suggest that clarification be made so that changes in the BA's footprint that would necessitate changes in the bias setting or the FRO be permanent changes, not just temporary. It is unclear how performance would be measured for a BA versus a frequency response sharing group.

Organization	Yes or No	Question 4 Comment
Response: The minimum is not required to be reduced but is allowed to be reduced if no significant impacts are seen on CPS1, CPS2 and BAAL. **The drafting team agrees that temporary changes will not apply in this case. It is a problem that will take care of itself. If two BAs change footprint but do not raise the issue the impact is transparent to the Interconnection. If one BA believes that its limits need to be adjusted the process will adjust the limits of both BAs accordingly.** **The Background Document and Attachment A explain how a FRSG would report. The FRS Forms allow BAs and RSGs to account for contributions from either.**		
PPL NERC Registered Affiliates	No	The NERC posting did not include a redline to Attachment A, therefore, it is not clear what modifications were made. However, there are several modifications that would add clarity to the attachment. The PPL Affiliates support the comments of the SERC OC Standards Review Group on this question, additionally, the following issues should be addressed: In Attachment A, page 3 and elsewhere, clarify that temporary or small transfers of load or generation between BAs do not require notification to the ERO or changes to the FBS or CPS limits. In Attachment A, page 4, a BA should be allowed to be exempt from evaluation any single frequency event where non-conforming load performs contrary to the performance of conventional load (ie. during a frequency decline, the non-conforming load simultaneously increases significantly). By nature, non-conforming load is totally unpredictable, changes quickly, and fluctuates widely. Other than interruption, the BA has no control over the actions of such loads nor can the BA predict or assume any "normal" action by a non-conforming load during a frequency disturbance event. Setting a limit on the number of events that a BA could exempt (regardless of the reason) from FR evaluation in any given year would be more fair and effective in evaluating a BA's frequency response performance.
Response: Please refer to our response to the SERC OC Standards Review Group.		

Organization	Yes or No	Question 4 Comment
The drafting team does not agree that there should be an exemption but has designed the forms to allow for adjustments for non-conforming load. However the BA may find that no adjustment for non-conforming load may be needed due to the measurement over multiple events rather than individual events.		
Kansas City Power & Light	No	The Standard proposes a calculation that overstates the frequency response obligation (FRO) for Balancing Authorities.
Response: The drafting team disagrees with your comment. However, the drafting team cannot provide any detail due to the lack of details in your comment.		
Arizona Public Service Company	No	The supporting document on the standards page does not provide information on CB Ratio and why it is used. It significantly increases FRO and should be justified based upon strong technical basis and actual experience. (Please also see AZPS response to question 6, The Frequency Response Initiative Report should be on the Standards page).
Response: The rationale can be found beginning on page 14 of the Background document and page 49 of the FRI report. **Please refer to our response for Question #6.**		
PJM Interconnection, LLC	No	The target contingency protection criterion for the Eastern Interconnection is the largest event in the last 10 years (believed to be a 2007 event) which is inconsistent with the other Interconnections. Is periodic review required for this criteria? Will this criteria be revised after the referenced event is older than 10 years? Are the other three interconnection's target contingency protection criteria subject to revision if they experience an event larger than a category C? This BA believes that future periodic analysis should be defined and subsequent findings used to support changes via the standard revision process. What are the procedural requirements for revising Attachment A? This BA is concerned that the procedure for revising Attachment A is undefined and

Organization	Yes or No	Question 4 Comment
		that, for example, the IFRO could be increased absent the formal standard revision process, increasing a BA's FRO and subsequently increasing a BA's compliance risk without providing BA's the opportunity to review, comment, and ballot.Related to the previous comment/question, how often are the statistically derived values in Table 1 subject to a required update? For example, the Eastern Interconnection is adjusted due to observed primary frequency response withdrawal ('lazy L' characteristic). The other Interconnections are adjusted for observed differences between point C and point B. As the frequency response characteristics of any Interconnection change, is Table 1 subject to required analysis and revision? This BA believes that future periodic analysis should be defined and subsequent findings used to support changes via the standard revision process. Attachment A indicates that a BA may exclude an event from annual Form 1 FRM evaluation only if its tie-line or frequency data is corrupt or unavailable. This exempts numerous scenarios that could result in a poor response score due to system variations. These could include, but are not limited to, changing energy schedules, changes in load, and AGC driving units up or down due to the ACE value at the time of the frequency event. This subjects the BA to undue compliance risk even though the BA may have adequate frequency responsive resources at the time. This BA suggests that the FRSDT adopt language (and Form 2 functionality) that allows the exclusion of events that are skewed by these types of situations. Attachment A and Forms 1 & 2 specify that 20 to 52 seconds will be used as the post-event B point average for FRM determination. The number of fast responding resources will increase as the technology for batteries, flywheels, and frequency controlled demand side devices moves forward over time. The 20 to 52 second interval does not adequately incentivize the devopment of these technologies.
Response: The results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason, the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. Further details		

Organization	Yes or No	Question 4 Comment
are provided on pages 52 through 55 of the Frequency Response Initiative paper. **As the model for the EI is improved and information and experience is gained under this standard the answer to your question will be determined through an open and inclusive process.** **If it is determined that a change in any methodology used in the processes in this standard is needed it would have to go through the standards process.** **The drafting team does not agree that there should be an exemption but has designed the forms to allow for certain adjustments. In addition, the methodology recommended utilizing the median addresses the concerns related to a single event occurrence. Ultimately the BA may find that no adjustment may be needed due to the measurement over multiple events rather than individual events.** **This standard was not intended to provide incentives for the development of new technologies. It is intended to provide for the reliable operation of the Bulk Electric System.**		
Northeast Power Coordinating Council	No	This document lacks definitions of terms such as CCadj, DFcc, DFcbr, resource contingency criteria (in the attachment, this is called the "target contingency criteria"), etc. A sample calculation would be of value to entities. "The largest category C (N-2) event is used for all interconnections except the Eastern which uses the largest event in the last 10 years". All interconnections should be using the same design basis contingency. The NERC 2012 CPS2 bounds has an Eastern Interconnection frequency bias of -6,360 MW/.1Hz. Why does this attachment refer to an Interconnection frequency response obligation of -1,002MW/.1Hz.? This is a significant difference.
Response: As stated in Attachment A these terms are defined in the Procedure. The drafting team clarified the use of multiple terms of "resource contingency criteria" throughout both Attachment A and the Procedure documents. **The drafting team will provide a sample calculation of the BA FRO and FRM and post this information on the NERC RS website. The calculation of the IFRO is shown in the Attachment A with the formulas shown in the Procedure document.** **The results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason, the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. Further details are provided on pages**		

Organization	Yes or No	Question 4 Comment
52 through 55 of the Frequency Response Initiative paper. **The -6,630 MW/0.1 Hz represents a summation of the Frequency Bias Settings of all Balancing Authorities in the Eastern Interconnection, most of which use the 1% default minimum as required in the current BAL-003-0 standard, which far exceeds their real response. The IFRO of -1002 MW/0.1 Hz is the response determined to avoid the first step of Underfrequency load shedding in the Interconnection for a 4,500 MW generation loss.**		
Ameren	No	We disagree on having different methodologies for determining the targets, and would like clarity added for when those targets may change, such as what will happen after the largestest event in the last 10 years rolls off the books for the EI?
Response: The results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason, the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. Further details are provided on pages 52 through 55 of the Frequency Response Initiative paper. **If it is determined that a change in any methodology used in the processes in this standard is needed it would have to go through the standards process.** **As the model for the EI is improved and information and experience is gained under this standard the answer to your question will be determined through an open and inclusive process.**		
Manitoba Hydro	Yes	(1) Page 2, Balancing Authority Frequency Response Obligation (FRO) and Frequency Bias Setting: States that the ERO is responsible for "annually assigning an FRO and Frequency Bias Setting to each BA." No mention is made of FRSGs. (2) Neither R1 nor the referenced Attachment A clarifies the FRM requirements for an FRSG to comply versus a BA. In particular, compared to BAL-002-0 R1.1, which clearly states that the BA may elect to fulfill its obligation through an FRSG and that in such cases the FRSG has the same responsibilities as each BA (that is a participant in the FRSG). (3)Attachment A refers to an FRSG calculating FRM, but the standard does not.

Organization	Yes or No	Question 4 Comment
Response: 1) - The FRSG FRO is a summation of its members' FROs. **2) & 3) -The drafting team believes that it is clearly stated for a FRSG compliance with R1. The Requirement reads "Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation."**		
Texas Reliability Entity	Yes	1. The calculation for the FRO for ERCOT includes a credit of 1400 MW for load resources. 1400 MW is currently the maximum amount of LR that can be procured through the ERCOT ancillary service process. There can be periods during the day where 1400 MW was not procured or is not available (It was noted during the summer of 2012 that on some days, only 900 MW of LR was available through the ancillary service process). Should the calculated IFRO (-286 MW per 0.1 Hz) be modified to account for this variation? 2. Background Document says: "Attachment A proposes the following Interconnection event criteria as a basis to determine an Interconnection's Frequency Response Obligation: o Largest category C loss-of-resource (N-2) event o Largest total generating plant with common voltage switchyard o Largest loss of generation in the interconnection in the last 10 years" For ERCOT, the largest loss of generation in the last 10 years was over 3400 MW, and does not match the 2750 MW (N-2) value used for the IFRO calculation.
Response: **(1) The process used to determine the IFRO has been vetted through multiple forums. The drafting team feels that the proposed calculation is appropriate for the standard at this time. As experience is gained through the implementation of this standard, the calculation will be reviewed and any adjustments will be addressed through an open and inclusive process.** **(2) The results for the current Texas Interconnection model represent observed response adequately so the recommended Resource Contingency Criteria for ERCOT is the Category C N-2 event. For further details related to the full determination,**		

Organization	Yes or No	Question 4 Comment
please refer to the Frequency Response Initiative paper.		
SPP Standards REview Group	Yes	Delete the 2nd 'that' in the 2nd bullet at the top of page 3.
Response: Thank you for the comment. The drafting team has made the correction.		
Xcel Energy	Yes	It is not clear however, as to if this is actually part of the standard or if it is a document that can be revised without going through the standards development process. Also, the formatting of the document should be modified to clearly identify where 'steps/actions' are needed from responsible parties, whether that be the ERO or BA/FRSG.
Response: If it is determined that a change in any methodology used in the processes in this standard is needed it would have to go through the standards process. **Please refer to the "timeline" on page #6 of Attachment A as this clearly provides for who has responsibility for each step in the process.**		
NextEra Energy	Yes	NextEra Energy does not support the changes made. It is concerned that certian changes were made to help some large East coast entities that could not comply at the expense of the FRCC region. Specifically, now on page 3 of Attachment A 4th paragraph from the bottom the statement is made " sets its frequency bias to the greater of". We believe that this must be changed to either Statement 1 " Any number the BA chooses between 100% etc"Or Statement 2 " Interconnection minimum as determined by the ERO" Without this change, NextEra beleives the FRCC will be unfiarly treated relative to others on the Eastern Interconnection. The technical reasons for this is concern was explained during the Standard Drafting Team meetings. In addition, the ERO limit which is set at 0.9% of load should be changed to read within 0.8 or 0.9% of peak load based on the BA's choice. Also, see page 7 of the Procedure document and compare to page 1 of Attachment A.

Organization	Yes or No	Question 4 Comment
		The formulae abbreviations for the variables in the Procedure are not likewise abbreviated in Attachment A. For example, "Credit for LR" on Attachment A is "CLR" in the Procedure, but it requires cross checking each document to figure this out. Or CBr in Attachment A, Table 1 is represented as DFCBR in the Procedure, Page 7. Since the same variables are being described, these should be represented the same way in both documents throughout. 2. Similarly, is "IFRO" in Table 1 of Attachment A the same as "FROInt" of the equation that follows on page 2? The same abbreviation should be used to represent this variable. The documents should be revised in general along these lines for all terms. 3. In Procedure document, page 5, paragraph 3 it should read "Table 2", not "1". 4. In the Procedure, it would be good to show Table 1 and Table 2 as Table 1 of Attachment A (i.e. use table lines and borders). 5. At least in the first usage, ERO in the Procedure document should be spelled out as "Electric Reliability Organization (ERO)". 6. In Table 1 of Attachment A, the two footnotes preceded by asterisks (single and double on page 2) should be connected to the table by adding a single superscripted asterisk to the Eastern UFLS value of 59.5, and a double superscripted asterisk to the ERCOT LR value of 1,400.

Response:

(1) The drafting team does not believe any BAs were favored over other BAs. However the drafting team is unclear as to your expressed concerns related to FRCC. In direct communications with FRCC they concluded that the IFRO starting frequency of the prevalent 59.5 Hz for the Eastern Interconnection is acceptable in that it imposes no greater risk of UFLS operation in FRCC for an external resource loss event than for an internal FRCC event.
The drafting team does not agree with the recommended wording change for the bias setting because it would essentially remove the Interconnection minimum FBS. The drafting team does not agree that we are mixing terms between the Procedure and Attachment A. The drafting team uses CBR and DFCBR in both documents defining two different variables. The drafting team clarified CLR.

Organization	Yes or No	Question 4 Comment
(2) The drafting team clarified IFRO/FRO in the documents. **(3) Thank you. The drafting team has corrected this in the document.** **(4) The drafting team thanks you for your comment. However, the majority of the industry does not support your suggested modification. Therefore, the drafting team will leave the tables as shown.** **(5) The drafting team changed ERO to Electric Reliability Organization as per your suggestion.** **(6) Thank you. The drafting team has made the changes.**		
NREL Transmission and Grid Integration Group	Yes	Table 1: CB_r units should be unitless, CB'adj should be Hz.
Response: Thank you for the comment. The drafting team has made these changes.		
NV Energy	Yes	This document is improved, and satisfactorily addresses comments from the prior posting.
Response: Thank you for the comment.		
New York Independent System Operator	Yes	With a new process we are concerned that the interconnection minimum will initially move from 1.0% to 0.9%.
Response: Thank you for your comment. The new process moves the minimum from 1.0% to 0.9%.		
MRO NSRF	Yes	
Edison Electric Institute	Yes	
pacificorp	Yes	
California Independent System Operator	Yes	

Organization	Yes or No	Question 4 Comment
Energy Mark, Inc.	Yes	
Tacoma Power	Yes	
Southern Company	Yes	
Idaho Power Company	Yes	
Tucson Electric Power	Yes	
Keen Resources Asia Ltd.	Yes	
MISO	Yes	
Puget Sound Energy		In reviewing the Consideration of Comments document, it is clear that the standard drafting team does not wish for the administrative elements of Attachment A to become items addressed during compliance evaluations ("There is no intent to require filing on a certain date and to have the BA prove to the auditor that a filing was made on that date." This quote appears at several places in the Consideration of Comments documents, but first at page 113). However, because Attachment A is referenced in the standard, its provisions, including the timing table, are all mandatory and enforceable. This result is emphasized by the language of requirement R1, which states that entities "...shall achieve an annual Frequency Response Measure (FRM) as calculated and reported in accordance with Attachment A...." This language means that a failure to file a document on a date specified in the attachment would be a potential compliance violation. Because Attachment A is mandatory and enforceable, the standard drafting team should carefully review its provisions and clarify which elements are requirements and which elements are background statements or guidance. In addition, the use of additional headings and section numbers would add in clarifying the document (for example, at the top of page 3, there is a discussion of how an FRSG would calculate its FRM; however, there is an entire section beginning on

Organization	Yes or No	Question 4 Comment
		page 4 addressing FRM where that discussion should instead appear).
Response: The requirement stated in the standard is the only requirement related to FRM. Attachment A is there to provide uniformity in the calculation of the FRM. The drafting team conscientiously included only reliability objectives in the requirements and put procedural steps in the attachment and procedure.		

5. The SDT has moved a portion of the material located in Attachment A and all of the material located in "Attachment B- Process for Adjusting Bias Setting Floor" into a new document "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard". The SDT created this document to assign tasks to the ERO and provide instructions for the ERO to follow when carrying them out under the BAL-003-1 standard. Do you agree that the ERO should perform these tasks and that this document provides sufficient detail for the ERO to do it under the BAL-003-1 standard? If not, what needs to be added to the document?".

Summary Consideration: Several commenters requested clarity on how modifications to the Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard would be made. The drafting team explained that the "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard" was not incorporated into the BAL-003 Frequency Response Reliability Standard. As such, modifications to the Procedure will not be developed through the standard development process. Consistent with NERC's commitment to an open and transparent process, the procedure for modifying the event selection process for supporting the Frequency Response Standard is set forth in the opening paragraph of the Procedure for ERO Support of Frequency Response and Frequency Bias Setting document. NERC will post suggested modifications for a 45-day formal comment period, respond to all comments and will discuss the revision request in a public meeting. Revisions will be provided to the NERC BOT for approval and in addition, any modifications will be filed with FERC for informational purposes. This process provides the industry assurance that changes will be properly vetted and that there is an opportunity for stakeholder input.

A couple of commenters questioned how events would be excluded, specifically with regards to during ramping periods. The drafting team stated that all events are considered. Events that occur over known ramping periods are selected last. As an example, the event reflected in the right graph shown in the Procedure would be selected over the event reflected in the graph on the left. If an inadequate number of events are available for that season, then these events may be used. The benefit of using the median of at least 20 events in a year helps minimize the impact of outliers.

A few commenters did not understand why the frequency criteria are different for each Interconnection. The drafting team explained that the frequency criteria was different for each interconnection because the frequency used to measure frequency response is interconnection dependent and varies differently for each interconnection. Larger interconnections have greater frequency response and as a consequence smaller frequency deviations for events of the size typically experienced.

One or two commenters questioned whether certain events should always be included in the evaluation process. The drafting team stated that based on event evaluation by this drafting team, it has been determined that it is impossible to require certain events to be included. This is the reason that the drafting team has developed the Event Selection Criteria.

Organization	Yes or No	Question 5 Comment
Keen Resources Asia Ltd.	No	As a professionally trained published statistical expert never compensated by any balloting participant, I consider event selection criterion 7 to be unacceptable because it violates the fundamental statistical procedure of sampling statistical data "as is" and not pre-selecting the data (to fit some preferred even-distribution over time) and therefore biasing it before applying any statistical procedure to the data. Event criterion 6 is also unacceptable for being an an "ad hoc" explicit exclusion, from the definition of the frequency response being measured, of response to frequency events that occur during a specific kind of scheduled generation and load changes. Said exclusion needs to be written into the definition of the Frequency Response that is being measured. It is procedurally improper and unacceptable to bias the sampling procedure by explicit exclusion of data as an alternative to redefining the thing being sampled. In that case it's not generic Frequency Response that is being sampled, but some specific Frequency-Response-less-Response-to-Excluded-Events that is being measured. It is non-transparent and subterfuge to avoid instead accordingy reworking/narrowing the definition of Frequency Response, especially as said reworking requires a clear technical justification that is absent from this standard, and modifying the existing NERC Glossary definition of Frequency Response which Criterion 6 therefore stands in flat violation of.

Response: Criterion 7 is included in the Event Selection Criteria because the drafting team considers it very important to be able to select and finalize events for analysis quarterly so that the BAs can evaluate their performance as the measurement year unfolds. This necessarily requires minimal criteria to insure that this selection and finalization process can be completed quarterly. The drafting team recognizes that this finalization may have some effect on the sampling, but values the quarterly selection and finalization more than the pure statistical sampling theory. This is a trade-off that the drafting team has chosen to make. Once several years of a regular disparity between seasons of the year were established in terms of number of events in a season, the industry could propose modifying the Standard at that time to adjust Criterion 7 accordingly.

Criterion 6 is included because historic data indicate that the periods within 5 minutes of the top of the hour have shown to have

Organization	Yes or No	Question 5 Comment
higher frequency variability than other periods in the hour. Statistical analysis presented in the FRI Report indicates that pre-disturbance frequency is a significant contributor to the variability of frequency response. The drafting team has chosen to allow the exclusion of events close to the top of the hour when other acceptable events are available until analysis is done of whether these periods have a statistically different frequency response and therefore introduce bias. Meanwhile, as Balancing Authorities are moving toward quarter-hourly scheduling, the higher top-of-the-hour frequency variability prompting the need and application of Criterion 6 is expected to disappear. Therefore, while your recommended alternative of changing the NERC definition of Frequency Response may be statistically correct, from a practical perspective it would likely prove to be a needless chore and to yield a needlessly complicated definition only to have to be changed back again.		
Southern Company	No	Attachment A states that Form 1 is posted annually. The ERO support document selects events annually. The timing for the two documents needs to be aligned so that the set of selected events does not change from quarter to quarter. (If three events are selected for the first quarter those same events will be a sub-set of the 20 events selected for the annual compliance calculations.)
Response: Attachment A indicates that Form 1 with the events from the previous quarter is posted on May 10th, August 10th, November 10th and the second business day in February. It is the intent of the standard that events once posted will be included in the FRM analysis.		
BC Hydro	No	BC Hydro agrees in principle that the ERO should perform these tasks related to BAL-003-1 but has the following concerns: 1. There is no clear indication whether the Interconnection FRO will be calculated every year, and if yes, how each of the factors involved will be determined. 2. It is not clear whether data gathered in these procedures are only for the determination of annual FRO and FBS, or also to determine whether the BA or the FRSG was in compliance to BAL-003-1 for the assessed year. Since the ERO in this Document seems to be the NERC Resources Subcommittee and its Frequency Work Group, we think this fact should be made clear. The Background document should also be reviewed to ensure its alignment in this regard.

Organization	Yes or No	Question 5 Comment
Response: The drafting team has chosen to use the methods presented in the FRI Report to determine the values presented in Table 1 of Attachment A to determine the Interconnection FRO. If the method of calculation by the ERO or the base starting values used to determine the IFRO change (i.e. Resource Contingency Criteria or Prevailing UFLS First Step), then those changes will be subject to the standards process to accept those changes. If the statistical determinates used in the method change (i.e. Starting Frequency, CC_{ADJ}, CB_R, BC'_{ADJ}, and Credit for LR) or the data used to allocate the IFRO among the BAs (i.e. FERC Form 714 data) changes, the new values will be implemented without being subject to the standards process. **The data gathered for the FRO calculation is not compliance related. The calculation of FBS is also not compliance related. However, assuming the information is entered into FRS Form 1 correctly then the FBS number will be used by an auditor to determine compliance with Requirement R2.** **The drafting team has been instructed by NERC to refer to all NERC entities (i.e. Frequency Working Group, Resources Subcommittee, etc) as the ERO.**		
Bonneville Power Administration	No	BPA does not agree with the methodologies outlined in Attachment B. Please see BPA's response to question 6 as well as BPA's extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found at: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf
Response: Please refer to our response to your comment for Question #6 and our responses to your comments dated 12/8/11.		
Kansas City Power & Light	No	Criteria 3 - Why are frequency thresholds different between regions when generator governor reaction is supposed to be the same between regions? Criteria 5 - What is the reasoning that multiple events that are not stabilized within 18 seconds not being considered? Criteria 6 - How are "changes in scheduled interchange" or load change determined in regions with interconnections with multiple BAs with different time zones?
Response: The frequency criteria is different for each interconnection because the frequency used to measure frequency response is interconnection dependent and varies differently for each interconnection. Larger interconnections have greater frequency response and as a consequence smaller frequency deviations for events of the size typically experienced.		

Organization	Yes or No	Question 5 Comment
The standardized method used to measure frequency response will not work correctly for events that have not stabilized within 18 seconds. **This determination will be made by the ERO (presently the Frequency Working Group).** **All events are considered. Events that occur over known ramping periods are selected last. As an example, the event reflected in the right graph shown in the Procedure would be selected over the event reflected in the graph on the left. If an inadequate number of events are available for that season, then these events may be used. The benefit of using the median of at least 20 events in a year helps minimize the impact of outliers.**		
Duke Energy	No	Duke Energy agrees with allowing the ERO to perform this function, however the industry needs some assurance that this Procedure cannot be changed outside of the Standards Process for approval by the industry. In the sixth line of the third paragraph on page 5, the statement should reference Table 2. Page 5 reads as if the BAs will submit their data based upon Form 1 which includes an adjustment to the Interconnection peak load (initially 0.9), and then the ERO will determine whether the Interconnection minimum FBS is still more than 20% above the measured response - if so, the minimum FBS will be adjusted, requiring the BAs to reassess their new minimum FBS based upon a different factor, and decide whether to use that value or choose a value up to 125% of their FRM, resulting in another iteration of values being submitted to the ERO. If the ERO is going to do an independent assessment of Interconnection Frequency Response to the events, on an annual basis prior to gathering data from the BAs, the ERO could compare the total FBS being used by the BAs against the estimated Frequency Response over that period to determine if an adjustment is warranted, and then the ERO could include the appropriate adjustment factor (0.9, 0.8, etc..) in Form 1 for the BAs to use. If the ERO is not going to estimate the Frequency Response aside from the BAs, multiple iterations will be likely. Duke Energy suggests the following language to cover the point above: “On an annual basis, the ERO will review the Interconnection total minimum Frequency Bias Setting for the prior period and compare it against the Interconnection’s total natural Frequency Response determined for that period. If an Interconnection’s total minimum Frequency Bias Setting exceeds (in absolute value) the Interconnection’s total natural

Organization	Yes or No	Question 5 Comment
		Frequency Response by more (in absolute value) than 0.2 percentage points of the Interconnection non-coincident peak load (expressed in MW/0.1Hz), the minimum Frequency Bias Setting for BAs within that Interconnection may be reduced (in absolute value) based on the technical evaluation and consultation with the regions affected by 0.1 percentage point of Interconnection non-coincident peak load (expressed in MW/0.1Hz) to better match that Frequency Bias Setting and natural Frequency Response. The ERO will include the adjustment factor in the Interconnection Form 1 used by the Balancing Authorities for the calculation of the new minimum Frequency Bias Setting. The Form 1 information from the Balancing Authorities will be gathered by the ERO in coordination with the regions of each Interconnection to determine the final Interconnection Frequency Bias Setting for the next period."
Response: The "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard" is not incorporated into the BAL-003 Frequency Response Reliability Standard. As such, modifications to the Procedure will not be developed through the standard development process. Consistent with NERC's commitment to an open and transparent process, the procedure for modifying the event selection process for supporting the Frequency Response Standard is set forth in the opening paragraph of the Procedure for ERO Support of Frequency Response and Frequency Bias Setting document. NERC will post suggested modifications for a 45-day formal comment period, respond to all comments and will discuss the revision request in a public meeting. Revisions will be provided to the NERC BOT for approval and in addition, any modifications will be filed with FERC for informational purposes. This process provides the industry assurance that changes will be properly vetted and that there is an opportunity for stakeholder input. **The reference has been changed from Table 1 to Table 2. Thank you for your comment.** **The review of the information provided by the BAs discussed in the Procedure document will take a significant amount of time. Therefore, the change to the Interconnection Minimum Frequency Bias Setting will occur on the subsequent year's Form 1. This will eliminate the risk of multiple iterations and allow sufficient time for the ERO to consult with the regions as indicated in the Procedure. The drafting team has included clarifying language in the document.**		
Tucson Electric Power	No	I think it should be more clear or better defined that an interconnection does have some input into what events are selected.

Organization	Yes or No	Question 5 Comment
Response: Thank you for your comment. Each interconnection has a representative on the Frequency Working Group that performs the selection of events.		
Exelon Corporation and its affiliates	No	Please see response to question 8.
Response: Thank you for your comment. Please see response to Question 8.		
PJM Interconnection, LLC	No	The Procedure indicates that events that occur when 'large interchange schedule ramping or load change is happening' and 'events occurring within 5 minutes of the top of the hour' should be excluded from consideration. Since interchange schedule ramping and load change occurs at the BA level, this BA believes that the Procedure allows for the selection of events that occur when a BA is experiencing these conditions but Attachment A does not allow for exemption of these events. Also, the Procedure specifies that events that occur at the top of the hour be excluded, if other qualifying events exist, but this does not take into consideration energy markets that allow for sub-hourly schedule changes (e.g. 15 minutes) and the BA is not permitted to exempt these events on Form 1 subjecting the BA to undue compliance risks.
Response: Thank you for your comment. All events are considered. Events that occur over known ramping periods are selected last. As an example, the event reflected in the right graph shown in the Procedure would be selected over the event reflected in the graph on the left. If an inadequate number of events are available for that season, then these events may be used. The benefit of using the median of at least 20 events in a year helps minimize the impact of outliers.		
Texas Reliability Entity	Yes	1. Event Selection Criteria Item 2: Should certain events require mandatory inclusion for FRM calculation (i.e. DCS events)? 2. Event Selection Criteria Item 6: We disagree with the way this is worded. If a unit trips during this time, as it often can, measured frequency response needs to occur. We understand that the results are impacted by the grid condition and perhaps that is why the SDT decided to exclude the issue. Need to define what is intended by a "large"

Organization	Yes or No	Question 5 Comment
		interchange ramp schedule or load change. May also want to consider changing the language from "will be excluded from consideration" to "MAY be excluded from consideration".
Response: Thank you for your comment. Based on event evaluation by this drafting team, it has been determined that it is impossible to require certain events to be included. This is the reason that the drafting team has developed the Event Selection Criteria. **The drafting team wrote the criteria to allow flexibility for any change that significantly impacts frequency.** **The drafting team looked at the language and determined that the present language provides greater clarity. The "will be excluded" is followed by "…if other acceptable frequency excursion events from the same quarter are available." Therefore, it is not a mandatory exclusion.**		
Edison Electric Institute	Yes	EEI supports the ERO's role as defined in the procedure but is concerned that the procedure, unlike approved NERC standards, is unbounded by the current rules for developing standards. For that reason, EEI recommends that the procedure become more formalized and integrated into the standard as an addendum thereby avoiding any Industry concerns that future modification might occur outside the approved processes
Response: Thank you for your comment. The "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard" is not incorporated into the BAL-003 Frequency Response Reliability Standard. As such, modifications to the Procedure will not be developed through the standard development process. Consistent with NERC's commitment to an open and transparent process, the procedure for modifying the event selection process for supporting the Frequency Response Standard is set forth in the opening paragraph of the Procedure for ERO Support of Frequency Response and Frequency Bias Setting document. NERC will post suggested modifications for a 45-day formal comment period, respond to all comments and will discuss the revision request in a public meeting. Revisions will be provided to the NERC BOT for approval and in addition, any modifications will be filed with FERC for informational purposes. This process provides the industry assurance that changes will be properly vetted and that there is an opportunity for stakeholder input.		
ACES Power Marketing	Yes	Overall, we agree. However, we suggest the document clarify that the ERO shall

Organization	Yes or No	Question 5 Comment
Standards Collaborators		perform these tasks in coordination with the Resources Subcommittee. It consists of industry experts that can be an extra resource to NERC. Furthermore, NERC staff working with the Resources Subcommittee will provide additional transparency to the process.
Response: Thank you for your comment. The drafting team has been instructed by NERC to refer to all NERC entities (i.e. Frequency Working Group, Resources Subcommittee, etc) as the ERO.		
MISO	Yes	The first hyperlink on page 3 of the Procedure for ERO Support does not work.
Response: Thank you for your comment. The drafting team has corrected this.		
Xcel Energy	YES	It is not clear however, as to if this is actually part of the standard or if it is a document that can be revised without going through the standards development process. Also, the formatting of the doucment should be modified to clearly identify where 'steps/actions' are needed from repsonsible parties, whether that be the ERO or BA/FRSG.
Response: Thank you for your comment. The "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard" is not incorporated into the BAL-003 Frequency Response Reliability Standard. As such, modifications to the Procedure will not be developed through the standard development process. Consistent with NERC's commitment to an open and transparent process, the procedure for modifying the event selection process for supporting the Frequency Response Standard is set forth in the opening paragraph of the Procedure for ERO Support of Frequency Response and Frequency Bias Setting document. NERC will post suggested modifications for a 45-day formal comment period, respond to all comments and will discuss the revision request in a public meeting. Revisions will be provided to the NERC BOT for approval and in addition, any modifications will be filed with FERC for informational purposes. This process provides the industry assurance that changes will be properly vetted and that there is an opportunity for stakeholder input.		
Manitoba Hydro	Yes	No comment.
NREL Transmission and Grid	Yes	

Organization	Yes or No	Question 5 Comment
Integration Group		
SPP Standards REview Group	Yes	
pacificorp	Yes	
California Independent System Operator	Yes	
Energy Mark, Inc.	Yes	
Idaho Power Company	Yes	
Independent Electricity System Operator	Yes	
NV Energy	Yes	
New York Independent System Operator	Yes	
MRO NSRF		MRO NSRF AGREES

6. The SDT is now using the method detailed in the Frequency Response Initiative Report dated September 30, 2012 to calculate the Interconnection Frequency Response Obligation. Do you agree that this method provides for the proper amount of Frequency Response? If not, what specifically needs to be changed?

Summary Consideration: Many of the commenters requested clarification on how changes to the methodology defined in Attachment A could be modified. The drafting team explained that Attachment A was part of the standard and as such is subject to the NERC standards process for making any changes.

Several commenters questioned the use of the largest event in the last 10 years for the Eastern Interconnection. The drafting team stated that the results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason the SDT has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. If the largest event in the last 10 years falls below 4500 MW then the SDT believes that an N-2 event would be utilized.

One commenter wanted a method to discount outliers. The drafting team explained that this was one of the reasons that they had chosen the median as the appropriate measure for FRM. The benefit of using the median of at least 20 events per year helps to minimize the impact of outliers.

Organization	Yes or No	Question 6 Comment
Bonneville Power Administration	No	BPA does not have specific changes to the methodology to suggest, however, a methodology that arrives at a negative 840 MW per tenth Hz for WECC is obviously under-calculating the frequency bias obligation. Currently WECC has an interconnection bias of over 2000 MW / 0.1Hz and with this bias the frequency is steady state following point B on the frequency response curve. BPA would expect to see frequency decline after point B if the FBO is lowered by almost 60%. BPA also must reiterate that there is still a problem with the method used for modifying the FBO and frequency bias for Balancing Authorities. A high-performing Balancing Authority will have its frequency bias increased each year due to higher response during the events chosen by the ERO. Conversely, a low-performing Balancing Authority will have its frequency bias reduced each year due to lower response during the events chosen by

Organization	Yes or No	Question 6 Comment
		the ERO.
Response: After review of comments, the drafting team feels confident with the current method of calculating Frequency Response Obligation as outlined in the Frequency Response Initiative report. This standard requires minimum bias setting not to be less than 0.9% of the non-coincidental peak load for a multi-BA interconnection. This will ensure that minimum bias settings will be based on Interconnection's non-coincidental peak load rather than biased toward low-performer. The minimum Frequency Bias settings requirement are outlined in Table 2 of "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard" **The drafting team points out that there is not a Frequency Bias obligation and that the currently measured response for the Western Interconnection is approximately -1200 MW/0.1 Hz. This number is above, but much closer to the required level of -840 MW/0.1 Hz under this standard.**		
Tucson Electric Power	No	I believe that the frequency bias obligation of the Western Interconnection is understated.
Response: The drafting team points out that there is not a Frequency Bias obligation and that the currently measured response for the Western Interconnection is approximately -1200 MW/0.1 Hz. This number is above, but much closer to the required level of -840 MW/0.1 Hz under this standard.		
Duke Energy	No	Similar to our earlier concern, the industry needs some assurance that the calculation of the Interconnection FRO described in the report cannot be changed outside of the Standards Process for approval by the industry. Duke Energy does not support using a 4500 MW loss as the basis for determining the FRO for the Eastern Interconnection for future events. However, as the calculation also includes 59.5 Hz as the basis for determining the FRO, the result is an allocation which can be supported. To the extent that the standard drafting team moves in the direction of using 59.7 Hz as the basis for the FRO, then it needs to follow a methodology similar to the other Interconnections for determining the credible multiple contingency to cover.
Response: Thank you for your comment. The Attachment A is part of the standard and as such is subject to the NERC standards		

Organization	Yes or No	Question 6 Comment
process manual for making any changes. **The drafting team agrees with your concern regarding the use of 4500 MW. However, the results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason the SDT has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. If the largest event in the last 10 years falls below 4500 MW then the SDT believes that an N-2 event would be utilized.**		
New York Independent System Operator	No	The drafting team should consider some method for discounting outliers, that may not be explainable.
Response: Thank you for your comment. All events are considered. Events that occur over known ramping periods are selected last. As an example, the event reflected in the right graph shown in the Procedure would be selected over the event reflected in the graph on the left. If an inadequate number of events are available for that season, then these events may be used. The benefit of using the median of at least 20 events in a year helps minimize the impact of outliers.		
Southern Company	No	The industry needs some assurance that the calculation of the Interconnection FRO described in the report cannot be changed outside of the Standards Process for approval by the industry. We do not support using a 4500 MW loss as the basis for determining the FRO for the Eastern Interconnection for future events. However, as the calculation also includes 59.5 Hz as the basis for determining the FRO, the result is an allocation which can be supported. To the extent that the standard drafting team moves in the direction of using 59.7 Hz as the basis for the FRO, then it needs to follow a methodology similar to the other Interconnections for determining the credible multiple contingency to cover.
Response: Thank you for your comment. The Attachment A is part of the standard and as such is subject to the NERC standards process for making any changes. **The drafting team agrees with your concern regarding the use of 4500 MW. However, the results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason, the drafting team has recommended the largest event in the last ten years be used to provide for an**		

Organization	Yes or No	Question 6 Comment
increased reliability margin for the Eastern Interconnection. If the largest event in the last 10 years falls below 4500 MW then the SDT believes that an N-2 event would be utilized.		
PPL NERC Registered Affiliates	No	The PPL Affiliates support the comments of the SERC OC Standards Review Group on this question
Response: The Attachment A is part of the standard and as such is subject to the NERC standards process for making any changes. **The drafting team agrees with your concern regarding the use of 4500 MW. However, the results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason, the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. If the largest event in the last 10 years falls below 4500 MW then the SDT believes that an N-2 event would be utilized.**		
Keen Resources Asia Ltd.	No	This question is falsely worded. The SDT is specifically NOT using the method detailed in the Frequency Response Initiative Report dated September 30, 2012. So the term "this method" is practically meaningless in this question because it is not clear if it means "the SDT's method" or "the FRI's method". The Background Document specifically states on page 29: "The NERC Frequency Response Initiative Report addressed the relative merits of using the median versus linear regression for aggregating single event frequency response samples into a frequency response measurement score for compliance evaluation. This report provided 11 evaluation criteria as a basis for recommending the use of linear regression instead of the median for the frequency response measurement aggregation technique. The FRSDT made its own assessment on the basis of these evaluation criteria on September 20, 2012, but concluded that the median would be the best aggregation technique to use initially when the relative importance of each criterion was considered." What needs to be changed, besides properly wording this question? The FRI method of linear regression should be adopted, and the SDT method of median should be rejected, in the standard to change the first sentence of this question into a true statement from a false statement and to, in answer to the question, provide for the proper amount of

Organization	Yes or No	Question 6 Comment
		Frequency Response.
Response: Thank you for your comments. The drafting team disagrees that the methodology for calculating the IFRO used in this standard is different than that detailed in the FRI Report. The drafting team considered replacing median with linear regression but chose to use the median because of its better resiliency to data quality problems found in the Actual Net Interchange data used in the frequency-response calculation.		
SERC OC Standards Review Group	No	We believe the industry needs some assurance that the calculation of the interconnection FRO cannot be changed without rigorous review and input from the industry. In addition the clarification should be made how the one in ten year loss for the Eastern Interconnection (4500 MW) would change after 10 years. Would the same methodology be used or would the largest Category C (n-2) be used?
Response: Thank you for your comment. The Attachment A is part of the standard and as such is subject to the NERC standards process manual for making any changes. **The drafting team agrees with your concern regarding the use of 4500 MW. However, the results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason, the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. If the largest event in the last 10 years falls below 4500 MW then the SDT believes that an N-2 event would be utilized.**		
Arizona Public Service Company	NO	1. The Frequency Response initiative report should be added to the standard as an appendix. It is not clear where to find this report. 2. The jusitification for dividing delta frequency with C to B ratio is not adequate and not clear.
Response: Thank you for your comment. 1) The drafting team disagrees that the FRI Report should be attached to this standard as an appendix. We do agree that it should be easier to locate. **2) Please refer to the FRI Report for the reasoning you request.**		
Edison Electric Institute	Yes	EEI finds the method to be acceptable but as mentioned in our response to question

Organization	Yes or No	Question 6 Comment
		No. 5 (above), we believe that the procedure should be more formally documented as an addendum. Such a change would ensure that the document would remain unchanged outside of the approved standards making process. Additionally, EEI does not support using 4500 MW loss as the basis for determining the FRO for the Eastern Interconnection for future events. However, as the calculation also includes 59.5 Hz as the basis for determining the FRO, the results is an allocation which we believe is acceptable. In the future, should the SDT decide to use 59.7 Hz as the basis for the FRO, than it will need to follow a methodology similar to the other interconnections for determining the credible multiple contingency to cover.
Response: Thank you for your comment. The Attachment A is part of the standard and as such is subject to the NERC standards process manual for making any changes. **The drafting team agrees with your concern regarding the use of 4500 MW. However, the results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. If the largest event in the last 10 years falls below 4500 MW then the SDT believes that an N-2 event would be utilized.**		
ACES Power Marketing Standards Collaborators	Yes	We agree that this method will provide sufficient frequency response. However, we believe Interconnection Frequency Response Obligation is used inconsistentently with the definition of Frequency Response Obligation as documented in our response to other comments.
Response: Please refer to our responses to your other comments.		
Manitoba Hydro	Yes	No comment.
NREL Transmission and Grid Integration Group	Yes	
SPP Standards REview	Yes	

Organization	Yes or No	Question 6 Comment
Group		
pacificorp	Yes	
PJM Interconnection, LLC	Yes	
California Independent System Operator	Yes	
Energy Mark, Inc.	Yes	
Idaho Power Company	Yes	
Independent Electricity System Operator	Yes	
Texas Reliability Entity	Yes	
Kansas City Power & Light	Yes	
Ameren	Yes	
NV Energy	Yes	
MISO	Yes	
MRO NSRF		MRO NSRF AGREES

7. Based on Industry comments received the SDT made significant clarifying modifications to the Background Document. Do you agree that this document provides sufficient information to justify the rationale used by the SDT in developing the draft standard and provides the industry with sufficient understanding of the issues being addressed by the standard?

Summary Consideration: Several of the commenters questioned why the formula for FRO was missing. The drafting team explained that this was a problem incurred during the conversion to a pdf file. Once the problem was recognized by NERC, it was immediately fixed during the posting.

A couple of commenters felt that there should be discussion in the Background Document concerning "inertial response". The drafting team stated that they saw a limited role for inertial response in the context of this standard. The standard inherently does not address inertial requirements. It is of interest herein because of its role in determining the post-contingency rate of decline of frequency, as it ultimately impacts the duration of time before the frequency nadir (point C) occurs. The drafting team considered a more elaborate description of inertial response, but believes that it is tangential to the main mission of this standard.

A few of the commenters questioned the use of the largest event in the last 10 years as the criteria for the Eastern Interconnection. The drafting team explained that the results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. Further details are provided on pages 52 through 55 of the Frequency Response Initiative paper.

Organization	Yes or No	Question 7 Comment
ACES Power Marketing Standards Collaborators	No	(1) The formula for calculating Frequency Response Obligation appears to be missing on page 23. (2) We are confused by the varying sample rates for the different scan rates in the Definitions of Frequency Values for Frequency Response Calculation table on page 13. It would appear that the time range of values for the average B value varies more than necessary by scan rate. For example, for 2-second scan rates, sampling would start at 20 seconds and end at 52 seconds. However, for the 4-second scan rates, sampling

Organization	Yes or No	Question 7 Comment
		starts at 24 seconds and ends at 48 seconds. Why would it not also cover 20 and 52 seconds for a 4-second scan rate?
Response: Thank you for your comment. (1) This was corrected during the posting. The formula was lost when converting to a pdf file. **(2) The SDT has corrected the table.**		
Bonneville Power Administration	No	BPA continues to fundamentally disagree with the approach that BAL-003-1 is developing into. Please reference BPA's extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found at: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf.
Response: Thank you for your comment. Please refer to our response to your comments dated 12/8/11.		
Keen Resources Asia Ltd.	No	See reply to Question 6. Also, the Background Document is seriously deficient in the discussion of inertial response and therefore how imbalances "cause" frequency deviation. The Background Document is overflowing in discussion of how frequency deviation causes frequency response. In other words, the Background Document is "reactive" and not "proactive". The Background Document lacks any discussion of the internal dynamics of rotating machines, beginning with any definition of what Inertial Response is. Inertial Response is the instantaneous power produced by the lag ("inertia") in the ability of the generator's rotor to slow down to the frequency of the magnetic field in the generator's fixed stator whose frequency is instantaneously lowered by a change in phase angle between voltage and current that is due to a sudden loss of interconnected generation to meet load. Adjustments by voltage response within milliseconds and near the location of the loss are sometimes possible to avert rapid spread of a loss to the frequency of the entire interconnection, and constitute the ongoing work of the Phasor Project long ago initiated by the DOE in the persistent absence of NERC interest or work in this area. NERC and drafting team members under advisement by NERC staff studiously resisted so much as any mention of frequency deviation causation in discussions or in the Background Document. An

Organization	Yes or No	Question 7 Comment
		inexplicable technical Cold War and Berlin Wall built in the 1970s and today separating the DOE Phasor Project from NERC Frequency Response standard development and NERC's so-called Frequency Response "Initiative" needs to be ended and torn down. My document http://www.robertblohm.com/Inertia.doc provides missing technical support and explanation for graphs 1-7 on pages 4-10 of the Background Document, on the basis of an exact understanding of Inertial Response.
Response: Thank you for your comment. The drafting team sees a limited role for inertial response in the context of this standard. The standard inherently does not address inertial requirements. It is of interest herein because of its role in determining the post-contingency rate of decline of frequency, as it ultimately impacts the duration of time before the frequency nadir (point C) occurs. The drafting team considered a more elaborate description of inertial response, but believes that it is tangential to the main mission of this standard.		
Northeast Power Coordinating Council	No	While the discussion of primary frequency response includes inertial energy, the term inertial energy is missing from the definition of “primary frequency response”.
Response: Thank you for your comment. The drafting team sees a limited role for inertial response in the context of this standard. The standard inherently does not address inertial requirements. It is of interest herein because of its role in determining the post-contingency rate of decline of frequency, as it ultimately impacts the duration of time before the frequency nadir (point C) occurs. The drafting team considered a more elaborate description of inertial response, but believes that it is tangential to the main mission of this standard.		
Consolidated Edison Co. of NY, Inc.	No	While the discussion of primary frequency response includes inertial energy, the term inertial energy is missing from the definition of “primary frequency response”.
Response: Thank you for your comment. The drafting team sees a limited role for inertial response in the context of this standard. The standard inherently does not address inertial requirements. It is of interest herein because of its role in determining the post-contingency rate of decline of frequency, as it ultimately impacts the duration of time before the frequency nadir (point C) occurs. The drafting team considered a more elaborate description of inertial response, but believes that it is tangential to the main mission of this standard.		

Organization	Yes or No	Question 7 Comment
PPL NERC Registered Affiliates	Yes	The PPL Affiliates applaud the SDT for developing this technical justification document.
Response: Thank you for your comment.		
Duke Energy	Yes	Though Duke Energy does not agree with some of the points in the Background Document, it does justify the rationale used by the SDT. Additional comments: at the top of page 23, it states that the basic Frequency Response Obligation is based on non-coincident peak load and generation data reported in FERC Form 714, however the actual calculation is missing and should be based upon the reported MWh, not the peak load as stated. At the bottom of page 23, it states that Attachment A proposes the three options for event criteria, however doesn't clarify why it was chosen that the Eastern Interconnection would be held to the largest event over the last 10 years, while others will be based upon the largest category C loss-of-resource (N-2) event.
Response: Thank you for your comment. (1) This was corrected during the posting. The formula was lost when converting to a pdf file. **(2) The results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. Further details are provided on pages 52 through 55 of the Frequency Response Initiative paper.**		
SERC OC Standards Review Group	Yes	We agree with the Duke Energy comments on this question.
Response: Thank you for your comment. (1) This was corrected during the posting. The formula was lost when converting to a pdf file. **(2) The results for the current Eastern Interconnection model do not represent observed response adequately. The models for the other Interconnections have a better match. For this reason the drafting team has recommended the largest event in the last ten years be used to provide for an increased reliability margin for the Eastern Interconnection. Further details are provided on**		

Organization	Yes or No	Question 7 Comment
pages 52 through 55 of the Frequency Response Initiative paper.		
SPP Standards REview Group	Yes	We like the document and feel that it provides a primer on the frequency response standard.The following are typos in and suggested corrections to the document:-The blue lines referenced in the paragraph under Figure 2 on page 14 are green (A) and red (B).-Insert an 'a' in the 3rd line of the 2nd paragraph in the Sustained Response section on page 19 between 'provides' and 'greater'.-Insert a 'for' in the 2nd line of the 1st paragraph on page 21 between 'resource' and 'all'.-Change 'provide' to 'provided' in the 3rd line from the bottom line of the 1st paragraph in the Single Event Frequency Response Data section on page 24.-Change the 'east' to 'Eastern Interconnection' in the 4th line of the 1st paragraph in the Median as the Standard's Measure of Balancing Authority Performance section on page 27. -Delete the 'put' in the 3rd bullet on page 29. Also, replace the 'put' in the 5th bullet with 'gave'.
Response: Thank you for your affirmative response and clarifying comment. The errors you mentioned have been corrected.		
Manitoba Hydro	Yes	No comment.
NREL Transmission and Grid Integration Group	Yes	
Edison Electric Institute	Yes	
pacificorp	Yes	
PJM Interconnection, LLC	Yes	
California Independent System Operator	Yes	
Energy Mark, Inc.	Yes	

Organization	Yes or No	Question 7 Comment
Southern Company	Yes	
Idaho Power Company	Yes	
Texas Reliability Entity	Yes	
Kansas City Power & Light	Yes	
Ameren	Yes	
NV Energy	Yes	
Tucson Electric Power	Yes	
BC Hydro	Yes	
MISO	Yes	
MRO NSRF		MRO NSRF AGREES

8. If you are not in support of this draft standard, what modifications do you believe need to be made in order for you to support the standard? Please list the issues and your proposed solution to the issue.

Summary Consideration: A couple of commenters expressed concern with the fact that the onus for Frequency Response was being put on the BAs who do not own or operate the generators. The drafting team explained that they had heard some of the same concerns, but there are quite a few good reasons why this standard is a good starting point to meet the FERC directives in Order No. 693 (which NERC was given a specific date next year to deliver).

There are several other standards where a similar situation occurs. As you note, many BAs don't own generators. Still, they are responsible for meeting DCS and CPS. The BAs control regulating and contingency reserves to meet the standards. Similarly a TOP is responsible for maintaining voltage even though they may own no capacitor banks or generators to control VArs.

To measure frequency response fairly accurately (one of the 693 directives), you have to monitor the BAs' frequency response (or generator governor response if the standard was generator centric) to about 30 events per year. There are about 140 BAs in North America. There are on the order of 4000 generators that would have to report under a generator-centric standard. How do you verify performance of 120,000 observations annually?

The standard is a backstop standard beyond which we could expect problems during light load conditions for a large contingency. It is not intended to be difficult to meet. As proposed, the standard has a performance obligation about half of what we see today in actual operation. The obligation for the East is on the order of -1000MW/0.1Hz. We have about -2200MW/0.1Hz on average. The standard allows the formation of frequency response sharing groups (similar in concept to DCS' RSGs) and allows obtaining response from other BAs contractually. This means there should be no BAs out of compliance once the standard is in place.

A couple of commenters stated that they thought the standard was confusing. The drafting team stated that they appreciated their concern that the standard is confusing, but the drafting team believed that the proposed standard is as clear as possible while covering all of the issues involved and that based on comments received the industry was not in agreement.

One or two commenters requested clarity on how modifications to the Attachment A could be made and if the FRS Forms 1 and 2 had to be used. The drafting team explained that Attachment A was part of the standard and would have to use the Standard Development Process to make any modifications. The drafting team also stated that the FRS Forms were required to be used in the reporting.

A couple of commenters questioned the use of the Background Document. The drafting team explained that the Background Document was only intended to be used for education and training similar to other training references in the NERC Operating Manual.

Organization	Yes or No	Question 8 Comment
ACES Power Marketing Standards Collaborators	No	(1) We believe that the drafting team work has demonstrated that the standard is unnecessary. The data presented in the posting shows that all of the interconnections easily exceed the required Frequency Response necessary to avoid actuating UFLS relays. Since one of the main purposes of the standard is to provide sufficient Frequency Response, it would seem the purpose is already met without implementing and enforceable standard. So why is a standard needed to compel required Frequency Response if it is already provided? (2) Even though we believe the supporting data for the posting demonstrates the standard is unnecessary, we understand NERC is required by a FERC directive to provide a standard. Given this requirement, we do believe the drafting team has largely provided a reasonable standard and supporting documents that only require a few additional adjustments (see our comments in other questions for these adjustments) to finalize the standard. As a result, we will likely end up supporting the standard once these final adjustments are made.
Response: Thank you for your comment. We agree that the standard meets the primary directive to provide Frequency Response. This standard will set a backstop to assure that Frequency Response will not decline past a "point of no return" **For issues raised in other questions please refer to our response to those questions.**		
Independent Electricity	No	a. We do not support R2 as drafted, specifically the phrase "until directed to change by the ERO". We do not agree that the ERO has any authority to "direct" a BA or FRSG, or

Organization	Yes or No	Question 8 Comment
System Operator		any responsible entities, to make changes to the Frequency Bias Setting or take any operating or operations planning actions. We suggest to replace the word “directed” with “requested”. b. In R2, the words “subject to” can be interpreted differently. We suggest to replace them with “in accordance with” to parallel the intent as conveyed in R1. c. We are still concerned with the status of Attachment A, as indicated in our comments submitted under Q4 - that it is unclear if the materials in Attachment A must be adhered to or not. A standard should not have an attachment whose enforcement status is unclear as part of a requirement. d. FRS Forms 1 and 2 are referenced in Attachment 1, which itself has an unclear status on measurability and enforceability. It is also unclear if FRS Forms 1 and 2 must be used to submit the requested data. Collectively, Attachment 1, FRS Form 1 and Form 2 make the standard very confusing as to which parts must be complied with. Much better clarity is needed to clearly convey the standard ‘s requirements that are measurable, enforceable and must be complied with.
Response: Thank you for your comments, **a) The drafting team believes that the term “direct” is less ambiguous. The drafting team believes that using the term “request” could leave the impression that the action is optional.** **b) The drafting team has adopted your suggested language.** **c) Please refer to the drafting team response to Question #4.** **d) The Attachment is mentioned in the standard requirements and is therefore enforceable. Since the FRS Forms are discussed in the Attachment then they must be used in the calculation process.**		
Bonneville Power Administration	No	BPA continues to fundamentally disagree with the approach that BAL-003-1 is developing into. Please reference BPA’s extensive comments submitted on 12/8/11 for Project 2007-12 Frequency Response found at: http://www.nerc.com/docs/standards/sar/2007-12_comments_received_120911.pdf.

Organization	Yes or No	Question 8 Comment
Response: Thank you for your comment. Please refer to the drafting team response to your comments submitted on 12/8/11.		
Exelon Corporation and its affiliates	No	Exelon checked "no" because it does not support the current draft standard. Exelon's position is that efforts to modify frequency monitoring and control should be directed at the existing standards. Since Frequency Bias is already a component of ACE, and ACE performance is tracked by both CPS 1 and CPS 2, it seems evident that NERC already has in place mechanisms for evaluating frequency response. NERC already has in place mechanisms for ensuring sustained frequency response during a contingency, through the Disturbance Control Standard (DCS) and its requirement for the contingent Balancing Authority to deploy resources. Under the current BAL-003-0.1b language, Balancing Authorities are given a consistent means for determining frequency bias, via the minimum requirement of 1% peak generation or 1% peak load. Together with the above references to existing CPS 1 performance measurements, current standards meet the objectives outlined in BAL-003-1. This proposed draft BAL-003-1 complicates the setting of Frequency Bias and attempts to go beyond that purpose into frequency response performance, without clear rules for how to perform. Exelon is also concerned with moving this standard forward while there is an ongoing field trial that could impact whether this standard should be put into place. For example, waivers are in place for CPS 2 for participating Balancing Authorities and there is ongoing effort with the BAAL field trial set of standards that will establish performance metrics around frequency control. As an alternate approach to waiting to move forward on the standard, Exelon recommends the following BAL-003-1 Requirement language: R1. The ERO shall identify up to five [5] system frequency events in each Interconnection that will be included in the Form 1 and 2 data requests for Balancing Authorities by April 30th each year. R2. Each Balancing Authority shall submit the following data to the ERO annually by July 15: R2.1 The total annual net output of generating plants inside the Balancing

Organization	Yes or No	Question 8 Comment
		Authority Area. R2.2 The total annual load with losses inside the Balancing Authority Area. R3. Each Balancing Authority shall calculate its Frequency Response Measure using Forms 1 and 2 as posted by the ERO. (See Attachment A_Form 1 and Form 2) R4. Each Balancing Authority or Frequency Response Sharing Group shall submit Forms 1 and 2 to contacts designated by the ERO before the expiration of ERO established deadlines, which shall be no earlier than 30 days after posting of Forms 1 and 2. R5. The ERO shall post the following information: R5.1. Each Interconnection's Frequency Response Obligation R5.2 Each Balancing Authorities Frequency Response Obligation R5.3 Each Balancing Authorities Frequency Bias Setting R6. Each Balancing Authority shall implement in its ACE equation its ERO established Frequency Bias Setting during the ERO established three-day implementation period. No further adjustments can be implemented outside of the parameters established below in the upcoming year unless a Balancing Authority coordinates with the Regional Entity and the affected Balancing Authorities. R6.1 A Balancing Authority using a fixed Frequency Bias Setting sets its Frequency Bias Setting to the greater of (in absolute value): R6.1.1. The number the BA chooses between 100% and 125% of its Frequency Response Measure as calculated on FRS Form 1. R6.1.2. The Balancing Authorities share of the Interconnection Minimum as determined by the ERO. R6.2 A Balancing Authority using a variable Frequency Bias Setting shall maintain a setting that is:

Organization	Yes or No	Question 8 Comment
		R6.2.1 Less than zero at all times, and R6.2.2 Equal to or greater in magnitude than its Frequency Response Obligations when Frequency varies from 60 Hz by more than +/-0.036 Hz. R7. Each Frequency Response Sharing Group or Balancing Authority that is not a member of a FRSG shall monitor its Frequency Response Obligation and work with generating facilities or demand response resources to provide sufficient Frequency Response to meet the Frequency Response Obligation assigned by the ERO. R8. Each Balancing Authority that adds or removes generation or load, including through the use of dynamic transfers, shall notify the ERO to ensure that any needed adjustments to the Interconnection Frequency Response Obligation or Balancing Authority Frequency Response Obligation and Bias can be calculated. R8.1. The ERO shall notify all affected Balancing Authorities of modifications to the Frequency Response Obligation due to the addition or removal of generation or load. R9. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent of the sum of the Frequency Bias Setting as communicated by the ERO for the participating Balancing Authorities.
Response: Thank you for your comment. ACE, CPS1, CPS2, BAAL and DCS are all standards that measure Secondary Control actions. The inclusion of the Frequency Bias Setting in ACE and these standards make them blind to Primary Frequency Control and thus incapable of helping with the evaluation of Frequency Response (Primary Frequency Control). R1 sets clear rules with respect to how much Frequency Response is required from each BA through the Frequency Response Obligation (FRO) and Frequency Response Measure (FRM). The BAAL Field Trial is investigating issues associated with Secondary Frequency Control only and is not impacted by and has no impact on Primary Frequency Control and BAL-003. The drafting team has considered the suggestions contained in the requirements suggested and has explained in the Background document the reasons for writing the		

Organization	Yes or No	Question 8 Comment
requirements and measures as contained in the draft BAL-003-1.		
Duke Energy	No	Given the FERC deadline approaching for NERC to deliver a Frequency Response standard, Duke Energy supports the adoption of this standard with some reservations. We believe that the proposed standard addresses the FERC directive to NERC, however it also introduces some longer-term issues related to secondary control and related costs that may have not been anticipated by the FERC. To that point, Duke Energy believes that if this standard is adopted, the industry will have the time and opportunity through the NERC standards development process to mitigate some of the concerns presented in our comments."
Response: Thank you for your affirmative response and clarifying comment. The drafting team agrees that there could be some impact on other standards but the implementation period will allow for time to adjust and learn		
Tucson Electric Power	No	I feel that a BA's frequency bias for the upcoming year should not be related to present performance. A BA may have a good response one year and not good response another year and therefore the threshold keeps moving around. I feel it should be related to BA size and therefore somewhat standardized. E.g. a high-performing Balancing Authority will have its frequency bias increased each year due to higher response during the events chosen by the ERO. Conversely, a low-performing Balancing Authority will have its frequency bias reduced each year due to lower response during the events chosen by the ERO.
Response: Thank you for your comment. The drafting team believes that control and frequency performance improve if the Bias Setting and the BA's Frequency Response are as closely matched as possible. Low performing BAs will still have to provide the Interconnection minimum Bias Setting. In an unlikely case where a high performing BA has an internal change that markedly reduces their Frequency Response, there are provisions in the standard's supporting document to accommodate an intra-year change in its Bias Setting.		
New York Independent System Operator	No	In general we support the work of the DT, and the proposal to measure the systems response to frequency events, along with the method to determine the FRO. My

Organization	Yes or No	Question 8 Comment
		outstanding concern is with enforcement on an entity that does not own the resources that provides the frequency response or the lack of obligation for the entity with the information to provide to the BA to make the assessment of expected frequency response. BA's should at a minimum be given assurance that resources will provide data that BA's could use to forecast frequency response and take corrective actions.

Response: Thank you for your comment. We've heard some of the same concerns, but there are quite a few good reasons why this standard is a good starting point to meet the FERC directives in Order No. 693 (which NERC was given a specific date next year to deliver).

There are several other standards where a similar situation occurs. As you note, many BAs don't own generators. Still, they are responsible for meeting DCS and CPS. The BAs control regulating and contingency reserves to meet the standards. Similarly a TOP is responsible for maintaining voltage even though they may own no capacitor banks or generators to control VArs.

To measure frequency response fairly accurately (one of the 693 directives), you have to monitor the BAs' frequency response (or generator governor response if the standard was generator centric) to about 30 events per year. There are about 140 BAs in North America. There are on the order of 4000 generators that would have to report under a generator-centric standard. How do you verify performance of 120,000 observations annually?

MISO has done analysis to find all large frequency events over the past year and how the generators in its footprint performed. It turns out that many of the generators aren't on line for any of the events and only a few of the generators were on line for all large events. So what do you do with generators that are not frequently run? Even if a generator ran 50% of the time, you wouldn't have enough events to do a quality measure in a year.

The standard is a backstop standard beyond which we could expect problems during light load conditions for a large contingency. It is not intended to be difficult to meet. As proposed, the standard has a performance obligation about half of what we see today in actual operation. The obligation for the East is on the order of -1000MW/0.1Hz. We have about -2200MW/0.1Hz on average. The standard allows the formation of frequency response sharing groups (similar in concept to DCS' RSGs) and allows obtaining response from other BAs contractually. This means there should be no BAs out of compliance once the standard is in place.

Finally, to make it a generator standard precluded other solutions (load management, flywheels, market solution, etc.).

Organization	Yes or No	Question 8 Comment
Tri-State Generation and Transmission Assn., Inc.	No	It is our opinion that there has not been enough justification to merit creating a new standard. If additional justification is provided then frequency responsive reserves should be a subset of spinning reserves much like spinning reserves are a subset of operating reserves.
Response: Thank you for your comment. This standard will set a backstop to assure that Frequency Response will not decline past a "point of no return" **This standard does not prescribe a method to provide Frequency Response but does provide for measuring that Frequency Response is delivered.** **Spinning reserve is outside the scope of the industry approved SAR.**		
Puget Sound Energy	No	See comment in response to question 4 above for a discussion of Attachment A concerns. Appendix 1 of the Frequency Response Standard Background Document contains a discussion about why the use of net actual interchange to calculate an entity's Frequency Response Measure might introduce inaccuracies into that calculation. That discussion ends with the following statement: "The frequency response is buried within the typical hour to hour operational cacophony superimposed on actual net interchange values. The choice of metrics will be important to artfully extract frequency response from the noise and other unrepresentative error." Based on these statements, it is very difficult to support the standard's approach to calculating the Frequency Response Measure.At Puget Sound Energy (PSE), though, we believe that there is another factor to add to the "operational cacophony" listed in Appendix 1. PSE is a comparatively small BA with limited internal generation. We are embedded between two of the largest energy exporters in the Western Interconnection and, when there is a frequency event, their response flows through PSE's system. As a result, PSE will experience transmission losses associated with the two BAs' frequency response as it flows through our system. When PSE's frequency response is measured using net actual interchange, these losses obscure, at least in part, our system's

Organization	Yes or No	Question 8 Comment
		frequency response. As a result, we ask the standard drafting team to consider specifying a process that would allow us to propose and use an equivalent measure of frequency response. For example, while we understand the concerns and difficulties associated with measuring frequency response at the generator as the default measure for all BAs, in our case, a choice to use that measurement option might prove to be a more-feasible way to comply with the standard.
Response: Thank you for your comment. Please refer to our response to your comments on Question #4. **Analysis of Field trial data has not shown that this has been a problem.** **The spreadsheets have been designed to allow for adjustment for dynamically scheduled resources located in another BA.**		
PJM Interconnection, LLC	No	See previous comments. Also, this standard should be applicable to GOP's as well as BA's with, at a minimum, the following requirements added: Each GOP shall follow all directives of it's Balancing Authority pertaining to frequency responsive operation, including but not limited to the status, droop & deadband settings of their governors. Each GOP shall provide to their BA the status and droop & deadband settings of their governors, and headroom available to respond to frequency deviations, as requested.
Response: Thank you for your comment. MISO has done analysis to find all large frequency events over the past year and how the generators in its footprint performed. It turns out that many of the generators aren't on line for any of the events and only a few of the generators were on line for all large events. So what do you do with generators that are not frequently run? Even if a generator ran 50% of the time, you wouldn't have enough events to do a quality measure in a year. **Generator verification standards (MOD 27) are scheduled to be revised. The drafting team believes that this will address your second concern**		
PPL NERC Registered	No	The PPL Affiliates are concerned that the document referred to "Attachment A" is

Organization	Yes or No	Question 8 Comment
Affiliates		directly referenced in the proposed standard's requirements but not actually attached to the standard itself as Attachment A. Therefore, it is not clear how the proposed document could be modified in the future. Having such material incorporated into a standard takes away from the open and transparent stakeholder drive process.
Response: Thank you for your comment. The attachment is mentioned in the requirement within the standard and therefore becomes a part of the standard. Any modifications needing to be made to the attachment will have to use the Standards Process.		
Consolidated Edison Co. of NY, Inc.	No	The purpose of BAL-003 was to calculate frequency bias in the ACE equation used in BAL-001. The Standard is currently confusing to understand and it is unclear how the bias is calculated. It is recommended that efforts should be made to clarify the changes, especially Attachment A.
Response: Thank you for your comment. The drafting team appreciates your concern that the standard is confusing, but the drafting team believes that the proposed standard is as clear as possible while covering all of the issues involved. **The drafting team will either develop training materials to provide better understanding for both the FRM and FBS calculations or recommend to the NERC Resources Subcommittee to develop said materials.**		
Northeast Power Coordinating Council	No	The purpose of BAL-003 was to calculate frequency bias in the ACE equation used in BAL-001. The Standard is currently confusing to understand, and it is unclear how the bias is calculated. It is recommended that efforts should be made to clarify the changes, especially in Attachment A.
Response: Thank you for your comment. The drafting team appreciates your concern that the standard is confusing, but the drafting team believes that the proposed standard is as clear as possible while covering all of the issues involved. **The drafting team will either develop training materials to provide better understanding for both the FRM and FBS calculations or recommend to the NERC Resources Subcommittee to develop said materials.**		
Kansas City Power & Light	No	The Standard does not consider instances for smaller BAs that operate generation for peak conditions and acquire energy for most of the operating year.

Organization	Yes or No	Question 8 Comment
Response: Thank you for your comment. The drafting team is unsure of your precise question. However, if your question concerns meeting your performance obligation year around, then the process does allow for mechanisms for a BA to obtain Frequency Response from external resources		
NV Energy	No	While I support the concept of a Frequency Response Standard with minimum performance obligations, this Standard places the entire obligation for performance on the Balancing Authority (and Frequency Reserve Sharing Group). Requirements R2-R4 are properly assigned to the BA, as this is the entity that is responsible for the configuration and parameters in the ACE equation, including the provision of a frequency bias setting. Requirement 1, however, is a performance requirement over which the BA in the Functional Model has virtually no control or ability to influence. Only a Generator Owner or Generator Operator is in a position of control over the performance under this requirement through the operational control and configuration of the responding generating units. In most BA's, the host BA entity also owns a fair amount, even a vast majority in many cases, of the generation within the BA. However, even in the event that the host BA owned 100% of the generation within its metered boundary, it is the action of the entity exercising its GO/GOP function that impacts the frequency response performance within the Balancing Area. Assignment of R1 to the BA is inappropriate from the standpoint that reliability requirements are to be assigned to the Reliability Functions who are capable of causing compliance to occur. A BA has limited ability to influence the outcome of the R1 performance metric. This is unlike other BA-assigned requirements, such as those related to DCS or CPS compliance. For those, the BA does have considerable influence regarding the curtailment of transactions to restore ACE, the direction of plant loading so as to distribute operating reserve, etc. In contrast, performance under this proposed R1 of BAL-003-1 is dependent upon the actions of the GO/GOP in such things as governor settings, generator control system configuration and other operatinal or maintenance activities conducted at the generating plant site. For this reason, it is inappropriate to assign this performance requirement to the BA. Rather, the requirements should be allocated among the GO/GOP's of the on-line generation in some fashion.In further support of

Organization	Yes or No	Question 8 Comment
		this notion, refer to the NERC Functional Model, where it is provided that one of the tasks for Generator Operation is to support Interconnection frequency.
Response: **Thank you for your comment. We've heard some of the same concerns, but there are quite a few good reasons why this standard is a good starting point to meet the FERC directives in Order No. 693 (which NERC was given a specific date next year to deliver).** **There are several other standards where a similar situation occurs. As you note, many BAs don't own generators. Still, they are responsible for meeting DCS and CPS. The BAs control regulating and contingency reserves to meet the standards. Similarly a TOP is responsible for maintaining voltage even though they may own no capacitor banks or generators to control VArs.** **To measure frequency response fairly accurately (one of the 693 directives), you have to monitor the BAs' frequency response (or generator governor response if the standard was generator centric) to about 30 events per year. There are about 140 BAs in North America. There are on the order of 4000 generators that would have to report under a generator-centric standard. How do you verify performance of 120,000 observations annually?** **MISO has done analysis to find all large frequency events over the past year and how the generators in its footprint performed. It turns out that many of the generators aren't on line for any of the events and only a few of the generators were on line for all large events. So what do you do with generators that are not frequently run? Even if a generator ran 50% of the time, you wouldn't have enough events to do a quality measure in a year.** **The standard is a backstop standard beyond which we could expect problems during light load conditions for a large contingency. It is not intended to be difficult to meet. As proposed, the standard has a performance obligation about half of what we see today in actual operation. The obligation for the East is on the order of -1000MW/0.1Hz. We have about -2200MW/0.1Hz on average. The standard allows the formation of frequency response sharing groups (similar in concept to DCS' RSGs) and allows obtaining response from other BAs contractually. This means there should be no BAs out of compliance once the standard is in place.** **Finally, to make it a generator standard precluded other solutions (load management, flywheels, market solution, etc.).**		
Arizona Public Service	NO	1. Either do not use C to B Ratio or provide adequate rational for using it. It appears to

Organization	Yes or No	Question 8 Comment
Company		make FRO unnecessarily too conservative and is not justified based upon experience. 2. The VRF is too complicated and hard to understand. It must be either simplified or should be followed by example. 3. The Frequency Response Obligation Methodology on Page 7 of "Procedure" does not show any formula (it is blank).
Response: Thank you for your comment. 1) The rationale can be found beginning on page 14 of the Background document and page 49 of the FRI report. **2) The drafting team is assuming you meant the VSLs. The VSL attempts to correct the VRF based on the BA's size and its impact on the interconnection.** **3) This was corrected during the posting. The problem occurred when the Word document was translated to a pdf file.**		
Energy Mark, Inc.	Yes	Although I am in favor of using linear regression to determine the FRM, the standard using Median is better than not having a standard.
Response: Thank you for your comment. The drafting team thanks you for your affirmative response and clarifying comment.		
Southern Company	Yes	Please refer to comments for question 9.
Response: The drafting team thanks you for your affirmative response and clarifying comment. Please refer to our response for Question #9.		
Manitoba Hydro	Yes	No comment.
NREL Transmission and Grid Integration Group	Yes	
Edison Electric Institute	Yes	
pacificorp	Yes	

Organization	Yes or No	Question 8 Comment
California Independent System Operator	Yes	
Ameren	Yes	
MISO	Yes	
AESO		1. The AESO disagrees with using a non-authoritative background document that has definitions/description of terms used in the reliability standard. It is the opinion of the AESO that these definitions/descriptions need to be authoritative. 2. The AESO has previously submitted comments to the SDT that for the purpose of the FRM calculation, BAs should be able to exclude or include events based on specific conditions or consideration, such as data quality or event suitability (e.g. BA separation from the Interconnection). The revisions made by the SDT do not enable the inclusion of other relevant events in the FRM calcualtion by a BA. The AESO would like to to see these type of events to be permitted in the FRM calculation by a BA.
Response: Thank you for your comment. 1) The Background Document is intended for education and training similar to the other training references in the NERC Operating Manual. **The drafting team believes that any new definitions that are located in the standard will ultimately be placed in the NERC glossary.** **2) The drafting team believes that your concern will be addressed through the process since:** **a) separation events would not be selected,** **b) the median will exclude the outlier situations, and** **c) If the data is corrupted, the FRS Forms allows for exclusion of that event.**		
Public Service Enterprise Group		PSEG entities will vote “Negative” on the standard until this Project 2007-12 achieves the following: 1. It coordinates with Project 2010-14.1 Phase 1 of Balancing Authority Reliability-

Organization	Yes or No	Question 8 Comment
		based Controls Reserves, specifically BAL-012-1, regarding (a) definitions and (b) requirements that address frequency response in both standards. a. Definitions that need to be coordinated: BAL-003-2 - "Frequency Response Obligation" and BAL-012-1 - "Frequency Responsive Reserve." b. Requirements that need to be coordinated: i. BAL-003-1, per R1, states "Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation." ii. BAL-012 requires BAs to have sufficient Frequency Responsive Reserves per R6, which requires BAs to "assess, on at least an hourly basis, that it has sufficient Regulating Reserve, Contingency Reserve, and Frequency Responsive Reserve to meet its reserve plan(s) to ensure reliable operation of the Bulk Electric System." For Frequency Responsive Reserves, R3 in BAL-012-1 requires BAs to develop an annual plan for these reserves.BAs should not be subject to duplicative requirements for frequency response requirements in different standards that are underdevelopment. Only one standard needs to define the frequency response requirements for BAs (we suggest that be BAL-003-1), although other standards, such as BAL-012-1, may reference that obligation. However, this decision should be made by consensus between the two SDTs. 2. It coordinates with Project 2010-14.1 Phase 1 of Balancing Authority Reliability-

Organization	Yes or No	Question 8 Comment
		based Controls Reserves, specifically BAL-012-1, to develop an application guide that would be attached to one of the standards and that could be referenced by each standard. The application guide would include: a. A hypothetical implementation plan for a BA that demonstrates how the BA may meet its Frequency Response Obligation or Frequency Responsive Reserve prior to an event. This is a technical issue and should not be confused with the institutional issue in #3 below. b. An explanation of the relationship between Regulating Reserve, Contingency Reserve, and Frequency Responsive Reserve contained in BAL-012-1 so that potential double counting (and whether that is proper of improper), is addressed. 3. Project 2007-12's "Frequency Response Standard Background Document" dated October, 2012 lists several methods of obtaining Frequency Response. Most of those are extracted below. We have provided questions and commentary that we ask the team to address. a. "Regulation services." This is addressed in BAL-001-0.1a. The purpose of this standard is "To maintain Interconnection STEADY-STATE FREQUENCY within defined limits by balancing real power demand and supply in real-time. How is this related to Frequency Response for a disturbance? (The team may answer this as part of 2.b above.) b. "Through a tariff (e.g. Frequency Response and regulation service). " The team is advised to review the actual pro-forma OATT schedule for Schedule 3 "Regulation and Frequency Response Service" which is specifically limited to services providers that are "capable of providing this service as necessary to follow the moment-by-moment changes in load." Again, how is this related to Frequency Response for a disturbance? (The team may answer this as part of 2.b above.) c. "From generators through an interconnection agreement." The FERC's pro-

Organization	Yes or No	Question 8 Comment
		forma Standard Large Generator Interconnection Agreement (LGIA) per Order 2003 contains no requirement for generators to provide Frequency Response service, and we are not aware on ANY interconnection agreement that does. We ask that the team point to ANY interconnection agreement with such a requirement. Modification of an interconnection agreement to incorporate such a requirement would require the consent of both parties. d. "Contract with an internal resource or loads."Since Frequency Response service would likely be considered as a necessary service to provide Transmission Service under an OATT, it would require a tariff. What existing tariff applies in the U.S.?The "methods" above that the team has listed have the factual errors described. The standard BAL-003-1 cannot be implemented until the necessary tariffs are developed that permit BAs and FRSGs to contract for Frequency Response services. Once that is done, BAL-003-1 can dictate the performance requirements of a BA or FRSG. o For context, FERC OATT schedules relevant to Frequency Response DO NOT set performance requirements. Schedule 3 (Regulation and Frequency Response Service) sets forth a tariff for the service, while BAL-001-0.1a sets forth performance requirements in aggregate for a BA or RSG. Likewise, Schedule 5 (Operating Reserve - Spinning Reserve Service) and Schedule 6 (Operating Reserve - Supplemental Reserve Service) set tariffs for both services, while BAL-002-1 sets performance requirement. Without an OATT schedule for Frequency Response service, BAs and FRSGs will have no means to contract with generators or loads to provide Frequency Response per BAL-003-1. The team should address this concern.
Response: Thank you for your comment. There is significant coordination between the two drafting teams and this coordination will continue as all standards referenced are posted for comment. **With regard to double jeopardy, both drafting teams have been coordinating to ensure this does not occur.** **We believe it is important from a reliability perspective to have a performance based standard. The ultimate need for tariff changes, interconnection agree, etc will be based on a BA's need to meet the standard.**		

Organization	Yes or No	Question 8 Comment
Within the measures for R1 and the discussions in the Background document, the drafting team believes that FERC and the industry will be able to develop the changes to tariffs to address your concerns with the BA contracting with sources of Frequency Response to meet its FRO. The BA is also responsible for dispatch levels of resources that provide Frequency Response. Now that Frequency Response has been clearly defined and is able to be measured, sources of Frequency Response for delivery of the service can be developed by the industry. **Once both BAL-003-1 and BAL-012-1 have passed, the drafting team believes it would then be an appropriate time for the members of the two drafting teams to develop an application guide.**		
American Electric Power		There is no leverage for the BA to require the generator to carry their burden of addressing governor settings or droop settings, yet the BA is obligated to meet some performance measures in that regard.This revision adds new performance measure responsibilities on the BA who likely has no direct control over every resource affecting their performance within their footprint. We are not necessarily challenging the performance measures themselves, nor their underlying objectives, however AEP views this as a gap in responsibilities which potentially effects reliability. AEP suggests that GOPs be considered as part of this standard so that their performance can be factored into the process to meet the performance objectives.
Response: Thank you for your comments. We've heard some of the same concerns, but there are quite a few good reasons why this standard is a good starting point to meet the FERC directives in Order No. 693 (which NERC was given a specific date next year to deliver). **There are several other standards where a similar situation occurs. As you note, many BAs don't own generators. Still, they are responsible for meeting DCS and CPS. The BAs control regulating and contingency reserves to meet the standards. Similarly a TOP is responsible for maintaining voltage even though they may own no capacitor banks or generators to control VARs.** **To measure frequency response fairly accurately (one of the 693 directives), you have to monitor the BAs' frequency response (or generator governor response if the standard was generator centric) to about 30 events per year. There are about 140 BAs in North America. There are on the order of 4000 generators that would have to report under a generator-centric standard. How do you verify performance of 120,000 observations annually?**		

Organization	Yes or No	Question 8 Comment
MISO has done analysis to find all large frequency events over the past year and how the generators in its footprint performed. It turns out that many of the generators aren't on line for any of the events and only a few of the generators were on line for all large events. So what do you do with generators that are not frequently run? Even if a generator ran 50% of the time, you wouldn't have enough events to do a quality measure in a year. The standard is a backstop standard beyond which we could expect problems during light load conditions for a large contingency. It is not intended to be difficult to meet. As proposed, the standard has a performance obligation about half of what we see today in actual operation. The obligation for the East is on the order of -1000MW/0.1Hz. We have about -2200MW/0.1Hz on average. The standard allows the formation of frequency response sharing groups (similar in concept to DCS' RSGs) and allows obtaining response from other BAs contractually. This means there should be no BAs out of compliance once the standard is in place. Finally, to make it a generator standard precluded other solutions (load management, flywheels, market solution, etc.).		
SPP Standards REview Group		We support the standard as proposed.
Response: The drafting team thanks you for your support.		

9. Please provide any other comments (that you have not already provided in response to the questions above) that you have on the draft standard BAL-003-1.

Summary Consideration: A couple of commenter disagreed with the VSLs for Requirement R1. The drafting team explained that the VSLs were a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections. Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the drafting team has added language to the requirement to reference the Interconnection Frequency Response Obligation.

One commenter felt that there was an inconsistency between Requirement R4 and Requirement R1 and Attachment A concerning how a BA providing Overlap Regulation Services would calculate its FBS. The drafting team disagreed with their comment. Under the two options in R4 the BAs must still comply with the minimum setting requirements through the calculations performed under R2. In your example, if both BAs turned in FRS Form 1 showing a FBS based on the 100% - 125% minimum these two numbers would be added together for compliance with R4.

One commenter felt that the definition should state that it is a negative value. The drafting team explained that while the desired value would be negative it is mathematically feasible for the actual value to be positive but that value would by definition mean that the entity failed the measurement for Requirement R1.

One commenter disagreed with putting the onus on the BA for providing Frequency Response. The drafting team The drafting team explained that they had heard some of the same concerns, but there are quite a few good reasons why this standard is a good starting point to meet the FERC directives in Order No. 693 (which NERC was given a specific date next year to deliver).

There are several other standards where a similar situation occurs. As you note, many BAs don't own generators. Still, they are responsible for meeting DCS and CPS. The BAs control regulating and contingency reserves to meet the standards. Similarly a TOP is responsible for maintaining voltage even though they may own no capacitor banks or generators to control VArs.

To measure frequency response fairly accurately (one of the 693 directives), you have to monitor the BAs' frequency response (or generator governor response if the standard was generator centric) to about 30 events per year. There are about 140 BAs in North America. There are on the order of 4000 generators that would have to report under a generator-centric standard. How do you verify performance of 120,000 observations annually?

The standard is a backstop standard beyond which we could expect problems during light load conditions for a large contingency. It is not intended to be difficult to meet. As proposed, the standard has a performance obligation about half of what we see today in actual operation. The obligation for the East is on the order of -1000MW/0.1Hz. We have about -2200MW/0.1Hz on average. The standard allows the formation of frequency response sharing groups (similar in concept to DCS' RSGs) and allows obtaining response from other BAs contractually. This means there should be no BAs out of compliance once the standard is in place.

One commenter questioned how the event selection process would work. The drafting team stated that the event selection process was outline in the Procedure for ERO Support of the Frequency Response and Frequency Bias Setting Standard.

Organization	Question 9 Comment
ACES Power Marketing Standards Collaborators	(1) Please strike “that is a member of a multiple BA Interconnection” in R2 and R3. The language makes the requirements difficult to read. We understand this is trying to clarify that these requirements should not apply to BAs such as ERCOT since changing its Frequency Bias Setting does not need to be coordinated with other BAs among other issues, and we do not have an issue with this intent. However, there is an easier way to address this issue without creating a confusing requirement. The SDT should include seeking a variance for the ERCOT area in conjunction with developing the standard. (2) Please strike “in order to represent the Frequency Bias Setting for the combined Balancing Authority Area” in Requirement R4 as it is superfluous and incorrect. First, the two bullets provide the necessary information making the statement unnecessary. Second, the BA Areas are not combined into a single BA Area as implied with the statement “combined Balancing Authority Area”. They are still in fact two distinct BA Areas.

Organization	Question 9 Comment
	(3) The data retention period for R1, R2, R3, and R4 is not consistent with the NERC Rules of Procedure. Section 3.1.4.2 of Appendix 4C - Compliance Monitoring and Enforcement Program states that the compliance audit will cover the period from the day after the last compliance audit to the end date of the current compliance audit. The data retention section states that data shall be kept for the current calendar year plus the three previous calendar years. This could be up to four years which exceeds the BA audit period of three years. It is unnecessary for a BA to maintain evidence that was already verified in a prior audit. We recommend changing the evidence retention period to three years. (4) Has the drafting team coordinated the addition of the Frequency Response Sharing Group (FRSG) with the Functional Model Working Group and the NERC staff responsible for organizational registration? If not, please do so as NERC will need to be willing to register entities as a FRSG if it is to be utilized. Furthermore, the Functional Model Working Group should document the purpose and intent of the FRSG .(5) We disagree with the VSLs for R1. The VSLs are structured such that a BA's or FRSG's violation is dependent upon the rest of the interconnection to determine the severity level of the violation. If the BAs collectively fail to achieve the Interconnection Frequency Response obligation, a 2% violation of the Frequency Response Measure jumps from a Lower VSL to a High VSL. This should never be the case. No violation by a registered entity should become potentially more or less severe based on the violation of another entity. We encourage the drafting team to work with NERC Legal department in reviewing this VSL further as FERC has already allowed ISO/RTO violations investigation to draw in third parties that potentially contributed to the ISO/RTO violation to ensure the appropriate party is fined. The principal is similar here in ensuring the appropriate BA is fined for its violation not the violations/failures of other BAs. The background document mentions on page 31 that the motivation for structuring the VSL in this manner was to prevent BAs in multiple BA interconnections from being sanctioned disproportionately. We appreciate the draftingteam considering this issue but believe there is a simpler solution. Four VSLs could simply be written based on the percentage the BA misses its own Frequency Response Obligation. Furthermore, the compliance enforcement process already considers if the violation impacted reliability when assessing a sanction

Organization	Question 9 Comment
	.(6) The Frequency Response Obligation (FRO) term is used inconsistently with the definition in the VSLs for R1. The first part of each BA implies that the Interconnection has an FRO. However, the definition specifically states that FRO is the BA's "share of the required Frequency Response". It does not apply to the Interconnection. How can the Interconnection have a share of the required frequency response? A new term may need to be defined for the Interconnection. (7) The implementation plan still references Requirement R5. There is no such requirement .(8) Requirement R1 is not consistent with the recent direction NERC has taken to refocus on reliability and looking forward during compliance audits rather than backwards. For instance, NERC has proposed monitoring internal controls of registered entities because this will provide a reasonable assurance that the registered entity is prepared to comply in the future. Current compliance audits focus mostly on past performance and provide no indication of future reliability. How does Requirement R1 support this forward looking vision when it is a lagging indicator that looks at historical performance? (9) Requirement R4 appears to be inconsistent with Requirement R1 and Attachment A. On page 3, Attachment A states the BA shall set its Frequency Bias Setting to 100% to 125% of it Frequency Response Measure or Interconnection Minimum. However, Requirement R4 states that the BA providing Overlap Regulation Service shall set its Frequency Bias Setting to the sum of its Frequency Bias Settings on FRS Form 1 and FRS Form 2 of its own BA and the BA to which its provides Overlap Regulation Service. For simplicity let's call the BA providing Overlap Regulation Service BA X and the BA receiving the service BA Y. Why would the BA X not set its Frequency Bias Setting to 100% to 125% of the sum of BA X's and BA Y's Frequency Response Measure? This would make Requirement R4 parallel with R2. (10) We do not understand the difference between the two bullets in Requirement R4. They appear to say essentially the same thing and the background document provides no discussion to distinguish their differences. Please provide further explanation.
Response: Thank you for your comments. **(1) The proposed variance alternative could create unnecessary work for different organizations.** **(2) The proposed elimination of words could help but, the elimination could bring more questions than benefits.**	

Organization	Question 9 Comment
(3) The drafting team believes that the language proposed in the draft standard is typical of other standards and is not in violation of anything. (4) The drafting team is coordinating as you stated. (5) VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections. Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the drafting team has added language to the requirement to reference the Interconnection Frequency Response Obligation. (6) The drafting team has clarified the VSL. (7) The drafting team has corrected the Implementation Plan. (8) The drafting team disagrees. The drafting team believes that this is a performance based standard similar to BAL-001 CPS and BAL-002 DCS requirements. With regards to "internal controls" the drafting team believes that this is an enforcement activity not a standards activity. (9) The drafting team disagrees with your comment. Under the two options in R4 the BAs must still comply with the minimum setting requirements through the calculations performed under R2. In your example, if both BAs turned in FRS Form 1 showing a FBS based on the 100% - 125% minimum these two numbers would be added together for compliance with R4. (10) Under the first bullet, two BAs have submitted two FRS Form 1 document in accordance with R1. Under the second bullet, one entity has turned in a single FRS Form 1 with all information for the two BAs combined.	
Keen Resources Asia Ltd.	A probabilistic/statistical basis needs to be developed for the FRM that assesses for usage of frequency response (causation of frequency error) and not just for provision of it. This would also overcome NERC's singular focus on reaction, and NERC's color-blindness to proaction, pointed out in my reply to question 7.
Response: Thank you for your comment. As part of the ongoing evaluation of Frequency Response this may be considered.	
SPP Standards REview Group	Additional typos:Change the ')' to a '(' in the 4th line of M1 of the standard.No further comment

Organization	Question 9 Comment
Response: Thank you for your comment. This has been corrected.	
Arizona Public Service Company	As mentioned in Item 8 above, the VRF language is too complicated and hard to follow. Even though the VRF poll is non binding, it needs to be clear and simple enough to be understood.
Response: Thank you for your comments. The drafting team is assuming you mean the VSL. VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plain as single-BA Interconnections. Consider a small BA that whose performance is 70% of it's FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response. To do otherwise would treat multi-BA Interconnections tens of times more harshly than single BA Interconnections. However, the drafting team has added language to the requirement to reference the Interconnection Frequency Response Obligation.	
BC Hydro	BC Hydro respectfully submits these additional comments/observations: 1.The proposed standard seems to indicate that it is applicable to the identified responsible entities at all times. There might be circumstances where a BA that belongs to a multiple-BA Interconnection became isolated and has to operate in restorative mode which might require adjusting the frequency bias to a value less negative than the minimum FBS setting value in order to follow the much reduced load/generation level in the area. We suggest adding some language in either the Applicability section or in individual Requirements to recognize these circumstances. 2.Effective Dates: the proposed standard specifies a fixed period (12-month or 24-month) following Regulatory Approval which may fall in the middle of the year while the calculation and implementation are performed on an annual basis. Does this represent any conflicts? 3.The proposed standard does not clearly specify whether a BA must chose between using fixed bias or variable bias for the entire year. Should BAs be allowed to switched back and forth between the two methods? If yes, more details may be needed to account for the FRM and minimum FBS. 4.The proposed standard does not clearly specify whether a BA can be part of a FRSG for only part

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	of the year or must be the whole year 5.The definition of FRO, FRM, FBS, etc. should all include language to indicate the "negative" nature of the value. 6.Measure M2 should have "and uses a fixed bias" added for clarity purpose. 7.In the Additional Compliance Information section of the proposed standard the following info still exists: For Interconnections that are also Balancing Authorities, Tie Line Bias control and fFlat Ffrequency control are equivalent and either is acceptable. Since all reference to AGC Modes have been removed from the Requirements, this additional info should also be removed.
Response: Thank you for your comments. **(1) The drafting team does not believe that there is any difference between adherence to the current standard and the proposed standard. With regard to islanded operations, the drafting team believes that other standards prevail under those conditions.** **(2) The timelines are not requirements and may be adjusted to meet the annual calculation process proposed by the standard.** **(3) The drafting team believes the standard as drafted, allows for two types of bias, fixed and variable. A fixed bias is a single number for the entire period. A number that changes within the period is a variable bias and is subject to Requirement R3.** **(4) FRS Form 1 and 2 allows for the transfer of Frequency Response on a per event basis.** **(5) While the desired value of the FRM would be negative it is mathematically feasible for the actual value to be positive but that value would by definition mean that the entity failed the measurement for Requirement R1. The FBS definition states that it is an inverse contribution to the interconnection frequency; therefore the definition does not need to reference a negative value. The FRO will be an allocation of the IFRO whose calculation methodology will provide a negative number. The allocation of a negative number will result in a negative number. For these reasons the SDT did not modify the definitions.** **(6) Requirement R2 is only applicable to entity's using a fixed bias therefore Measure M2 only applies to those utilizing a fixed bias.** **(7) The proposed elimination of words could help but, the elimination could bring up more questions than benefits.**	
Edison Electric Institute	EEI supports the efforts and improvements made by the Standards Drafting Team (SDT) in the latest version of BAL-003 and believe those changes have been responsive to the directives in Order 693. However, we recognizes that the Industry has struggled with this standard and remains split as to how best to respond to those directives and in some cases there are those who question

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	whether a standard is even necessary. Given the many open issues and the concerns expressed by stakeholders we anticipate that this standard will once again fail to achieve sufficient support to gain approval. Should the Standard fail to achieve ballet approval, it is our hope that NERC Staff and the NERC Board of Trustees will allow the SDT a little more time to resolve any final issues that have been identified in this latest ballet. Although we recognize that May 31, 2013 does not leave the ERO with a lot of time to comply with this FERC imposed deadline, we still remain confident that given the progress made by the SDT a standard, which is acceptable to the Industry, is still possible. To the extent EEI can help, we are committed to working with member companies to communicate the issues and exchange insights from the SDT to help as we can to achieve a positive outcome.
Response: Thank you for your comment and support.	
Manitoba Hydro	Purpose: Is the reference to 'Interconnection Frequency' supposed to be 'Frequency Response'? This would be consistent with later wording in the standard. R1: (1) The acronym 'FRO' is used inconsistently within the document. (2) The phrase "to ensure that sufficient Frequency Response ..." should be separated from the requirement as it is (i) not descriptive of the required actions (ii) redundant with the stated purpose at the beginning of the standard. In general, such a drafting technique should be avoided as it may allow Responsible Entities to argue that a violation has not occurred where the specific action that is described has not been taken, but the purpose referenced in the requirement has been met. M1: The reference to 'documented formula' is not clear. Does this imply that the FRSG or BA have a record of their calculation? In addition, there is a typo, a random ')' after FRM. M2: Should include the words 'and uses a fixed Frequency Bias Setting...' after overlap Regulation

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	Service to make the wording consistent within the Requirement. M3: The wording of this measure switches tenses between 'is' and 'was'. For consistency, we suggest that this be corrected. NERC Glossary definition of an FRSG is a group of BAs that collectively maintain, allocate and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members. No mention is made of the agreement including the sharing or delegation of responsibility related to FRM. Accordingly, the standard should only reference a BA being able to delegate responsibility to an FRSG if the RSG Agreement allows for such delegation. Data Retention 1.3. (1) As the standard is currently drafted, both the BA and the FRSG would be required to retain data or evidence to show compliance with requirements R1 and M1. It is unclear whether this is the intention, or whether it would be acceptable that just one or the other would maintain such records .(2) In the third paragraph, it should be clarified who is required to keep information related to non compliance if the BA belongs to an FRSG - the BA or the FRSG or both.

Response: Thank you for your comments. The drafting team believes that the purpose statement is correct as written. The standard is for both Frequency Response and Frequency Bias Setting both of which support Interconnection Frequency.

(1) The drafting team corrected the identified FRO inconsistencies within the documents.
(2) The drafting team was advised by NERC staff to include the language you are referencing.
(3) M1 – Yes the entity must have a record of their calculation. The typo has been fixed.
M2 - Requirement R2 is only applicable to entity's using a fixed bias therefore Measure M2 only applies to those utilizing a fixed bias.
M3 – The drafting team corrected the use of "is" in the last line of the measure.
(4) The drafting team believes that any agreement between members of a RSG is an issue that the RSG would handle. We have a created the FRSG to address the concerns that an existing RSG may or may not be a FRSG.

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Data Retention **(1) Both the BA and FRSG must maintain data. At a minimum the BA needs data to document its bias setting obligation. In addition, the BAs data may be needed to demonstrate FRSG performance.** **(2) The drafting team believes that the language is clear; the entity that is found non-compliant would be the entity that would be required to keep the data.**	
JEA	R1 places the burden for compliance on the BA but the BA does not control generation assets and should not be solely responsible for maintaining frequency response. While the standard can still define the amount of Frequency Response for each BA, there needs to be an obligation on the GO/GOP to provide that service as directed by the BA and they should also be held accountable for compliance. Finally, we do not believe that a sufficient study has been conducted to determine the impact of this standard. We are concerned that a substantial number of compliance issues could result and that the resulting cost to maintain compliance could be excessive and we suggest it be put through the Cost Effective Analysis Process (CEAP). We suggest that the proposed values be evaluated on a sample size within each region to determine the number of compliance issues and for those issues that are found determine what the BA would have to do be compliant.
Response: Thank you for your comments. We've heard some of the same concerns, but there are quite a few good reasons why this standard is a good starting point to meet the FERC directives in Order No. 693 (which NERC was given a specific date next year to deliver). **There are several other standards where a similar situation occurs. As you note, many BAs don't own generators. Still, they are responsible for meeting DCS and CPS. The BAs control regulating and contingency reserves to meet the standards. Similarly a TOP is responsible for maintaining voltage even though they may own no capacitor banks or generators to control VArs.** **To measure frequency response fairly accurately (one of the 693 directives), you have to monitor the BAs' frequency response (or generator governor response if the standard was generator centric) to about 30 events per year. There are about 140 BAs in North America. There are on the order of 4000 generators that would have to report under a generator-centric standard. How do you verify performance of 120,000 observations annually?**	

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MISO has done analysis to find all large frequency events over the past year and how the generators in its footprint performed. It turns out that many of the generators aren't on line for any of the events and only a few of the generators were on line for all large events. So what do you do with generators that are not frequently run? Even if a generator ran 50% of the time, you wouldn't have enough events to do a quality measure in a year. **The standard is a backstop standard beyond which we could expect problems during light load conditions for a large contingency. It is not intended to be difficult to meet. As proposed, the standard has a performance obligation about half of what we see today in actual operation. The obligation for the East is on the order of -1000MW/0.1Hz. We have about -2200MW/0.1Hz on average. The standard allows the formation of frequency response sharing groups (similar in concept to DCS' RSGs) and allows obtaining response from other BAs contractually. This means there should be no BAs out of compliance once the standard is in place.** **Finally, to make it a generator standard precluded other solutions (load management, flywheels, market solution, etc.).** **The SDT does not believe that there is a need to perform a "cost analysis". The numbers are lower than the numbers we are presently seeing.**	
Los Angeles Department of Water and Power	Spinning reserves are intended to support the interconnection response to the loss of a resource. If BAL-003-1 is adopted through this Project, the LADWP recommends that the spinning reserve requirements of BAL-002-0.1b and BAL-STD-002-0 be removed, as the Spinning reserve requirement would require utilities to reserve resources in excess of the reserves required in BAL-003-1. LADWP recognizes that this recommendation may be handled through a separate NERC Project, but wanted to submit this comment to bring light to this potential conflict in Reliability Standards.
Response: Thank you for the observation.	
Tacoma Power	The addition to the Frequency Bias Setting definition of "and discourage response withdrawal through secondary control systems" seems incomplete. Tacoma Power does not see anything in the standard that addresses (or measures) how a frequency bias setting will discourage response withdrawal through secondary systems. This should either be more fully addressed or removed.

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Response: The FRI Report and the Background Documents contain explanations on this issue.	
SERC OC Standards Review Group	The comments expressed herein represent a consensus of the views of the above namedmembers of the SERC OC Standards Review Group only and should not be construed as theposition of SERC Reliability Corporation, its board, or its officers.
Response: Thank you for the clarification	
Duke Energy	The concern raised in Duke Energy's comments in item 4 will not be a factor for a few years, but will be an issue as more and more BAs are in the position of their FRM being better than the Interconnection Minimum allocation. We believe that the language that we proposed for calculating the minimum FBS in a multiple-BA Interconnection allows for the proper incentives for BAs to maintain FRM much better than required, and allows for comparable measurement of secondary control performance between similarly-sized BAs, while presenting no risk to reliability.
Response: Thank you for your comment. The industry will utilize information from the process related to this standard to make future decisions. Also, please refer to our response to your Question #4 comment.	
Puget Sound Energy	The definition of "Frequency Response Obligation" applies only to a Balancing Authority. However, requirement R1 applies to both FRSGs and BAs and includes a Frequency Response Obligation that applies to each of those entities. As a result, the definition must also address an FRSG's Frequency Response Obligation. The acronym for Balancing Authority is not included following the first reference to the term in requirement R1 (looks like an inadvertent deletion). Requirement R1 states that an entity "... shall achieve an annual Frequency Response Measure (FRM)...." However, the definition of Frequency Response Measure already includes the concept of annual. As a result, the word "annual" should be removed from the requirement. Requirement R1 includes the language "... to ensure that sufficient Frequency Response is provided

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	by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation." This language is a purpose statement rather than a requirement applicable to a FRSG or a BA and should be excluded from the requirement. So long as an FRSG or BA achieves the FRM calculated in accordance with Attachment A, it has done everything necessary to comply with the standard. There are discrepancies between the implementation plan and the proposed standard:- The definitions of "Frequency Response Measure" and "Frequency Response Obligation" in the Implementation Plan are different from those proposed in the draft standard.- The Implementation Plan references "Reserve Sharing Group" rather than "Frequency Response Sharing Group".- The Implementation Plan does not include a definition for the term "Frequency Response Sharing Group".- The Implementation Plan continues to reference R5 in the discussion of the standard's proposed effective date. The annual process dates listed on page 32 of the Background document appear to be inconsistent with those listed in Attachment A.
Responses: Thank you for your comments. **The calculation of FRO is done at the individual BA level. Those BAs that are part of a FRSG must sum their individual FROs to determine the FRSG FRO. This is clearly stated in Attachment A.** **The drafting team corrected this oversight.** **The drafting team disagrees that the term "annual" should be removed as it provides greater clarity as written.** **The drafting team was advised by NERC staff to include the language you are referencing.** **The drafting team has corrected the Implementation Plan.** **The dates are not firm dates but are examples for the process.**	
California Independent System Operator	The ISO supports the development of BAL-003-1 and would like to offer the following comments/suggestions: (1) Some BAs may have to develop a new Ancillary Service product to ensure that its FRO can be met and believes that 12 months after FERC's approval may not provide adequate time to

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	stakeholder and modify market software applications. The ISO suggest increasing the implementation timeline by at least one more year. (2) If the implementation timeline cannot be changed, then the ISO suggests that compliance should be waived for the first year of operation under BAL-003-1. (3) Some BAs may elect to procure a portion of its FRO through bilateral agreements for certain hours (e.g. off-peak) with a neighboring BA. Since a contingency could be in a BA other than the two BAs under a bilateral agreement, the standard or background document needs to clarify the duration of frequency response so that transmission reservation is not a requirement for frequency response. The ISO believes that the BA experiencing the contingency should have adequate arrangements in place to deal with internal contingencies.
Response: Thank you for your comments. **(1) The implementation date for Requirement R1 is 24 months after FERC approval, not 12 months. We believe that this would provide ample time.** **(2) See (1) above.** **(3) The measurement period is 20 to 52 seconds after the beginning of the event. Additionally, there is no mention of transmission requirements for purchase or delivery of Frequency Response.**	
Portland General Electric Company	The issue with proposed Reliability Standard BAL-003-1, requirement R1, is that the Annual Frequency Response Measure (FRM) is determined after the fact with an entity unable to identify or monitor compliance (on non-compliance) along the way. Also, the requirement seems to go the opposite direction of NERC's risk based initiatives where collecting historic compliance information become unsustainable.
Response: Thank you for your comments. **(1) The identification and posting of events will occur on a quarterly basis as stated in the Procedure Document. This will allow BAs to monitor their compliance.** **(2) The SDT believes that this is a performance based standard similar to BAL-001 CPS and BAL-002 DCS requirements.**	

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MRO NSRF	The MRO NSRF is concerned with the drafting team's exclusion of single Balancing Authority Interconnections from compliance with Requirement R2. To ensure a consistent approach in the application of BAL-003-1, recommend R2 be revised as follows: R2). Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation ...
Response: Based on the comment rather than the proposed language the drafting team is providing the following response. The drafting team discussed the applicability of bias requirements to single BA Interconnections extensively. The consensus of the FRSDT was that single BA Interconnections inherently have strong incentives to accurately represent their frequency response characteristic. Any adverse consequences of misrepresenting the frequency response characteristic will be borne solely by that BA and cannot affect other BAs in other Interconnections adversely.	
Southern Company	The organization selecting events must ensure that the change in frequency is outside the normal dead-band of generator governors. Many of the events selected in the past have not been outside the dead-band and therefore, the frequency response was much less than expected. Southern Company proposes .07 which is consistant with WECC.
Response: Thank you for your comments. The drafting team has created a Procedure Document that details the event selection criteria for each Interconnection. This should alleviate the concern of smaller events being selected.	
Independent Electricity System Operator	The proposed effective date for this standard conflicts with Ontario regulatory practice respecting the effective date of implementing approved standards. It is suggested that this conflict be removed by appending to each of Section A1.3 and A1.4, after "months after applicable regulatory approval", of the standard to the following effect:", or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities."The same change should be made to the two bullets in the proposed Implementation Plan.
Response: The drafting team appreciates your comment. However, this language is required to be used by the drafting team with	

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the only modification allowed to be the number of months prior to implementation.	
Northeast Power Coordinating Council	The VSL's refer to the FRM (Frequency Response Measure). If that is the intent of the Standard, then GO's and GOP's should be included in the applicability since they are the entities responding to the AGC signals. If the intent is the FRO (Frequency Response Obligation) only, then the VSL's should be updated.
Response: The FRM is not intended to measure response to AGC signals but is intended to measure response to frequency changes. Therefore, the drafting team does not believe that any modification is warranted.	
Consolidated Edison Co. of NY, Inc.	The VSL's refer to the FRM (Frequency Response Measure). If that is the intent of the Standard, then GO's and GOP's should be included in the applicability since they are the entities responding to the AGC signals. If the intent is the FRO (Frequency Response Obligation) only, then the VSL's should be updated.
Response: The FRM is not intended to measure response to AGC signals but is intended to measure response to frequency changes. Therefore, the SDT does not believe that any modification is warranted.	
Tucson Electric Power	This is an important task and the efforts of the drafting team are appreciated.
Response: Thank you for the recognition.	
The United Illuminating Company	UI believes the VRF should be High. The VRF justification for Medium is that the prior year's bias setting would exist in the control system so the impact would not cause a Cascade. UI thinks that is an adjustment factor that is applied after non-compliance is determined. Not having settings is likely to cause cascade so the VRF is High.
Response: The drafting team reviewed the definition for the VRF levels and believes that the appropriate levels were used for each requirement.	
Tri-State Generation and	We are concerned with the tariff implictations associated with this standard. Will this standard

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Transmission Assn., Inc.	create the need for an additional ancillary service under the FERC pro forma OATT?
Response: The drafting team believes that your comment is possible but does not think that it is in the scope of NERC to make changes to the FERC pro forma OATT.	
NREL Transmission and Grid Integration Group	We commend the drafting team for a rigorous approach to this new and important standard. Being observers who have a strong interest in this standard as it applies to much of the research that we do, but not stakeholders of the ultimate standard, we submit our overall comments as recommendations here. We believe there are a few potential issues, that may at least need more thought before going forward. The first is the credit for LR. (1) Overfrequency can be an issue: using ERCOT as an example, with -282 MW/0.1Hz response and 1400 MW of LR all responsive at 59.7 Hz, if just meeting FRO requirements, the 1400MW LR can all be triggered with a loss of (282*3=) 846MW, causing (1400-846=)554MW of overgeneration. This can be exacerbated by further increases of LR without recognition of the triggering frequency, and the disconnect between BA and interconnection in the other interconnections. (2) With crediting LR toward the Interconnection, it will not give incentive toward BAs to provide it. We believe the LR should contribute to the BA FRO rather than discount the IFRO. (3) There is no requirement for frequency response capacity (ie MW) available to provide the FR. This is a nonissue in today's world with the amount of spinning reserve already available, but the issue could be apparent on future systems with increased reserve sharing, or reserve capacity from resources that operate in modes which do not provide frequency response. The European Interconnection requirement has two intentions: a 3,000 MW capacity requirement and a 1,500 MW/0.1Hz FRO requirement that is allocated out to its Transmission System Operators. This could solve the issue with LR and generators, where LR is in MW and generation governing is in MW/0.1Hz. (4) It is likely, and from our understanding is true in some areas like ERCOT, that the LR is selected based on market solutions, and may not be available all times of the year. This is another reason why the LR should contribute to the BA FRO rather than discount the IFRO. (5) It may be beneficial to guide frequency settings for LR or even multiple settings to mimic a

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	droop curve for LR. Other potential issues not related to the LR. We think the SDT has done an outstanding job on reviewing the data sets and determining statistically based values to better account for different factors that may affect minimum frequency levels. We agree that there are current issues in the primary governing response, but that there may be a disconnect in fixing those issues with the static values. We also agree that there is not an easy solution. In specific: (a) The static CB ratio might not incentivize BAs to improve response with increased inertia or faster responding governing response. (b) The static withdrawal BC'adj may not incentivize BAs to improve their governing response and limit their withdrawal. Improved technology may allow for better measurement to account for these issues dynamically rather than using static numbers. Guidance on increasing inertia, increasing governing speed, and reducing withdrawal should be considered by stakeholders. We thank NERC and the SDT for the opportunity to provide comments on this important standard.
Response: Thank you for your comments. **(1) The standard as presently written addresses both over and under frequency events.** **(2) The credit given for LCR is based on numbers provided by the interconnection. The utilization of load by any individual BA will be included in the calculation of their FRM through the Net Actual Interchange term rather than the IFRO.** **(3) Thank you for your comment.** **(4) Please refer to our response to (2) above.** **(5) Thank you for your comment. As more information is gained through implementation of this standard modifications based on this information will be possible.**	
Ameren	While we support this draft, we believe that this might only be a starting point and as additional knowledge and experience is gained through the implementation of this standard and other efforts such as the FRI, that the improvements can be embraced by all parties, even if those improvements result in relaxed requirements.
Response: Thank you for your comments. The NERC process allows for adjustments and improvements for both its thresholds and	

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methodologies when operational experience has been gained.	
Xcel Energy	Xcel Energy supports this proposed revision to the standard as a first step and suggests that after operating for a couple of years under the revised standard, that NERC initiates a more complete study to support any modifications to the standard.
Response: Thank you for your comment. The drafting team agrees.	

END OF REPORT

Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed:

1. The Standards Committee approved the SAR for posting on January 13, 2005.
2. The SAR was posted for industry comment from January 17, 2005 through February 17, 2005.
3. Reply comments and a revised SAR were posted for a second industry comment period from April 4, 2006 through May 3, 2006.
4. Reply comments and a revised SAR were posted for a third industry comment period from February 8, 2007 through March 9, 2007.
5. Standards Committee approved moving the project into the standards development phase on July 12, 2007.
6. The Standards Committee appointed the Standard Drafting Team on August 13, 2007.
7. The draft standard was posted for a 30 day formal comment period from February 4, 2011 through March 7, 2011.
8. The draft standard was posted for a 45-day formal comment period and a 10 day initial ballot from October 25, 2011 through December 8, 2011.

Proposed Action Plan and Description of Current Draft:

This is the third posting of the proposed standard and its associated documents for a 30 day formal comment period and a successive 10 day ballot, from October 5, 2012 through November 5, 2012.

Future Development Plan:

Anticipated Actions	Anticipated Date
1. Respond to comments submitted within the comment period and with the successive ballot.	December, 2012
2. Conduct a recirculation ballot for ten days.	December, 2012
3. BOT adoption.	February, 2013

Definitions of Terms used in the Standard

Frequency Response Measure (FRM)

The median of all the Frequency Response observations reported annually by Balancing Authorities or Frequency Response Sharing Groups for frequency events specified by the ERO. This will be calculated as MW/0.1Hz.

Frequency Response Obligation (FRO)

The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection. This will be calculated as MW/0.1Hz.

Frequency Bias Setting

A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's inverse Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems.

Frequency Response Sharing Group (FRSG)[1]

A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.

[1] This term and definition is identical to the definition in BAL-012-1 proposed standard.

A. Introduction

Title: Frequency Response and Frequency Bias Setting

Number: BAL-003-1

Purpose: To require sufficient Frequency Response from the Balancing Authority (BA) to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored to its scheduled value. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting.

Applicability:

1.1. Balancing Authority

1.1.1 The Balancing Authority is the responsible entity unless the Balancing Authority is a member of a Frequency Response Sharing Group, in which case, the Frequency Response Sharing Group becomes the responsible entity.

1.2. Frequency Response Sharing Group

Effective Date:

1.3. In those jurisdictions where regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after Board of Trustees adoption.

1.4. In those jurisdictions where regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after Board of Trustees adoption.

B. Requirements

R1. Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation. *[Risk Factor: Medium][Time Horizon: Real-time Operations]*

R2. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined in accordance with Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO and shall use this Frequency Bias Setting until directed to change by the ERO. *[Risk Factor: Medium][Time Horizon: Operations Planning]*

R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is: *[Risk Factor: Medium][Time Horizon: Operations Planning]*

3.1 Less than zero at all times, and

3.2 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz.

R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either: *[Risk Factor: Medium][Time Horizon: Operations Planning]*

- The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or
- The Frequency Bias Setting shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.

C. Measures

M1. Each Frequency Response Sharing Group or Balancing Authority that is not a member of a Frequency Response Sharing Group shall have evidence such as dated data plus documented formula in either hardcopy or electronic format that it achieved an annual FRM (in accordance with the methods specified by the ERO in Attachment A with data from FRS Form 1 reported to the ERO as specified in Attachment A) that is equal to or more negative than its FRO to demonstrate compliance with Requirement R1.

M2. The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service shall have evidence such as a dated document in hard copy or electronic format showing the ERO validated Frequency Bias Setting was implemented into its ACE calculation within the implementation period specified or other evidence to demonstrate compliance with Requirement R2.

M3. The Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing variable Frequency Bias shall have evidence such as a dated report in hard copy or electronic format showing the average clock-minute average Frequency Bias Setting was less than zero and during periods when the clock-minute average frequency was outside of

the range 59.964 Hz to 60.036 Hz was equal to or more negative than its Frequency Response Obligation to demonstrate compliance with Requirement R3.

M4. The Balancing Authority shall have evidence such as a dated operating log, database or list in hard copy or electronic format showing that when it performed Overlap Regulation Service, it modified its Frequency Bias Setting in its ACE calculation as specified in Requirement R4 to demonstrate compliance with Requirement R4.

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

The Regional Entity is the Compliance Enforcement Authority except where the responsible entity works for the Regional Entity. Where the responsible entity works for the Regional Entity, the Regional Entity will establish an agreement with the ERO or another entity approved by the ERO and FERC (i.e. another Regional Entity), to be responsible for compliance enforcement.

1.2. Compliance Monitoring and Assessment Processes:

Compliance Audits

Self-Certifications

Spot Checking

Compliance Investigation

Self-Reporting

Complaints

1.3. Data Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

The Balancing Authority shall retain data or evidence to show compliance with Requirements R1, R2, R3 and R4, Measures M1, M2, M3 and M4 for the current year plus the previous three calendar years unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The Frequency Response Sharing Group shall retain data or evidence to show compliance with Requirement R1 and Measure M1 for the current year plus the previous three calendar years unless directed by its Compliance Enforcement

Authority to retain specific evidence for a longer period of time as part of an investigation.

If a Balancing Authority or Frequency Response Sharing Group is found non-compliant, it shall keep information related to the non-compliance until found compliant or for the time period specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all subsequent requested and submitted records.

1.4. Additional Compliance Information

For Interconnections that are also Balancing Authorities, Tie Line Bias control and flat frequency control are equivalent and either is acceptable.

2.0 Violation Severity Levels

R#	Lower VSL	Medium VSL	High VSL	Severe VSL
R1	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's IFRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's IFRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its IFRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its IFRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO
R2	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation

	Service and uses a fixed Frequency Bias Setting failed to implement the validated Frequency Bias Setting value into its ACE calculation within the implementation period specified but did so within 5 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 5 calendar days but less than or equal to 15 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 15 calendar days but less than or equal to 25 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting did not implement the validated Frequency Bias Setting value into its ACE calculation in more than 25 calendar days from the implementation period specified by the ERO.
R3	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 1% but by at most 10%.	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 10% but by at most 20%.	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 20% but by at most 30%.	The Balancing Authority that is a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response obligation by more than 30%..
R4	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing

	Overlap Regulation Services with combined footprint setting-error less than or equal to 10% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 10% but less than or equal to 20% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 20% but less than or equal to 30% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 30% of the validated or calculated value. OR The Balancing Authority failed to change the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services.

E. Regional Variance

None

F. Associated Documents

Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard

FRS Form 1

FRS Form 2

Frequency Response Standard Background Document

G. Version History

Version	Date	Action	Change Tracking
0	April 1, 2005	Effective Date	New
1		Complete Revision under Project 2007-12	Revision

Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed:

1. The Standards Committee approved the SAR for posting on January 13, 2005.
2. The SAR was posted for industry comment from January 17, 2005 through February 17, 2005.
3. Reply comments and a revised SAR were posted for a second industry comment period from April 4, 2006 through May 3, 2006.
4. Reply comments and a revised SAR were posted for a third industry comment period from February 8, 2007 through March 9, 2007.
5. Standards Committee approved moving the project into the standards development phase on July 12, 2007.
6. The Standards Committee appointed the Standard Drafting Team on August 13, 2007.
7. The draft standard was posted for a 30 day formal comment period from February 4, 2011 through March 7, 2011.
8. The draft standard was posted for a 45-day formal comment period and a 10 day initial ballot from October 25, 2011 through December 8, 2011.

Proposed Action Plan and Description of Current Draft:

This is the third posting of the proposed standard and its associated documents for a 30 day formal comment period and a successive 10 day ballot, from October 5, 2012 through November 5, 2012.

Future Development Plan:

Anticipated Actions	Anticipated Date
1. Respond to comments submitted within the comment period and with the successive ballot.	December, 2012
2. Conduct a recirculation ballot for ten days.	December, 2012
3. BOT adoption.	February, 2013

Definitions of Terms used in the Standard

Frequency Response Measure (FRM)

The median of all the Frequency Response observations reported annually by Balancing Authorities or Frequency Response Sharing Groups for frequency events specified by the ERO. This will be calculated as MW/0.1Hz.

Frequency Response Obligation (FRO)

The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection. This will be calculated as MW/0.1Hz.

Frequency Bias Setting

A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's inverse Frequency Response contribution to the Interconnection, and discourage response withdrawal through secondary control systems.

Frequency Response Sharing Group (FRSG)[1]

A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.

[1] This term and definition is identical to the definition in BAL-012-1 proposed standard.

A. Introduction

Title: Frequency Response and Frequency Bias Setting

Number: BAL-003-1

Purpose: To require sufficient Frequency Response from the Balancing Authority (BA) to maintain Interconnection Frequency within predefined bounds by arresting frequency deviations and supporting frequency until the frequency is restored to its scheduled value. To provide consistent methods for measuring Frequency Response and determining the Frequency Bias Setting.

Applicability:

1.1. Balancing Authority

1.1.1 The Balancing Authority is the responsible entity unless the Balancing Authority is a member of a Frequency Response Sharing Group, in which case, the Frequency Response Sharing Group becomes the responsible entity.

1.2. Frequency Response Sharing Group

Effective Date:

1.3. In those jurisdictions where regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after Board of Trustees adoption.

1.4. In those jurisdictions where regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after Board of Trustees adoption.

B. Requirements

R1. Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or BA that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation. *[Risk Factor: Medium][Time Horizon: Real-time Operations]*

R2. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined in accordance with~~subject to~~ Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO and shall use this Frequency Bias Setting until directed to change by the ERO. *[Risk Factor: Medium][Time Horizon: Operations Planning]*

R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is: *[Risk Factor: Medium][Time Horizon: Operations Planning]*

3.1 Less than zero at all times, and

3.2 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz.

R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either: *[Risk Factor: Medium][Time Horizon: Operations Planning]*

- The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or
- The Frequency Bias Setting shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.

C. Measures

M1. Each Frequency Response Sharing Group or Balancing Authority that is not a member of a Frequency Response Sharing Group shall have evidence such as dated data plus documented formula in either hardcopy or electronic format that it achieved an annual FRM ~~)~~(in accordance with the methods specified by the ERO in Attachment A with data from FRS Form 1 reported to the ERO as specified in Attachment A) that is equal to or more negative than its FRO to demonstrate compliance with Requirement R1.

M2. The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service shall have evidence such as a dated document in hard copy or electronic format showing the ERO validated Frequency Bias Setting was implemented into its ACE calculation within the implementation period specified or other evidence to demonstrate compliance with Requirement R2.

M3. The Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing variable Frequency Bias shall have evidence such as a dated report in hard copy or electronic format showing the average clock-minute average Frequency Bias Setting was less than zero and during periods when the clock-minute average frequency was~~is~~ outside

of the range 59.964 Hz to 60.036 Hz was equal to or more negative than its Frequency Response Obligation to demonstrate compliance with Requirement R3.

M4. The Balancing Authority shall have evidence such as a dated operating log, database or list in hard copy or electronic format showing that when it performed Overlap Regulation Service, it modified its Frequency Bias Setting in its ACE calculation as specified in Requirement R4 to demonstrate compliance with Requirement R4.

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

The Regional Entity is the Compliance Enforcement Authority except where the responsible entity works for the Regional Entity. Where the responsible entity works for the Regional Entity, the Regional Entity will establish an agreement with the ERO or another entity approved by the ERO and FERC (i.e. another Regional Entity), to be responsible for compliance enforcement.

1.2. Compliance Monitoring and Assessment Processes:

Compliance Audits

Self-Certifications

Spot Checking

Compliance Investigation

Self-Reporting

Complaints

1.3. Data Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

The Balancing Authority shall retain data or evidence to show compliance with Requirements R1, R2, R3 and R4, Measures M1, M2, M3 and M4 for the current year plus the previous three calendar years unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The Frequency Response Sharing Group shall retain data or evidence to show compliance with Requirement R1 and Measure M1 for the current year plus the previous three calendar years unless directed by its Compliance Enforcement

Authority to retain specific evidence for a longer period of time as part of an investigation.

If a Balancing Authority or Frequency Response Sharing Group is found non-compliant, it shall keep information related to the non-compliance until found compliant or for the time period specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all subsequent requested and submitted records.

1.4. Additional Compliance Information

For Interconnections that are also Balancing Authorities, Tie Line Bias control and flat frequency control are equivalent and either is acceptable.

2.0 Violation Severity Levels

R#	Lower VSL	Medium VSL	High VSL	Severe VSL
R1	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's IFRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's IFRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its IFRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its IFRO, and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO
R2	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation

	Service and uses a fixed Frequency Bias Setting failed to implement the validated Frequency Bias Setting value into its ACE calculation within the implementation period specified but did so within 5 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 5 calendar days but less than or equal to 15 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 15 calendar days but less than or equal to 25 calendar days from the implementation period specified by the ERO.	Service and uses a fixed Frequency Bias Setting did not implement the validated Frequency Bias Setting value into its ACE calculation in more than 25 calendar days from the implementation period specified by the ERO.
R3	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 1% but by at most 10%.	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 10% but by at most 20%.	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 20% but by at most 30%.	The Balancing Authority that is a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response obligation by more than 30%..
R4	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing

	Overlap Regulation Services with combined footprint setting-error less than or equal to 10% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 10% but less than or equal to 20% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 20% but less than or equal to 30% of the validated or calculated value.	Overlap Regulation Services with combined footprint setting-error more than 30% of the validated or calculated value. OR The Balancing Authority failed to change the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services.

E. Regional Variance

None

F. Associated Documents

Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard

FRS Form 1

FRS Form 2

Frequency Response Standard Background Document

G. Version History

Version	Date	Action	Change Tracking
0	April 1, 2005	Effective Date	New
1		Complete Revision under Project 2007-12	Revision

Attachment A

BAL-003-1 Frequency Response & Frequency Bias Setting Standard

Supporting Document

Interconnection Frequency Response Obligation (IFRO)

The ERO, in consultation with regional representatives, has established a target contingency protection criterion for each Interconnection called the Interconnection Frequency Response Obligation (IFRO). The default IFRO listed in Table 1 is based on the resource contingency criteria (RCC), which is the largest category C (N-2) event identified except for the Eastern Interconnection, which uses the largest event in the last 10 years. A maximum delta frequency (MDF) is calculated by adjusting a starting frequency for each Interconnection by the following:

- Prevailing UFLS first step
- CC_{Adj} which is the adjustment for the differences between 1-second and sub-second Point C observations for frequency events. A positive value indicates that the sub-second C data is lower than the 1-second data
- CB_R which is the statistically determined ratio of the Point C to Value B
- BC'_{Adj} which is the statistically determined adjustment for the event nadir being below the Value B (Eastern Interconnection only) during primary frequency response withdrawal.

The IFRO for each Interconnection in Table 1 is then calculated by dividing the RCC MWs by 10 times the MDF. In the Eastern Interconnection there is an additional adjustment (BC'_{Adj}) for the event nadir being below the Value B due to primary frequency response withdrawal. This IFRO includes uncertainty adjustments at a 95 % confidence level. Detailed descriptions of the calculations used in Table 1 below are defined in the *Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard*.

Interconnection	Eastern	Western	ERCOT	HQ	Units
Starting Frequency (F_{Start})	**59.974**	**59.976**	**59.963**	**59.972**	Hz
Prevailing UFLS First Step	**59.5***	**59.5**	**59.3**	**58.5**	Hz
Base Delta Frequency (DF_{Base})	**0.474**	**0.476**	**0.663**	**1.472**	Hz
CC_{ADJ}	**0.007**	**0.004**	**0.012**	**N/A**	Hz
Delta Frequency (DF_{CC})	**0.467**	**0.472**	**0.651**	**1.472**	Hz
CB_R	**1.000**	**1.625**	**1.377**	**1.550**	

Delta Frequency (DF_{CBR})	**0.467**	**0.291**	**0.473**	**0.949**	Hz
BC'_{ADJ}	**0.018**	**N/A**	**N/A**	**N/A**	Hz
Max. Delta Frequency (MDF)	**0.449**	**0.291**	**0.473**	**0.949**	
Resource Contingency Criteria (RCC)	**4,500**	**2,740**	**2,750**	**1,700**	MW
Credit for Load Resources (CLR)		**300**	**1,400****		MW
IFRO	**-1,002**	**-840**	**-286**	**-179**	MW/0.1 Hz

Table 1: Interconnection Frequency Response Obligations

**The Eastern Interconnection UFLS set point listed is a compromise value set midway between the stable frequency minimum established in PRC-006-1 (59.3 Hz) and the local protection UFLS setting of 59.7 Hz used in Florida and Manitoba.*

***In the Base Obligation measure for ERCOT, 1400 MW (Load Resources triggered by Under Frequency Relays at 59.70 Hz) was reduced from its Resource Contingency Criteria level of 2750 MW to get 239 MW/0.1 Hz. This was reduced to accurately account for designed response from Load Resources within 30 cycles.*

An Interconnection may propose alternate IFRO protection criteria to the ERO by submitting a SAR with supporting technical documentation.

Balancing Authority Frequency Response Obligation (FRO) and Frequency Bias Setting

The ERO will manage the administrative procedure for annually assigning an FRO and implementation of the Frequency Bias Setting for each Balancing Authority. The annual timeline for all activities described in this section are shown below.

For a multiple Balancing Authority interconnection, the Interconnection Frequency Response Obligation shown in Table 1 is allocated based on the Balancing Authority annual load and annual generation. The FRO allocation will be based on the following method:

$$\mathrm{FRO_{BA}} = \mathrm{IFRO} \times \frac{\mathrm{Annual\ Gen_{BA}} + \mathrm{Annual\ Load_{BA}}}{\mathrm{Annual\ Gen_{Int}} + \mathrm{Annual\ Load_{Int}}}$$

Where:

- Annual Gen_{BA} is the total annual "Output of Generating Plants" within the Balancing Authority Area (BAA), on FERC Form 714, column c of Part II - Schedule 3.
- Annual $Load_{BA}$ is total annual Load within the BAA, on FERC Form 714, column e of Part II - Schedule 3.
- Annual Gen_{Int} is the sum of all Annual Gen_{BA} values reported in that interconnection.
- Annual $Load_{Int}$ is the sum of all Annual $Load_{BA}$ values reported in that interconnection.

The data used for this calculation is from the most recently filed Form 714. As an example, a report to NERC in January 2013 would use the Form 714 data filed in 2012, which utilized data from 2011.

Balancing Authorities that are not FERC jurisdictional should use the Form 714 Instructions to assemble and submit equivalent data to the ERO for use in the FRO Allocation process.

Balancing Authorities that elect to form a FRSG will calculate a FRSG FRO by adding together the individual BA FRO's.

Balancing Authorities that elect to form a FRSG as a means to jointly meet the FRO will calculate their FRM performance one of two ways:

- Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or
- Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that contains the sum of each participant's individual event performance.

Balancing Authorities that merge or that transfer load or generation are encouraged to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation to the Interconnection remains the same and so that CPS limits can be adjusted.

Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit their FRS Form 1.

Once the ERO reviews the data submitted in FRS Form 1 and FRS Form 2 for all Balancing Authorities, the ERO will use FRS Form 1 data to post the following information for each Balancing Authority for the upcoming year:

- Frequency Bias Setting
- Frequency Response Obligation (FRO)

Once the data listed above is fully posted, the ERO will announce the three-day implementation period for changing the Frequency Bias Setting if it differs from that shown in the timeline below.

A BA using a fixed Frequency Bias Setting sets its Frequency Bias Setting to the greater of (in absolute value):

- Any number the BA chooses between 100% and 125% of its Frequency Response Measure as calculated on FRS Form 1
- Interconnection Minimum as determined by the ERO

For purposes of calculating the minimum Frequency Bias Setting, a Balancing Authority participating in a Frequency Response Sharing Group will need to calculate its stand-alone Frequency Response Measure using FRS Form 1 and FRS Form 2 to determine its minimum Frequency Bias Setting.

A Balancing Authority providing Overlap Regulation will report the historic peak demand and generation of its combined BAs' areas on FRS Form 1 as described in Requirement R4.

There are occasions when changes are needed to Bias Settings outside of the normal schedule. Examples are footprint changes between Balancing Authorities and major changes in load or generation or the formation of new Balancing Authorities. In such cases the changing Balancing Authorities will work with their Regions, NERC and the Resources Subcommittee to confirm appropriate changes to Bias Settings, FRO, CPS limits and Inadvertent Interchange balances.

If there is no net change to the Interconnection total Bias, the Balancing Authorities involved will agree on a date to implement their respective change in Bias Settings. The Balancing Authorities and ERO will also agree to the allocation of FRO such that the sum remains the same.

If there is a net change to the Interconnection total Bias, this will cause a change in CPS2 limits and FRO for other Balancing Authorities in the Interconnection. In this case, the ERO will notify the impacted Balancing Authorities of their respective changes and provide an implementation window for making the Bias Setting changes.

Frequency Response Measure (FRM)

The Balancing Authority will calculate its FRM from Single Event Frequency Response Data (SEFRD), defined as: "the data from an individual event from a Balancing Authority that is used to calculate its Frequency Response, expressed in MW/0.1Hz" as calculated on FRS Form 2 for each event shown on FRS Form 1. The events in FRS Form 1 are selected by the ERO using the *Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard*. The SEFRD for a typical Balancing Authority in an Interconnection with more than one Balancing Authority is basically the change in its Net Actual Interchange on its tie lines with its adjacent Balancing Authorities divided by the change in Interconnection frequency. (Some Balancing Authorities may choose to apply corrections to their Net Actual Interchange (NA_I) values to account for factors such as nonconforming loads. FRS Form 1 and 2 shows the types of adjustments that are allowed. Note that with the exception of the Contingent BA column, any adjustments made must be made for all events in an evaluation year. As an example, if an entity has non-conforming loads and makes an adjustment for one event, all events must show the non-conforming load, even if the non-conforming load does not impact the calculation. This ensures that the reports are not utilizing the adjustments only when they are favorable to the BA.) The ERO will use a standardized sampling interval of approximately 16 seconds before the event up to the time of the event for the pre-event NA_I, and frequency (A values) and approximately 20 to 52 seconds after the event for the post-event NA_I (B values) in the computation of SEFRD values, dependent on the data scan rate of the Balancing Authority's Energy Management System (EMS).

All events listed on FRS Form 1 need to be included in the annual submission of FRS Forms 1 and 2. The only time a Balancing Authority should exclude an event is if its tie-line data or its Frequency data is corrupt or its EMS was unavailable. FRS Form 2 has instructions on how to correct the BA's data if the given event is internal to the BA or if other authorized adjustments are used.

Assuming data entry is correct FRS Form 1 will automatically calculate the Balancing Authority's FRM for the past 12 months as the median of the SEFRD values. A Balancing Authority electing to report as an FRSG or a provider of Overlap Regulation Service will provide an FRS Form 1 for the aggregate of its participants.

To allow Balancing authorities to plan its operations, events with a "Point C" that cause the Interconnection Frequency to be lower than that shown in Table 1 above (for example, an event in the Eastern Interconnection that causes the Interconnection Frequency to go to 59.4 Hz) or higher than an equal change in frequency going above 60 Hz may be included in the list of events for that interconnection. However, the calculation of the BA response to such an event will be adjusted to show a frequency change only to the Target Minimum Frequency shown in Table 1 above (in the previous example this adjustment would cause Frequency to be shown as 59.5 Hz rather than 59.4 HZ) or a high frequency amount of an equal quantity. Should such an event happen, the ERO will provide additional guidance.

Timeline for Balancing Authority Frequency Response and Frequency Bias Setting Activities

Described below is the timeline for the exchange of information between the ERO and Balancing Authorities (BA) to:

- Facilitate the assignment of BA Frequency Response Obligations (FRO)
- Calculate BA Frequency Response Measures (FRM)
- Determine BA Frequency Bias Settings (FBS)

Target Date	Activity
April 30	The ERO reviews candidate frequency events and selects frequency events for the first quarter (December to February).
May 10	Form1 is posted with selected events from the first quarter for BA usage by the ERO.
May 15	The BAs receive a request to provide load and generation data as described in Attachment A to support FRO assignments and determining minimum FBS for BAs.
July 15	The BAs provide load and generation data as described in Attachment A to the ERO.
July 30	The ERO reviews candidate frequency events and selects frequency events for the second quarter (March to May).
August 10	Form1 is posted with selected events from the first and second quarters for BA usage by the ERO.
October 30	The ERO reviews candidate frequency events and selects frequency events for the third quarter (June to August)
November 10	Form1 is posted with selected events from the first, second, and third quarters for BA usage by the ERO.
November 20	If necessary, the ERO provides any updates to the necessary Frequency Response.
November 20	The ERO provides the fractional responsibility of each BA for the Interconnection's FRO and Minimum FBS to the BAs.
January 30	The ERO reviews candidate frequency events and selects frequency events for the fourth quarter (September to November).

2nd business day in February	Form1 is posted with all selected events for the year for BA usage by the ERO.
February 10	The ERO assigns FRO values to the BAs for the upcoming year.
March 7	BAs complete their frequency response sampling for all four quarters and their FBS calculation, returning the results to the ERO.
March 24	The ERO validates FBS values, computes the sum of all FBS values for each Interconnection, and determines L10 values for the CPS 2 criterion for each BA as applicable.
Any time during first 3 business days of April (unless specified otherwise by the ERO)	The BA implements any changes to their FBS and L10 value.

Attachment A

BAL-003-1 Frequency Response & Frequency Bias Setting Standard

Supporting Document

Interconnection Frequency Response Obligation (IFRO) ~~for the Interconnection~~

The ERO, in consultation with regional representatives, has established a target contingency protection criterion for each Interconnection called the Interconnection Frequency Response Obligation (IFRO). The default IFRO~~target~~ listed in Table 1 is based on the resource contingency criteria (RCC), which is the largest category C (N-2) event identified except for the Eastern Interconnection, which uses the largest event in the last 10 years. A maximum delta frequency (MDF) is calculated by adjusting a starting frequency for each Interconnection by the following:

- Prevailing UFLS first step
- CC_{Adj} which is the adjustment for the differences between 1-second and sub-second Point C observations for frequency events. A positive value indicates that the sub-second C data is lower than the 1-second data
- CB_R which is the statistically determined ratio of the Point C to Value B
- BC'_{Adj} which is the statistically determined adjustment for the event nadir being below the Value B (Eastern Interconnection only) during primary frequency response withdrawal.

~~Additionally, this contingency protection criterion includes uncertainty adjustments at a 95 % confidence level to prevent Point C from encroaching on the interconnection's highest Under Frequency Load Shed (UFLS) step for credible contingencies.~~ The IFRO~~Obligation~~ for each Interconnection in Table 1 is then calculated by dividing the RC~~Target Protection C~~riteria MWs by 10 times the MDF~~difference between the starting frequency and the Prevailing UFLS First Step~~. ~~This number is then multiplied by the C to B Ratio to arrive at a MW/0.1 Hz number.~~ In the Eastern Interconnection there is an additional adjustment (BC'_{Adj}) for the event nadir being below the Value B due to primary frequency response withdrawal. This ~~Interconnection Frequency Response Obligation (~~IFRO~~)~~ includes uncertainty adjustments at a 95 % confidence level. Detailed descriptions of the calculations used in Table 1 below are defined in the *Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard*.

Interconnection	Eastern	Western	ERCOT	HQ	Units

Starting Frequency (F_{Start})	**59.974**	**59.976**	**59.963**	**59.972**	Hz
Prevailing UFLS First Step	**59.5***	**59.5**	**59.3**	**58.5**	Hz
Base Delta Frequency (DF_{Base})	**0.474**	**0.476**	**0.663**	**1.472**	Hz
CC_{ADJ}	**0.007**	**0.004**	**0.012**	**N/A**	Hz
Delta Frequency (DF_{CC})	**0.467**	**0.472**	**0.651**	**1.472**	Hz
CB_R	**1.000**	**1.625**	**1.377**	**1.550**	~~Hz~~
Delta Frequency (DF_{CBR})	**0.467**	**0.291**	**0.473**	**0.949**	Hz
BC'_{ADJ}	**0.018**	**N/A**	**N/A**	**N/A**	Hz
Max. Delta Frequency (MDF)	**0.449**	**0.291**	**0.473**	**0.949**	
Resource Contingency Criteria (RCC)	**4,500**	**2,740**	**2,750**	**1,700**	MW
Credit for Load Resources (CLR)		**300**	**1,400****		MW
IFRO	**-1,002**	**-840**	**-286**	**-179**	MW/0.1 Hz

Table 1: Interconnection Frequency Response Obligations

**The Eastern Interconnection UFLS set point listed is a compromise value set midway between the stable frequency minimum established in PRC-006-1 (59.3 Hz) and the local protection UFLS setting of 59.7 Hz used in Florida and Manitoba.*

***In the Base Obligation measure for ERCOT, 1400 MW (Load Resources triggered by Under Frequency Relays at 59.70 Hz) was reduced from its Resource Contingency ~~Protection~~ Criteria level of 2750 MW to get 239 MW/0.1 Hz. This was reduced to accurately account for designed response from Load Resources within 30 cycles.*

An Interconnection may propose alternate IFRO protection criteria to the ERO by submitting a SAR with supporting technical documentation.

Balancing Authority Frequency Response Obligation (FRO) and Frequency Bias Setting

The ERO will manage the administrative procedure for annually assigning an FRO and implementation of the Frequency Bias Setting for each Balancing Authority. The annual timeline for all activities described in this section are shown below.

For a multiple Balancing Authority interconnection, the Interconnection Frequency Response Obligation shown in Table 1 is allocated based on the Balancing Authority annual load and annual generation. The FRO allocation will be based on the following method:

$$\text{FRO}_{\text{BA}} = \text{IFRO}_{\text{~~Int~~}} \times \frac{\text{Annual Gen}_{\text{BA}} + \text{Annual Load}_{\text{BA}}}{\text{Annual Gen}_{\text{Int}} + \text{Annual Load}_{\text{Int}}}$$

Where:

- Annual Gen_{BA} is the total annual "Output of Generating Plants" within the Balancing Authority Area (BAA), on FERC Form 714, column c of Part II - Schedule 3.
- Annual $Load_{BA}$ is total annual Load within the BAA, on FERC Form 714, column e of Part II - Schedule 3.
- Annual Gen_{Int} is the sum of all Annual Gen_{BA} values reported in that interconnection.
- Annual $Load_{Int}$ is the sum of all Annual $Load_{BA}$ values reported in that interconnection.

The data used for this calculation is from the most recently filed Form 714. As an example, a report to NERC in January 2013 would use the Form 714 data filed in 2012, which utilized data from 2011.

Balancing Authorities that are not FERC jurisdictional should use the Form 714 Instructions to assemble and submit equivalent data to the ERO for use in the FRO Allocation process.

Balancing Authorities that elect to form a FRSG will calculate a FRSG FRO by adding together the individual BA FRO's.

Balancing Authorities that elect to form a FRSG as a means to jointly meet the FRO will calculate their FRM performance one of two ways:

- Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or
- Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that ~~that~~ contains the sum of each participant's individual event performance.

Balancing Authorities that merge or that transfer load or generation are encouraged to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation to the Interconnection remains the same and so that CPS limits can be adjusted.

Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit their FRS Form 1.

Once the ERO reviews the data submitted in FRS Form 1 and FRS Form 2 for all Balancing Authorities, the ERO will use FRS Form 1 data to post the following information for each Balancing Authority for the upcoming year:

- Frequency Bias Setting
- Frequency Response Obligation (FRO)

Once the data listed above is fully posted, the ERO will announce the three-day implementation period for changing the Frequency Bias Setting if it differs from that shown in the timeline below.

A BA using a fixed Frequency Bias Setting sets its Frequency Bias Setting to the greater of (in absolute value):

- Any number the BA chooses between 100% and 125% of its Frequency Response Measure as calculated on FRS Form 1
- Interconnection Minimum as determined by the ERO

For purposes of calculating the minimum Frequency Bias Setting, a Balancing Authority participating in a Frequency Response Sharing Group will need to calculate its stand-alone Frequency Response Measure using FRS Form 1 and FRS Form 2 to determine its minimum Frequency Bias Setting.

A Balancing Authority providing Overlap Regulation will report the historic peak demand and generation of its combined BAs' areas on FRS Form 1 as described in Requirement R4.

There are occasions when changes are needed to Bias Settings outside of the normal schedule. Examples are footprint changes between Balancing Authorities and major changes in load or generation or the formation of new Balancing Authorities. In such cases the changing Balancing Authorities will work with their Regions, NERC and the Resources Subcommittee to confirm appropriate changes to Bias Settings, FRO, CPS limits and Inadvertent Interchange balances.

If there is no net change to the Interconnection total Bias, the Balancing Authorities involved will agree on a date to implement their respective change in Bias Settings. The Balancing Authorities and ERO will also agree to the allocation of FRO such that the sum remains the same.

If there is a net change to the Interconnection total Bias, this will cause a change in CPS2 limits and FRO for other Balancing Authorities in the Interconnection. In this case, the ERO will notify the impacted Balancing Authorities of their respective changes and provide an implementation window for making the Bias Setting changes.

Frequency Response Measure (FRM)

The Balancing Authority will calculate its FRM from Single Event Frequency Response Data (SEFRD), defined as: "the data from an individual event from a Balancing Authority that is used to calculate its Frequency Response, expressed in MW/0.1Hz" as calculated on FRS Form 2 for each event shown on FRS Form 1. The events in FRS Form 1 are selected by the ERO using the *Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard*. The SEFRD for a typical Balancing Authority in an Interconnection with more than one Balancing Authority is basically the change in its Net Actual Interchange on its tie lines with its adjacent Balancing Authorities divided by the change in Interconnection frequency. (Some Balancing Authorities may choose to apply corrections to their Net Actual Interchange (NA_I) values to account for factors such as nonconforming loads. FRS Form 1 and 2 shows the types of adjustments that are allowed. Note that with the exception of the Contingent BA column, any adjustments made must be made for all events in an evaluation year. As an example, if an entity has non-conforming loads and makes an adjustment for one event, all events must show the non-conforming load, even if the non-conforming load does not impact the calculation. This ensures that the

reports are not utilizing the adjustments only when they are favorable to the BA.) The ERO will use a standardized sampling interval of approximately 16 seconds before the event up to the time of the event for the pre-event NA_I, and frequency (A values) and approximately 20 to 52 seconds after the event for the post-event NA_I (B values) in the computation of SEFRD values, dependent on the data scan rate of the Balancing Authority's Energy Management System (EMS).

All events listed on FRS Form 1 need to be included in the annual submission of FRS Forms 1 and 2. The only time a Balancing Authority should exclude an event is if its tie-line data or its Frequency data is corrupt or its EMS was unavailable. FRS Form 2 has instructions on how to correct the BA's data if the given event is internal to the BA or if other authorized adjustments are used.

Assuming data entry is correct FRS Form 1 will automatically calculate the Balancing Authority's FRM for the past 12 months as the median of the SEFRD values. A Balancing Authority electing to report as an FRSG or a provider of Overlap Regulation Service will provide an FRS Form 1 for the aggregate of its participants.

To allow Balancing authorities to plan its operations, events with a "Point C" that cause the Interconnection Frequency to be lower than that shown in Table 1 above (for example, an event in the Eastern Interconnection that causes the Interconnection Frequency to go to 59.4 Hz) or higher than an equal change in frequency going above 60 Hz may be included in the list of events for that interconnection. However, the calculation of the BA response to such an event will be adjusted to show a frequency change only to the Target Minimum Frequency shown in Table 1 above (in the previous example this adjustment would cause Frequency to be shown as 59.5 Hz rather than 59.4 HZ) or a high frequency amount of an equal quantity. Should such an event happen, the ERO will provide additional guidance.

Timeline for Balancing Authority Frequency Response and Frequency Bias Setting Activities

Described below is the timeline for the exchange of information between the ERO and Balancing Authorities (BA) to:

- Facilitate the assignment of BA Frequency Response Obligations (FRO)
- Calculate BA Frequency Response Measures (FRM)
- Determine BA Frequency Bias Settings (FBS)

Target Date	Activity
April 30	The ERO reviews candidate frequency events and selects frequency events for the first quarter (December to February).
May 10	Form1 is posted with selected events from the first quarter for BA usage by the ERO.
May 15	The BAs receive a request to provide load and generation data as described in Attachment A to support FRO assignments and determining minimum FBS for BAs.
July 15	The BAs provide load and generation data as described in Attachment A to the ERO.
July 30	The ERO reviews candidate frequency events and selects frequency events for the second quarter (March to May).
August 10	Form1 is posted with selected events from the first and second quarters for BA usage by the ERO.
October 30	The ERO reviews candidate frequency events and selects frequency events for the third quarter (June to August)
November 10	Form1 is posted with selected events from the first, second, and third quarters for BA usage by the ERO.
November 20	If necessary, the ERO provides any updates to the necessary Frequency Response.
November 20	The ERO provides the fractional responsibility of each BA for the Interconnection's FRO and Minimum FBS to the BAs.
January 30	The ERO reviews candidate frequency events and selects frequency events for the fourth quarter (September to November).

2nd business day in February	Form1 is posted with all selected events for the year for BA usage by the ERO.
February 10	The ERO assigns FRO values to the BAs for the upcoming year.
March 7	BAs complete their frequency response sampling for all four quarters and their FBS calculation, returning the results to the ERO.
March 24	The ERO validates FBS values, computes the sum of all FBS values for each Interconnection, and determines L10 values for the CPS 2 criterion for each BA as applicable.
Any time during first 3 business days of April (unless specified otherwise by the ERO)	The BA implements any changes to their FBS and L10 value.

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Implementation Plan for BAL-003-1 – Frequency Response & Frequency Bias Setting Standard

Prerequisite Approvals

There are no other reliability standards or Standard Authorization Requests (SARs), in progress or approved, that must be implemented before this standard can be implemented.

Modified Standards

BAL-003-0.1b should be retired midnight of the day immediately prior to the Effective Date of BAL-003-1 in the Jurisdiction in which the new standard is becoming effective.

New or Modified Definitions

The following definitions shall become effective when BAL-003-1 Requirements R2, R3, R4 and R5 become effective:

Frequency Response Measure (FRM): The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz.

Frequency Response Obligation (FRO): The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection. This will be calculated as MW/0.1Hz.

Frequency Bias Setting: A number, either fixed or variable, , usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's inverse Frequency Response contribution to the Interconnection, and discourage withdrawal through secondary control systems.

Frequency Response Sharing Group (FRSG)[1]: A group, whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members.

The existing definition of Frequency Bias Setting should be retired midnight of the day immediately prior to the Effective Date of BAL-003-1 in the Jurisdiction in which the new standard is becoming effective.

[1] This term and definition is identical to the definition in BAL-012-1 proposed standard.

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The proposed revised definition for "Frequency Bias Setting" is incorporated in the following NERC approved standards:

- BAL-001-0.1a Real Power Balancing Control Performance
- BAL-004-0 Time Error Correction
- BAL-004-1 Time Error Correction
- BAL-005-0.1b Automatic Generation Control

Compliance with Standards

Once this standard becomes effective, the responsible entities identified in the applicability section of the standard must comply with the requirements. These include:

- Balancing Authorities
- Frequency Response Sharing Groups

Proposed Effective Date

Compliance with BAL-003-1 shall be implemented over a two-year period, as follows:

- In those jurisdictions where regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after Board of Trustees adoption.
- In those jurisdictions where regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after Board of Trustees adoption.
- Requirement R1 cannot be implemented prior to the addition of Frequency Response Sharing Group to the Compliance Registry.

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Implementation Plan for BAL-003-1 – Frequency Response & Frequency Bias Setting Standard

Prerequisite Approvals

There are no other reliability standards or Standard Authorization Requests (SARs), in progress or approved, that must be implemented before this standard can be implemented.

Modified Standards

BAL-003-0.1b should be retired midnight of the day immediately prior to the Effective Date of BAL-003-1 in the Jurisdiction in which the new standard is becoming effective.

New or Modified Definitions

The following definitions shall become effective when BAL-003-1 Requirements R2, R3, R4 and R5 become effective:

Frequency Response Measure (FRM): The median of all the Frequency Response observations reported annually by Balancing Authorities for frequency events specified by the ERO. This will be calculated as MW/0.1Hz.

Frequency Response Obligation (FRO): The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection. This will be calculated as MW/0.1Hz.

Frequency Bias Setting: A number, either fixed or variable, , usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's inverse Frequency Response contribution to the Interconnection, and discourage withdrawal through secondary control systems.

Frequency Response Sharing Group (FRSG)[1]: A group, whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the Frequency Response Obligations of its members.

The existing definition of Frequency Bias Setting should be retired midnight of the day immediately prior to the Effective Date of BAL-003-1 in the Jurisdiction in which the new standard is becoming effective.

[1] This term and definition is identical to the definition in BAL-012-1 proposed standard.

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Compliance with Standards

Once this standard becomes effective, the responsible entities identified in the applicability section of the standard must comply with the requirements. These include:

- Balancing Authorities
- Frequency Response Sharing Groups

Proposed Effective Date

Compliance with BAL-003-1 shall be implemented over a two-year period, as follows:

- In those jurisdictions where regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R2, R3 and R4 of this standard shall become effective the first calendar day of the first calendar quarter 12 months after Board of Trustees adoption.
- In those jurisdictions where regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after applicable regulatory approval. In those jurisdictions where no regulatory approval is required, Requirements R1 of this standard shall become effective the first calendar day of the first calendar quarter 24 months after Board of Trustees adoption.
- Requirement R1 cannot be implemented prior to the addition of Frequency Response Sharing Group to the Compliance Registry.

This procedure outlines the Electric Reliability Organization (ERO) process for supporting the Frequency Response Standard (FRS). A Procedure revision request may be submitted to the ERO for consideration. The revision request must provide a technical justification for the suggested modification. The ERO shall post the suggested modification for a 45-day formal comment period and discuss the revision request in a public meeting. The ERO will make a recommendation to the NERC BOT, which may adopt the revision request, reject it, or adopt it with modifications. Any approved revision to this Procedure shall be filed with FERC for informational purposes.

Event Selection Process

Event Selection Objectives

The goals of this procedure are to outline a transparent, repeatable process to annually identify a list of frequency events to be used by Balancing Authorities (BA) to calculate their Frequency Response to determine:

- Whether the BA met its Frequency Response Obligation, and
- An appropriate fixed Bias Setting.

Event Selection Criteria

1. The ERO will use the following criteria to select FRS frequency excursion events for analysis. The events that best fit the criteria will be used to support the FRS. The evaluation period for performing the annual Frequency Bias Setting and the Frequency Response Measure (FRM) calculation is December 1 of the prior year through November 30 of the current year.
2. The ERO will identify 20 to 35 frequency excursion events in each Interconnection for calculating the Frequency Bias Setting and the FRM. If the ERO cannot identify 20 frequency excursion events in a 12 month evaluation period satisfying the criteria below, then similar acceptable events from the subsequent year's evaluation period will be included with the data set by the ERO for determining FRS compliance. This is described later.
3. The ERO will use three criteria to determine if an acceptable frequency excursion event for the FRM has occurred:
    a. The change in frequency as defined by the difference from the A Value to Point C and the arrested frequency Point C exceeds the excursion threshold values specified for the Interconnection in Table 1 below.
        i. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline.
        ii. Point C is the arrested value of frequency observed within 12 seconds following the start of the excursion.

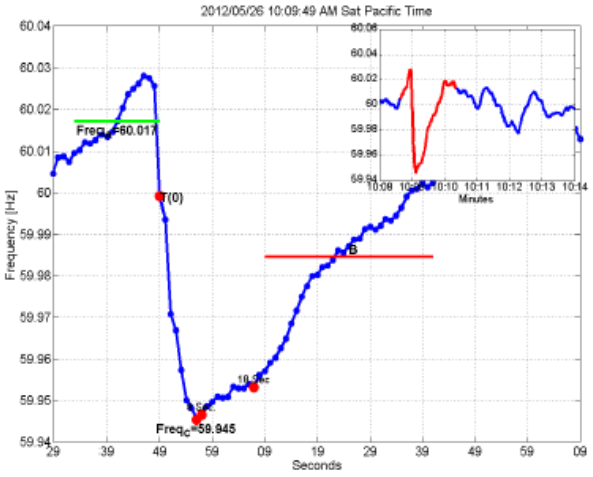
Interconnection	A Value to Pt C	Point C (Low)	Point C (High)
East	0.04Hz	< 59.96	> 60.04
West	0.07Hz	< 59.95	> 60.05
ERCOT	0.15Hz	< 59.90	> 60.10
HQ	0.30Hz	< 59.85	> 60.15

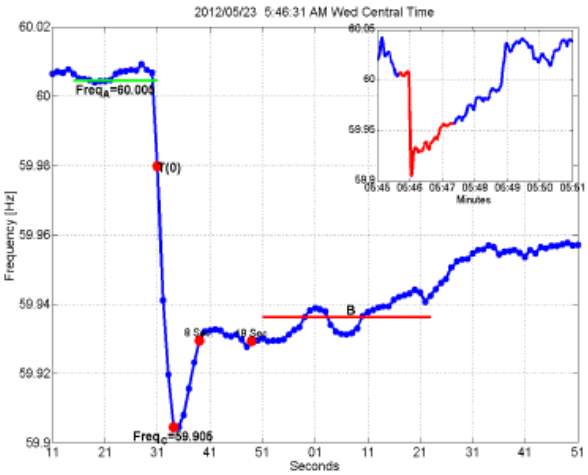
Table 1: Interconnection Frequency Excursion Threshold Values

b. The time from the start of the rapid change in frequency until the point at which Frequency has stabilized within a narrow range should be less than 18 seconds.

c. If any data point in the B Value average recovers to the A Value, the event will not be included.

4. Pre-disturbance frequency should be relatively steady and near 60.000 Hz for the A Value. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline. For example, given the choice of the two events below, the one on the right is preferred as the pre-disturbance frequency is stable and also closer to 60 Hz.





5. Excursions that include 2 or more events that do not stabilize within 18 seconds will not be considered.

6. Frequency excursion events occurring during periods:

(i) when large in*t*erchange schedule ramping or load change is happening, or

(ii) *w*ithin 5 minutes of the top of the hour,

will be excluded from consideration if other acceptable frequency excursion events from the same quarter are available.

7. The ERO will select the largest (A Value to Point C) 2 or 3 frequency excursion *e*vents occurring each month. If there are not 2 frequency excursion events satisfying the selection criteria in a month, then other frequency excursion events should be picked in the following sequence:
    a. From the same event quarter of the year.
    b. From an adjacent month.
    c. From a similar load season in the year (shoulder vs. summer/winter)
    d. The largest unused event.

As noted earlier, if a total of 20 events are not available in an evaluation year, then similar acceptable events from the next year's evaluation period will be included with the data set by the ERO for determining Frequency Response Obligation (FRO) compliance. The first year's small set of data will be reported and used for Bias Setting purposes, but compliance evaluation on the FRO will be done using a 24 month data set.

To assist Balancing Authority preparation for complying with this standard, the ERO will provide quarterly posting of candidate frequency excursion events for the current year FRM calculation. The ERO will post the final list of frequency excursion events used for standard compliance as specified in Attachment A of BAL-003-1. The following is a general description of the process that the ERO will use to ensure that BAs can evaluate events during the year in order to monitor their performance throughout the year.

Monthly

Candidate events will be initially screened by the "Frequency Event Detection Methodology" shown on the following link located on the NERC Resources Subcommittee area of the NERC website: http://www.nerc.com/docs/oc/rs/Frequency_Event_Detection_Methodology_and_Criteria_Oct_2011.pdf. Each month's list will be posted by the end of the following month on the NERC website, http://www.nerc.com/filez/rs.html and listed under "Candidate Frequency Events".

Quarterly

The monthly event lists will be reviewed quarterly with the quarters defined as:

- December through February
- March through May
- June through August
- September through November

Based on criteria established in the "*Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard",* events will be selected to populate the FRS Form 1 for each Interconnection. The Form 1's will be posted on the NERC website, in the Resources Subcommittee area under the title "Frequency Response Standard Resources". Updated Form 1's will be posted at the end of each quarter listed above after a review by the NERC RS' Frequency Working Group. While the events on this list are expected to be final, as outlined in the selection criteria, additional events may be considered, if the number of events throughout the year do not create a list of at least 20 events. It is intended that this quarterly posting of updates to the FRS Form 1 would allow BAs to evaluate the events throughout the year, lessening the burden when the yearly posting is made.

Annually

The final FRS Form 1 for each Interconnection, which would contain the events from all four quarters listed above, will be posted as specified in Attachment A. Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO as specified in Attachment A using the final FRS Form 1. The ERO will check for errors and use the FRS Form 1 data to calculate CPS limits and FROs for the upcoming year.

Once the data listed above is fully reviewed, the ERO may adjust the implementation specified in Attachment A for changing the Frequency Bias Settings and CPS limits. This allows flexibility in when each BA implements its settings.

Process for Adjusting Interconnection Minimum Frequency Bias Setting

This procedure outlines the process the ERO is to use for modifying minimum Frequency Bias Settings to better meet reliability needs. The ERO will adjust the Frequency Bias Setting minimum in accordance with this procedure.

The ERO will post the minimum Frequency Bias Setting values on the ERO website along with other balancing standard limits.

Under BAL-003-1, the minimum Frequency Bias Settings will be moved toward the natural Frequency Response in each interconnection. In the first year, the minimum Frequency Bias Setting for each interconnection is shown in Table 2 below. Each Interconnection Minimum Frequency Bias Setting is based on the sum of the non-coincident peak loads for each BA from the currently available FERC 714 Report or equivalent. This non-coincident peak load sum is multiplied by the percentage shown in Table 2 to get the Interconnection Minimum Frequency Bias Setting. The Interconnection Minimum Frequency Bias Setting is allocated among the BAs on an interconnection using the same allocation method as is used for the allocation of the Frequency Response Obligation (FRO).

Interconnection	Interconnection Minimum Frequency Bias Setting (in MW/0.1Hz)
Eastern	0.9% of non-coincident peak load
Western	0.9% of non-coincident peak load
ERCOT*	N/A
HQ*	N/A

Table 2. Frequency Bias Setting Minimums

*The minimum Frequency Bias Setting requirement does not apply to a Balancing Authority that is the only Balancing Authority in its Interconnection. These Balancing Authorities are solely responsible for providing reliable frequency control of their Interconnection. These Balancing Authorities are responsible for converting frequency error into a megawatt error to provide reliable frequency control, and the imposition of a minimum bias setting greater than the magnitude the Frequency Response Obligation may have the potential to cause control system hunting, and instability in the extreme.

The ERO, in coordination with the regions of each interconnection, will annually review Frequency Bias Setting data submitted by BAs. If an Interconnection's total minimum Frequency Bias Setting exceeds (in absolute value) the Interconnection's total natural Frequency Response by more (in absolute value) than 0.2 percentage points of peak load (expressed in MW/0.1Hz), the minimum Frequency Bias Setting for BAs within that Interconnection may be reduced (in absolute value) in the subsequent years FRS Form 1 based on the technical evaluation and consultation with the regions affected by 0.1 percentage point of peak load (expressed in MW/0.1Hz) to better match that Frequency Bias Setting and natural Frequency Response.

The ERO, in coordination with the regions of each Interconnection, will monitor the impact of the reduction of minimum frequency bias settings, if any, on frequency performance, control performance, and system reliability. If unexpected and undesirable impacts such as, but not limited to, sluggish post-contingency restoration of frequency to schedule or control performance problems occur, then the prior reduction in the minimum frequency bias settings may be reversed, and/or the prospective reduction based on the criterion stated above may not be implemented.

Interconnection Frequency Response Obligation Methodology

This procedure outlines the process the ERO is to use for determining the Interconnection Frequency Response Obligation (IFRO).

The following are the formulae that comprise the calculation of the IFROs.

$$DF_{Base} = F_{Start} - UFLS$$

$$DF_{CC} = DF_{Base} - CC_{Adj}$$

$$DF_{CBR} = \frac{DF_{CC}}{CB_R}$$

$$MDF = DF_{CBR} - BC'_{Adj}$$

$$ARCC = RCC - CLR$$

$$IFRO = \frac{ARCC}{10 * MDF}$$

Where:

- DF_{Base} is the base delta frequency.
- F_{Start} is the starting frequency determined by the statistical analysis.
- UFLS is the highest UFLS trip setpoint for the interconnection.
- CC_{Adj} is the adjustment for the differences between 1-second and sub-second Point C observations for frequency events. A positive value indicates that the sub-second C data is lower than the 1-second data.
- DF_{CC} is the delta frequency adjusted for the differences between 1-second and sub-second Point C observations for frequency events.
- CB_R is the statistically determined ratio of the Point C to Value B.
- DF_{CBR} is the delta frequency adjusted for the ratio of the Point C to Value B.
- BC'_{ADJ} is the statistically determined adjustment for the event nadir being below the Value B (Eastern Interconnection only) during primary frequency response withdrawal.
- MDF is the maximum allowable delta frequency.
- RCC is the resource contingency criteria.
- CLR is the credit for load resources.
- ARCC is the adjusted resource contingency criteria adjusted for the credit for load resources.
- IFRO is the interconnection frequency response obligation.

~~**Event Selection Process**~~

This procedure outlines the Electric Reliability Organization (ERO) process for supporting the Frequency Response Standard (FRS). A Procedure revision request may be submitted to the ERO for consideration. The revision request must provide a technical justification for the suggested modification. The ERO shall post the suggested modification for a 45-day formal comment period and discuss the revision request in a public meeting. The ERO will make a recommendation to the NERC BOT, which may adopt the revision request, reject it, or adopt it with modifications. Any approved revision to this Procedure shall be filed with FERC for informational purposes.

Event Selection Process

Event Selection Objectives

The goals of this procedure are to outline a transparent, repeatable process to annually identify a list of frequency events to be used by Balancing Authorities (BA) to calculate their Frequency Response to determine:

- Whether the BA met its Frequency Response Obligation, and
- An appropriate fixed Bias Setting.

Event Selection Criteria

1. The ERO will use the following criteria to select FRS frequency excursion events for analysis. The events that best fit the criteria will be used to support the FRS. The evaluation period for performing the annual Frequency Bias Setting and the Frequency Response Measure (FRM) calculation is December 1 of the prior year through November 30 of the current year.
2. The ERO will identify 20 to 35 frequency excursion events in each Interconnection for calculating the Frequency Bias Setting and the FRM. If the ERO cannot identify 20 frequency excursion events in a 12 month evaluation period satisfying the criteria below, then similar acceptable events from the subsequent year's evaluation period will be included with the data set by the ERO for determining FRS compliance. This is described later.
3. The ERO will use three criteria to determine if an acceptable frequency excursion event for the FRM has occurred:
    a. The change in frequency as defined by the difference from the A Value to Point C and the arrested frequency Point C exceeds the excursion threshold values specified for the Interconnection in Table 1 below.
        i. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline.
        ii. Point C is the arrested value of frequency observed within 12 seconds following the start of the excursion.

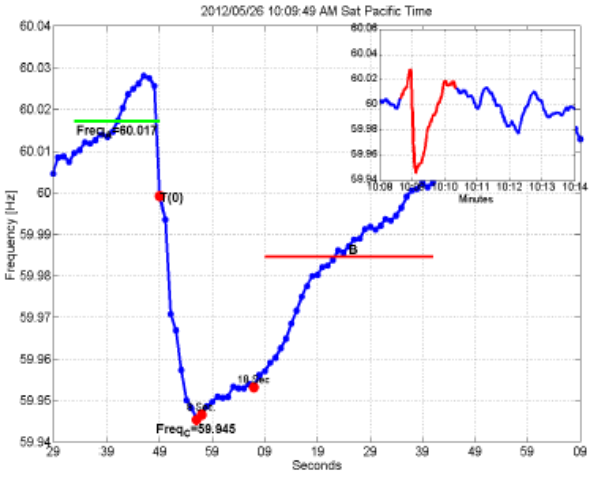
Interconnection	A Value to Pt C	Point C (Low)	Point C (High)
East	0.04Hz	< 59.96	> 60.04
West	0.07Hz	< 59.95	> 60.05
ERCOT	0.15Hz	< 59.90	> 60.10
HQ	0.30Hz	< 59.85	> 60.15

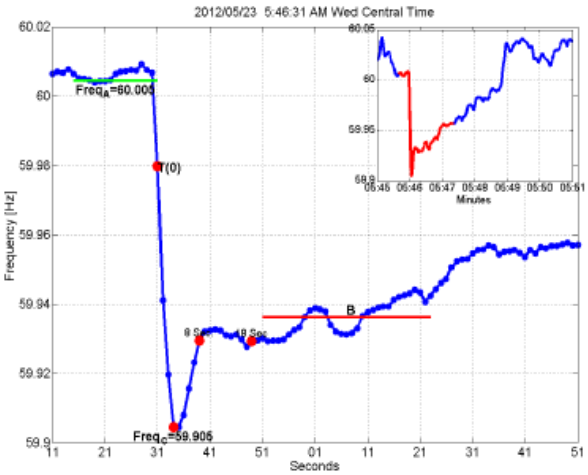
Table 1: Interconnection Frequency Excursion Threshold Values

b. The time from the start of the rapid change in frequency until the point at which Frequency has stabilized within a narrow range should be less than 18 seconds.

c. If any data point in the B Value average recovers to the A Value, the event will not be included.

4. Pre-disturbance frequency should be relatively steady and near 60.000 Hz for the A Value. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline. For example, given the choice of the two events below, the one on the right is preferred as the pre-disturbance frequency is stable and also closer to 60 Hz.





5. Excursions that include 2 or more events that do not stabilize within 18 seconds will not be considered.

6. Frequency excursion events occurring during periods:

(i) when large interchange schedule ramping or load change is happening, or

~~and frequency excursion events occurring~~ (ii) within 5 minutes of the top of the hour,

will be excluded from consideration if other acceptable frequency excursion events from the same quarter are available.

~~6.~~7. The ERO will select the largest (A Value to Point C) 2 or 3 frequency excursion *e*vents occurring each month. If there are not 2 frequency excursion events satisfying the selection criteria in a month, then other frequency excursion events should be picked in the following sequence:

a. From the same event quarter of the year.

b. From an adjacent month.

c. From a similar load season in the year (shoulder vs. summer/winter)

d. The largest unused event.

As noted earlier, if a total of 20 events are not available in an evaluation year, then similar acceptable events from the next year's evaluation period will be included with the data set by the ERO for determining Frequency Response Obligation (FRO) compliance. The first year's small set of data will be reported and used for Bias Setting purposes, but compliance evaluation on the FRO will be done using a 24 month data set.

To assist Balancing Authority preparation for complying with this standard, the ERO will provide quarterly posting of candidate frequency excursion events for the current year FRM calculation. The ERO will post the final list of frequency excursion events used for standard compliance as specified in Attachment A of BAL-003-1. The following is a general description of the process that the ERO will use to ensure that BAs can evaluate events during the year in order to monitor their performance throughout the year.

Monthly

Candidate events will be initially screened by the "Frequency Event Detection Methodology" shown on the following link located on the NERC Resources Subcommittee area of the NERC website: http://www.nerc.com/docs/oc/rs/Frequency_Event_Detection_Methodology_and_Criteria_Oct_2011.pdf. Each month's list will be posted by the end of the following month on the NERC website, http://www.nerc.com/filez/rs.html and listed under "Candidate Frequency Events".

Quarterly

The monthly event lists will be reviewed quarterly with the quarters defined as:

- December through February
- March through May
- June through August
- September through November

Based on criteria established in the "*Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard",* events will be selected to populate the FRS Form 1 for each Interconnection. The Form 1's will be posted on the NERC website, in the Resources Subcommittee area under the title "Frequency Response Standard Resources". Updated Form 1's will be posted at the end of each quarter listed above after a review by the NERC RS' Frequency Working Group. While the events on this list are expected to be final, as outlined in the selection criteria, additional events may be considered, if the number of events throughout the year do not create a list of at least 20 events. It is intended that this quarterly posting of updates to the FRS Form 1 would allow BAs to evaluate the events throughout the year, lessening the burden when the yearly posting is made.

Annually

The final FRS Form 1 for each Interconnection, which would contain the events from all four quarters listed above, will be posted as specified in Attachment A. Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO as specified in Attachment A using the final FRS Form 1. The ERO will check for errors and use the FRS Form 1 data to calculate CPS limits and FROs for the upcoming year.

Once the data listed above is fully reviewed, the ERO may adjust the implementation specified in Attachment A for changing the Frequency Bias Settings and CPS limits. This allows flexibility in when each BA implements its settings.

Process for Adjusting Interconnection Minimum Frequency Bias Setting

This procedure outlines the process the ERO is to use for modifying minimum Frequency Bias Settings to better meet reliability needs. The ERO will adjust the Frequency Bias Setting minimum in accordance with this procedure.

The ERO will post the minimum Frequency Bias Setting values on the ERO website along with other balancing standard limits.

Under BAL-003-1, the minimum Frequency Bias Settings will be moved toward the natural Frequency Response in each interconnection. In the first year, the minimum Frequency Bias Setting for each interconnection is shown in Table 2 below. Each Interconnection Minimum Frequency Bias Setting is based on the sum of the non-coincident peak loads for each BA from the currently available FERC 714 Report or equivalent. This non-coincident peak load sum is multiplied by the percentage shown in Table 2~~1~~ to get the Interconnection Minimum Frequency Bias Setting. The Interconnection Minimum Frequency Bias Setting is allocated among the BAs on an interconnection using the same allocation method as is used for the allocation of the Frequency Response Obligation (FRO).

Interconnection	Interconnection Minimum Frequency Bias Setting (in MW/0.1Hz)
Eastern	0.9% of non-coincident peak load
Western	0.9% of non-coincident peak load
ERCOT*	N/A
HQ*	N/A

Table 2. Frequency Bias Setting Minimums

*The minimum Frequency Bias Setting requirement does not apply to a Balancing Authority that is the only Balancing Authority in its Interconnection. These Balancing Authorities are solely responsible for providing reliable frequency control of their Interconnection. These Balancing Authorities are responsible for converting frequency error into a megawatt error to provide reliable frequency control, and the imposition of a minimum bias setting greater than the magnitude the Frequency Response Obligation may have the potential to cause control system hunting, and instability in the extreme.

The ERO, in coordination with the regions of each interconnection, will annually review Frequency Bias Setting data submitted by BAs. If an Interconnection's total minimum Frequency Bias Setting exceeds (in absolute value) the Interconnection's total natural Frequency Response by more (in absolute value) than 0.2 percentage points of peak load (expressed in MW/0.1Hz), the minimum Frequency Bias Setting for BAs within that Interconnection may be reduced (in absolute value) in the subsequent years FRS Form 1 based on the technical evaluation and consultation with the regions affected by 0.1 percentage point of peak load (expressed in MW/0.1Hz) to better match that Frequency Bias Setting and natural Frequency Response.

The ERO, in coordination with the regions of each Interconnection, will monitor the impact of the reduction of minimum frequency bias settings, if any, on frequency performance, control performance, and system reliability. If unexpected and undesirable impacts such as, but not limited to, sluggish post-contingency restoration of frequency to schedule or control performance problems occur, then the prior reduction in the minimum frequency bias settings may be reversed, and/or the prospective reduction based on the criterion stated above may not be implemented.

Interconnection Frequency Response Obligation Methodology

This procedure outlines the process the ERO is to use for determining the Interconnection Frequency Response Obligation (IFRO).

The following are the formulae that comprise the calculation of the IFROs.

$$DF_{Base} = F_{Start} - UFLS$$

$$DF_{CC} = DF_{Base} - CC_{Adj}$$

$$DF_{CBR} = \frac{DF_{CC}}{CB_R}$$

$$MDF = DF_{CBR} - BC'_{Adj}$$

$$ARCC = RCC - CLR$$

$$IFRO = \frac{ARCC}{10 * MDF}$$

Where:

- DF_{Base} is the base delta frequency.
- F_{Start} is the starting frequency determined by the statistical analysis.
- UFLS is the highest UFLS trip setpoint for the interconnection.
- CC_{Adj} is the adjustment for the differences between 1-second and sub-second Point C observations for frequency events. A positive value indicates that the sub-second C data is lower than the 1-second data.
- DF_{CC} is the delta frequency adjusted for the differences between 1-second and sub-second Point C observations for frequency events.
- CB_R is the statistically determined ratio of the Point C to Value B.
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- BC'_{ADJ} is the statistically determined adjustment for the event nadir being below the Value B (Eastern Interconnection only) during primary frequency response withdrawal.
- MDF is the maximum allowable delta frequency.
- RCC is the resource contingency criteria.
- CLR is the credit for load resources.
- ARCC is the adjusted resource contingency criteria adjusted for the credit for load resources.
- IFRO is the interconnection frequency response obligation.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Frequency Response Standard Background Document

November, 2012

RELIABILITY | ACCOUNTABILITY




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Table of Contents

Introduction

This document provides background on the development, testing and implementation of BAL-003-1 - Frequency Response Standard (FRS).[1] The intent is to explain the rationale and considerations for the Requirements of this standard and their associated compliance information. The document also provides good practices and tips for Balancing Authorities ("BAs") with regard to Frequency Response.

In Order No. 693, the Federal Energy Regulatory Commission ("FERC" or the "Commission") directed additional changes to BAL-003.[2] This document explains how compliance with those directives are met by BAL-003-1.

The original Standards Authorization Request ("SAR"), finalized on June 30, 2007, assumed there was adequate Frequency Response in all the North American Interconnections. The goal of the SAR was to update the Standard to make the measurement process of frequency response more objective and to provide this objective data to Planners and Operators for improved modeling. The updated models will improve understanding of the trends in Frequency Response to determine if reliability limits are being approached. The Standard would also lay the process groundwork for a transition to a performance-based Standard if reliability limits are approached.

This document will be periodically updated by the FRS Drafting Team (FRSDT) until the Standard is approved. Once approved, this document will then be maintained and updated by the ERO and the NERC Resources Subcommittee to be used as a reference and training resource.

Background

This section discusses the different components of frequency control and the individual components of Primary Frequency Control also known as Frequency Response.

Frequency Control

Most system operators generally have a good understanding of frequency control and Bias Setting as outlined in the balancing standards and the references to them in the NERC Operating Manual. Frequency control can be divided into four overlapping windows of time as outlined below.

> **Primary Frequency Control (Frequency Response) –** Actions provided by the Interconnection to arrest and stabilize frequency in response to frequency deviations. Primary Control comes from automatic generator governor response (also known as speed

[1] Unless otherwise designated herein, all capitalized terms shall have the meaning set forth in the Glossary of Terms Used in NERC Reliability Standards, available here: http://www.nerc.com/files/Glossary_of_Terms.pdf.

[2] *Mandatory Reliability Standards for the Bulk-Power System*, Order No. 693, FERC Stats. & Regs. ¶ 31,242 at PP 368-375, *order on reh'g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007).

regulation), load response (typically from motors), and other devices that provide an immediate response based on local (device-level) control systems.

Secondary Frequency Control – Actions provided by an individual BA or its Reserve Sharing Group to correct the resource – load unbalance that created the original frequency deviation, which will restore both Scheduled Frequency and Primary Frequency Response. Secondary Control comes from either manual or automated dispatch from a centralized control system.

Tertiary Frequency Control – Actions provided by Balancing Authorities on a balanced basis that are coordinated so there is a net zero effect on Area Control Error (ACE). Examples of Tertiary Control include dispatching generation to serve native load; economic dispatch; dispatching generation to affect Interchange; and re-dispatching generation. Tertiary Control actions are intended to replace Secondary Control Response by reconfiguring reserves.

Time Control includes small offsets to scheduled frequency to keep long term average frequency at 60 Hz.

Primary Frequency Control – Frequency Response

Primary Frequency Control, also known generally as **Frequency Response**, is the first stage of overall frequency control and is the response of resources and load to a locally sensed change in frequency in order to arrest that change in frequency. Frequency Response is automatic, not driven by any centralized system, and begins within seconds rather than minutes. Different resources, loads, and systems provide Frequency Response with different response times, based on current system conditions such as total resource/load and their respective mix.

The proposed NERC Glossary of Terms defines **Frequency Response** as:

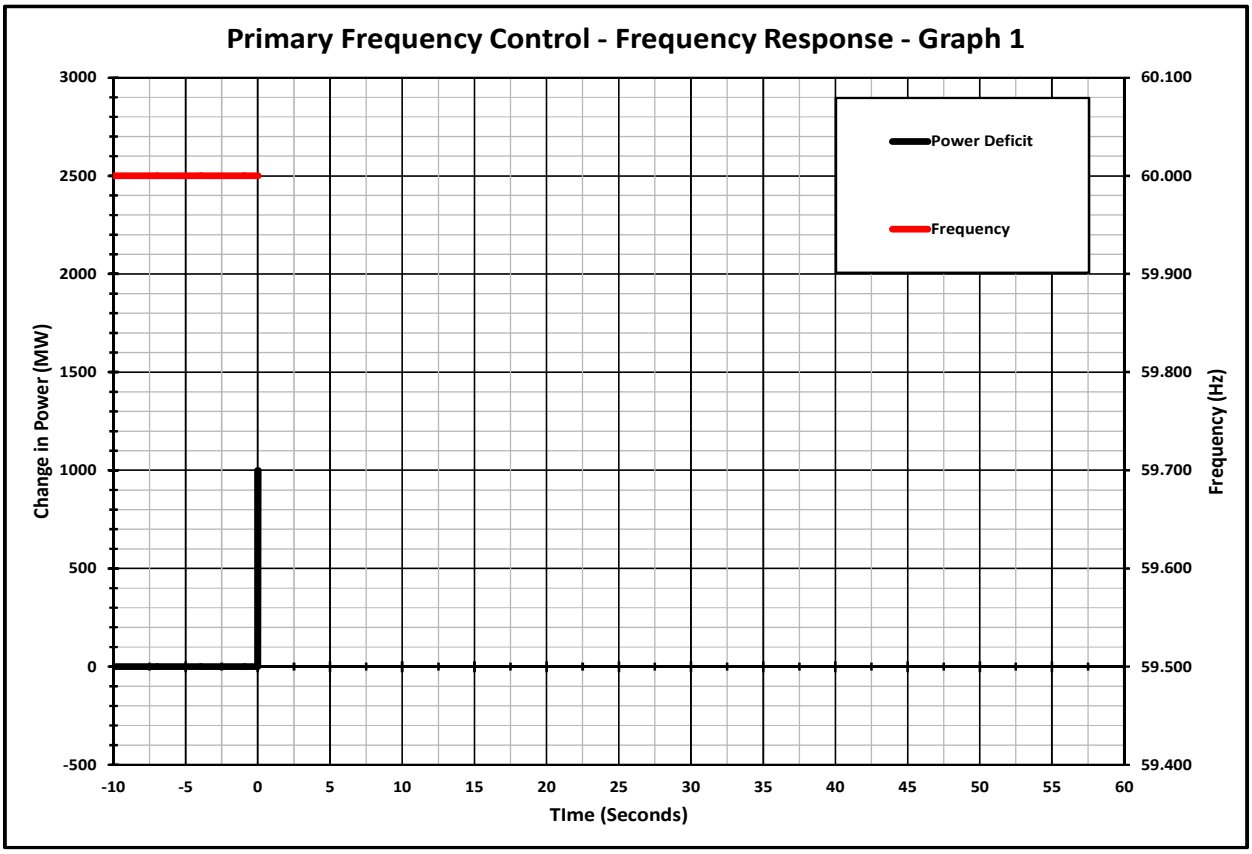
- (Equipment) The immediate and automatic reaction or response of power from a system or power from elements of the system to a change in locally sensed system frequency.
- (System) The sum of the change in demand, and the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 Hertz (MW/0.1 Hz).

As noted above, Frequency Response is the characteristic of load and generation within Balancing Authorities and Interconnections. It reacts or responds with changes in power to attempted changes in load-resource balance that result in changes to system frequency. Because the loss of a large generator is much more likely than a sudden loss of an equivalent amount of load, Frequency Response is typically discussed in the context of a loss of a large generator. Included within Frequency Response are many components of that response. Understanding Frequency Response and the FRS requires an understanding of each of these components and how they relate to each other.

Frequency Response Illustration

The following simple example is presented to illustrate the components of Frequency Response in graphical form. It includes a series of seven graphs that illustrate the various components of

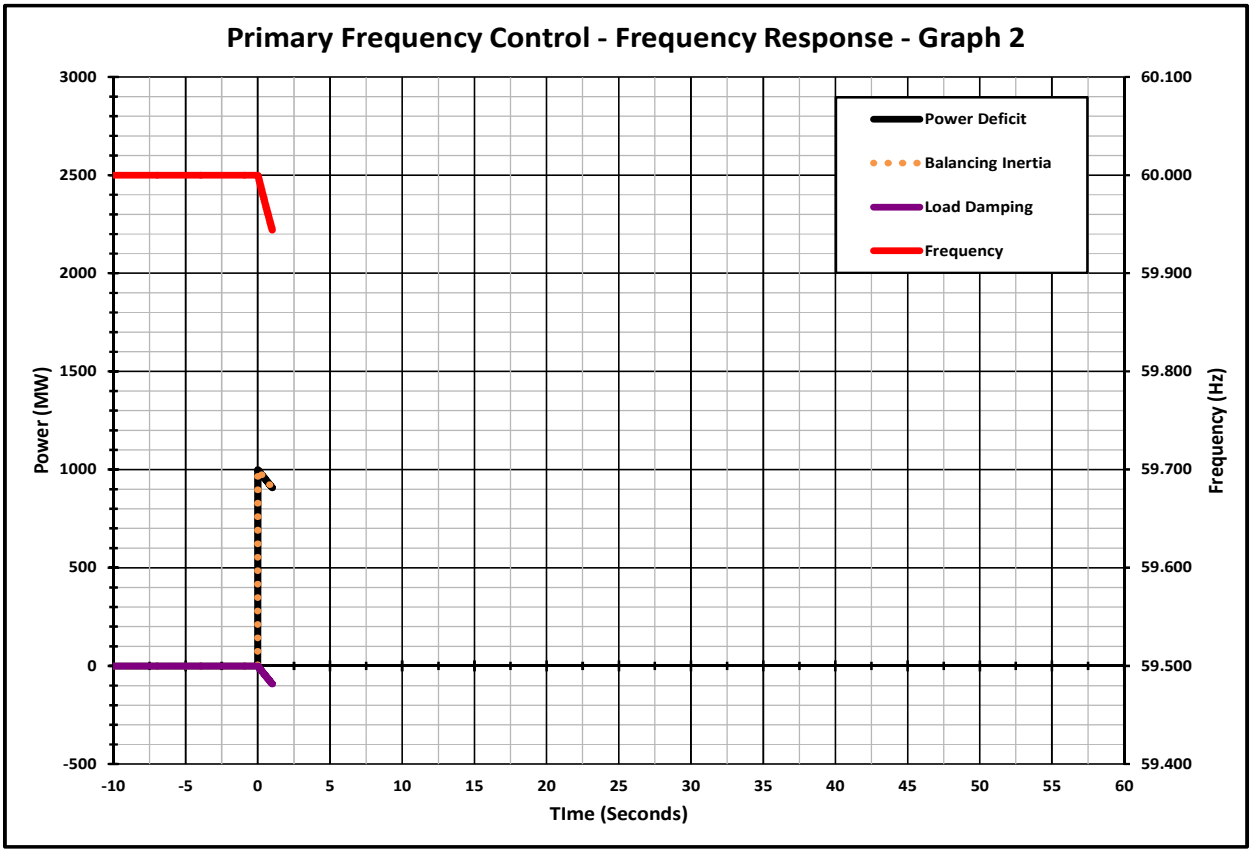
Frequency Response and a brief discussion of each describing how these components react to attempted changes in the load-resource balance and resulting changes in system frequency. The illustration is based on an assumed Disturbance event of the sudden loss of 1000 MW of generation. Although a large event is used to illustrate the response components, even small frequently occurring events will result in similar reactions or responses. The magnitude of the event only affects the shape of the curves on the graph; it does not obviate the need for Frequency Response.



The first graph, Primary Frequency Control – Frequency Response – Graph 1, presents a sudden loss of generation of 1000 MW. The components are presented relative to time as shown on the horizontal Time axis in seconds. This simplified example assumes a Disturbance event of the sudden loss of generation resulting from a breaker trip that instantaneously removes 1000 MW of generation from the interconnection. This sudden loss is illustrated by the power deficit line shown in black using the MW scale on the left. Interconnection frequency is illustrated by the frequency line shown in red using the Hertz scale on the right. Since the Scheduled Frequency is normally 60 Hz, it is assumed that this is the frequency when the Disturbance event occurs.

Even though the generation has tripped and power injected by the generator has been removed from the interconnection, the loads continue to use the same amount of power. The

"Law of Conservation of Energy"[3] requires that the 1000 MW must be supplied to the interconnection if energy balance is to be "conserved". This additional 1000 MW of power is produced by extracting kinetic energy that was stored in the rotating mass of all of the synchronized generators and motors on the interconnection – essentially using this equipment as a giant flywheel. The extracted energy supplies the "balancing inertia"[4] power required to maintain the power and energy balance on the interconnection. This balancing inertia power is produced by the generators' spinning inertial mass' resistance to the slowdown in speed of the rotating equipment on the interconnection that both provides the stored kinetic energy and reduces the frequency of the interconnection. This is illustrated in the second graph, Primary Frequency Control – Frequency Response – Graph 2, by the orange dots representing the balancing inertia power that exactly overlay and offset the power deficit.



As the frequency decreases, synchronized motors slow, as does the work they are providing, resulting in a decrease in load called "load damping." This load damping is the reason that the power deficit initially declines. Synchronously operated motors will contribute to load damping. Variable speed drives that are decoupled from the interconnection frequency do not

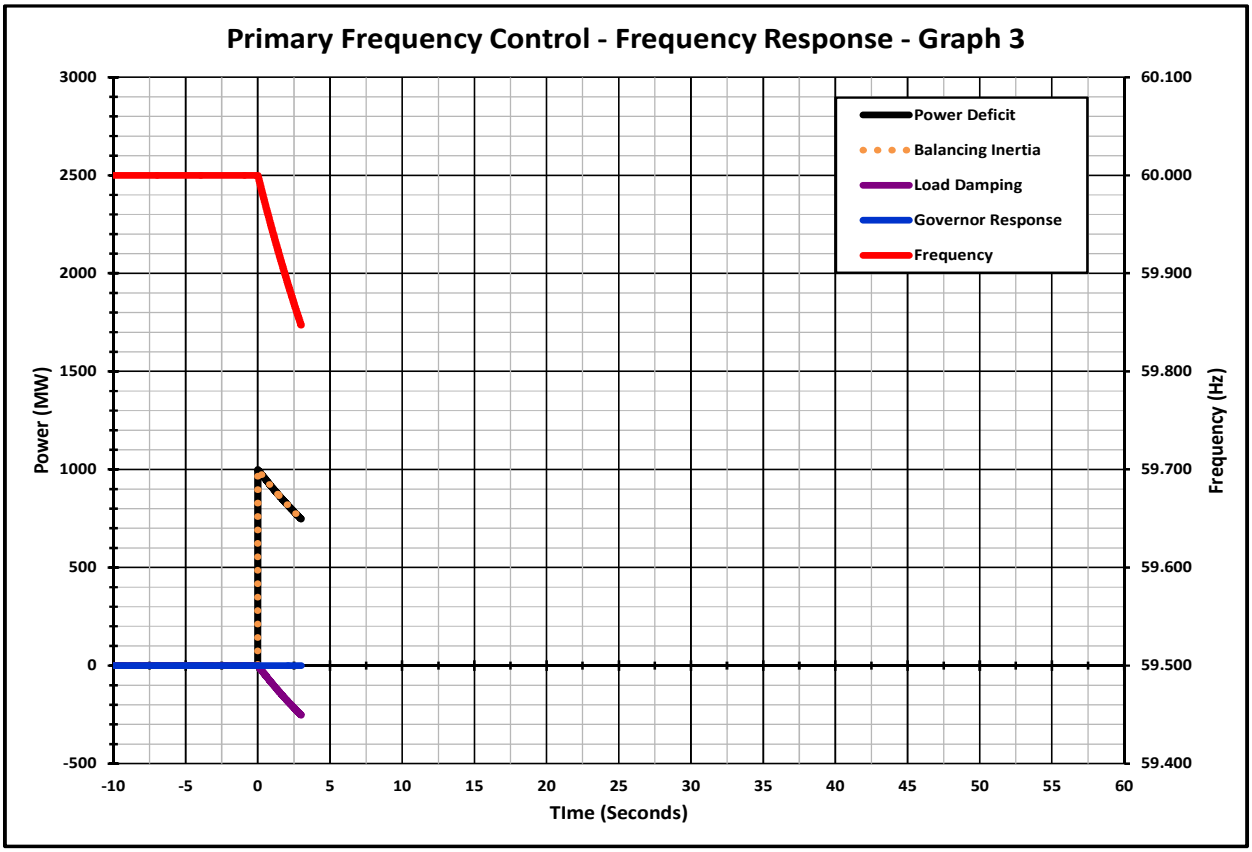
[3] The "Law of Conservation of Energy" is applied here in the form of power. If energy must be conserved, then power which is the first derivative of energy with respect to time, must also be conserved.

[4] The term "balancing Inertia" is coined here from the terms "inertial frequency response" and "balancing energy". Inertial frequency response is a common term used to describe the power supplied for this portion of the frequency response and balancing energy is a term used to describe the market energy supposedly purchased to restore energy balance.

contribute to load damping. In general, any load that does not change with interconnection frequency including resistive load will not contribute to load damping or Frequency Response.

It is important to note that the power deficit equals exactly the balancing inertia, indicating that there is no power or energy imbalance at any time during this process. What is normally considered as "balancing power or energy" is actually power or energy required to correct the frequency error from scheduled frequency. Any apparent power or energy imbalance is corrected instantaneously by the balancing inertia power and energy extracted from the interconnection. Thus the balancing function is really a frequency control function described as a balancing function because ACE is calculated in MWs instead of Hertz, frequency error.

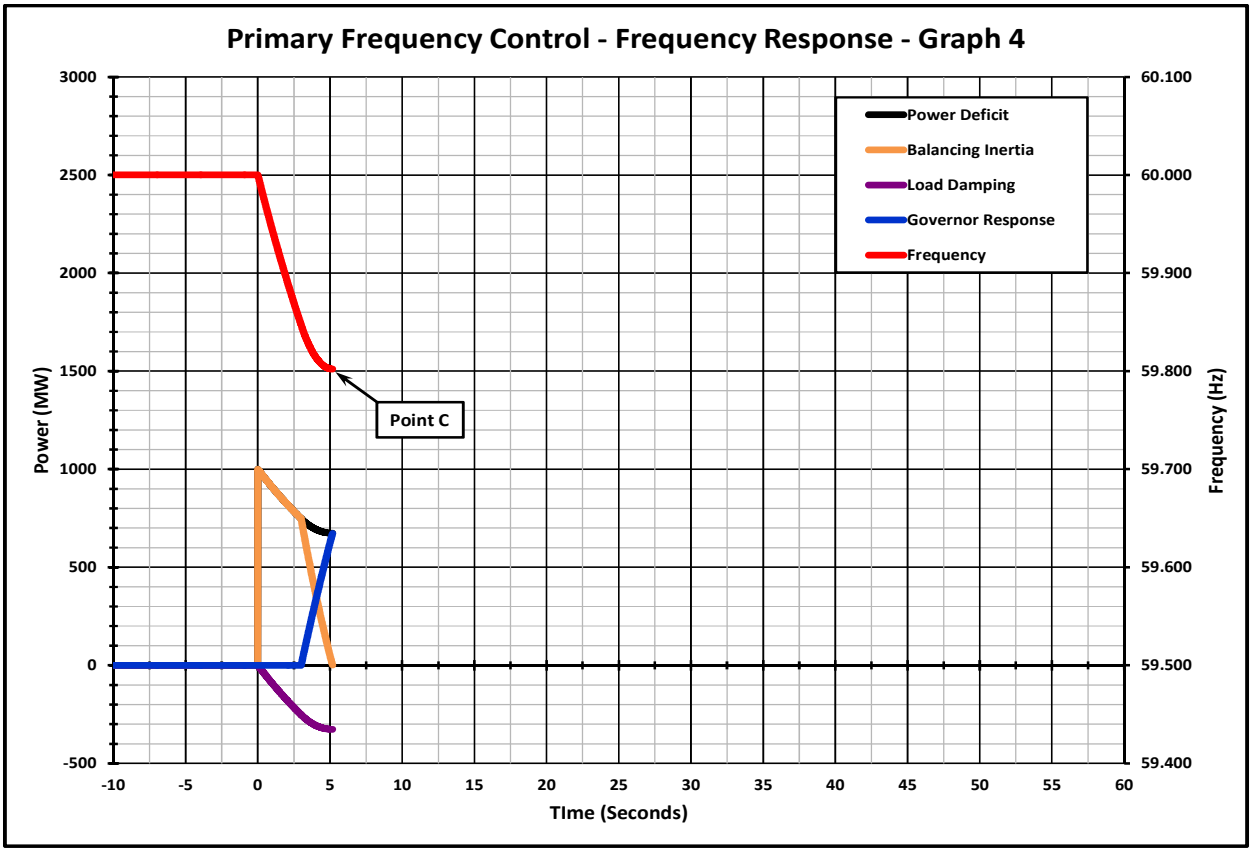
During the initial seconds of the Disturbance event, the governors have yet to respond to the frequency decline. This is illustrated with the Blue line on the third graph, Primary Frequency Control – Frequency Response – Graph 3, showing Governor Response. This time delay results from the time that it takes the controller to adjust the equipment and the time it takes the mass to flow from the source of the energy (main steam control valve for steam turbines, the combustor for gas turbines, or the gate valve for hydro turbines) to the turbine-generator blades where the power is converted to electrical energy.



Note that the frequency continues to decline due to the ongoing extraction by balancing inertia power of energy from the rotating turbine-generators and synchronous motors on the interconnection. The reduction in load also continues as the effect of load damping continues

to reduce the load while frequency declines. During this time delay (before the governor response begins) the balancing inertia limits the rate of change of frequency.

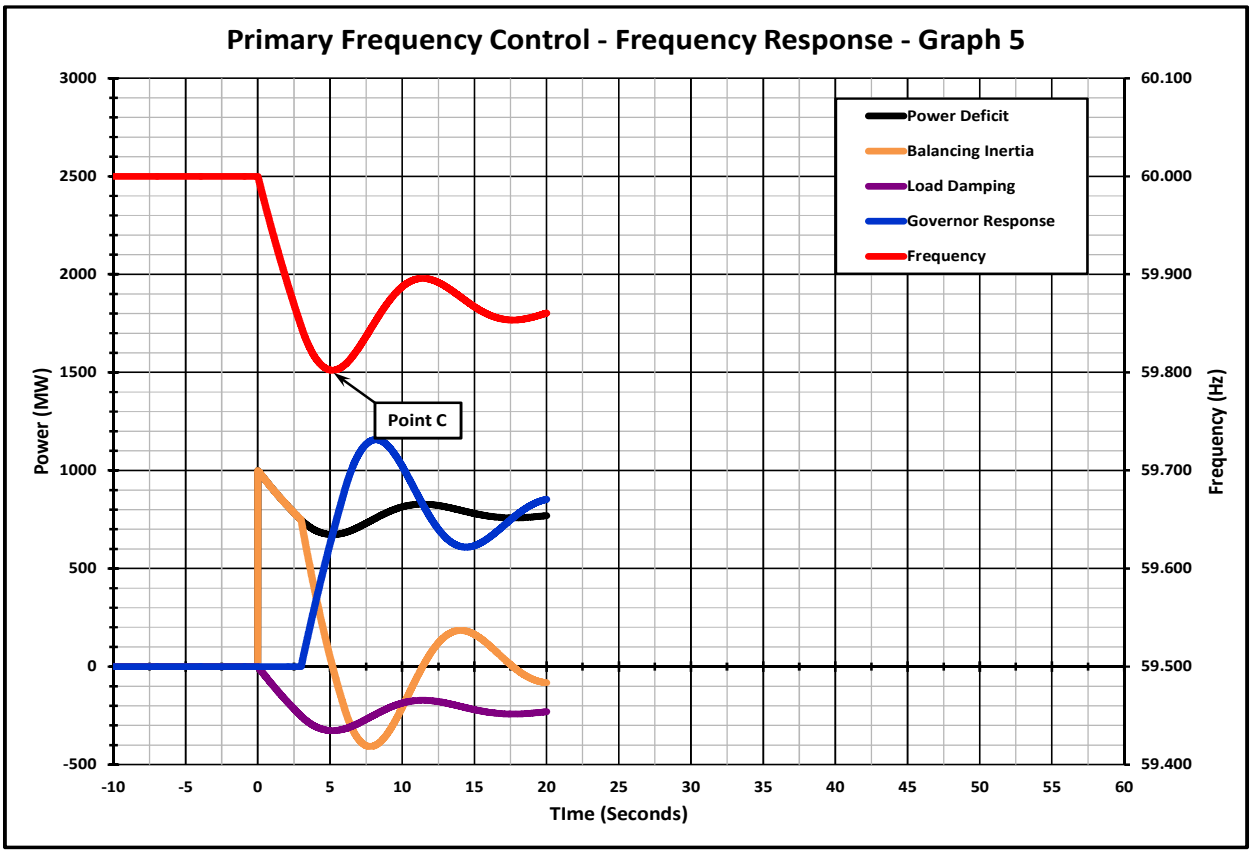
After a short time delay, the governor response begins to increase rapidly in response to the initial rapid decline in frequency, as illustrated on the fourth graph, Primary Frequency Control – Frequency Response – Graph 4. Governor response exactly offsets the power deficit at the point in time that the frequency decline is arrested. At this point in time, the balancing inertia has provided its contribution to reliability and its power contribution is reduced to zero as it is replaced by the governor response. If the time delay associated with the delivery of governor response is reduced, the amount of balancing inertia required to limit the change in frequency by the Disturbance event can also be reduced. This supports the conclusion that balancing inertia is required to manage the time delays associated with the delivery of Frequency Response. Not only is the rapid delivery of Frequency Response important, but the shortening of the time delay associated with its delivery is also important. Therefore, two important components of Frequency Response are 1) how long the time delay is before the initial delivery of response begins; and 2) how much of the response is delivered before the frequency change is arrested.



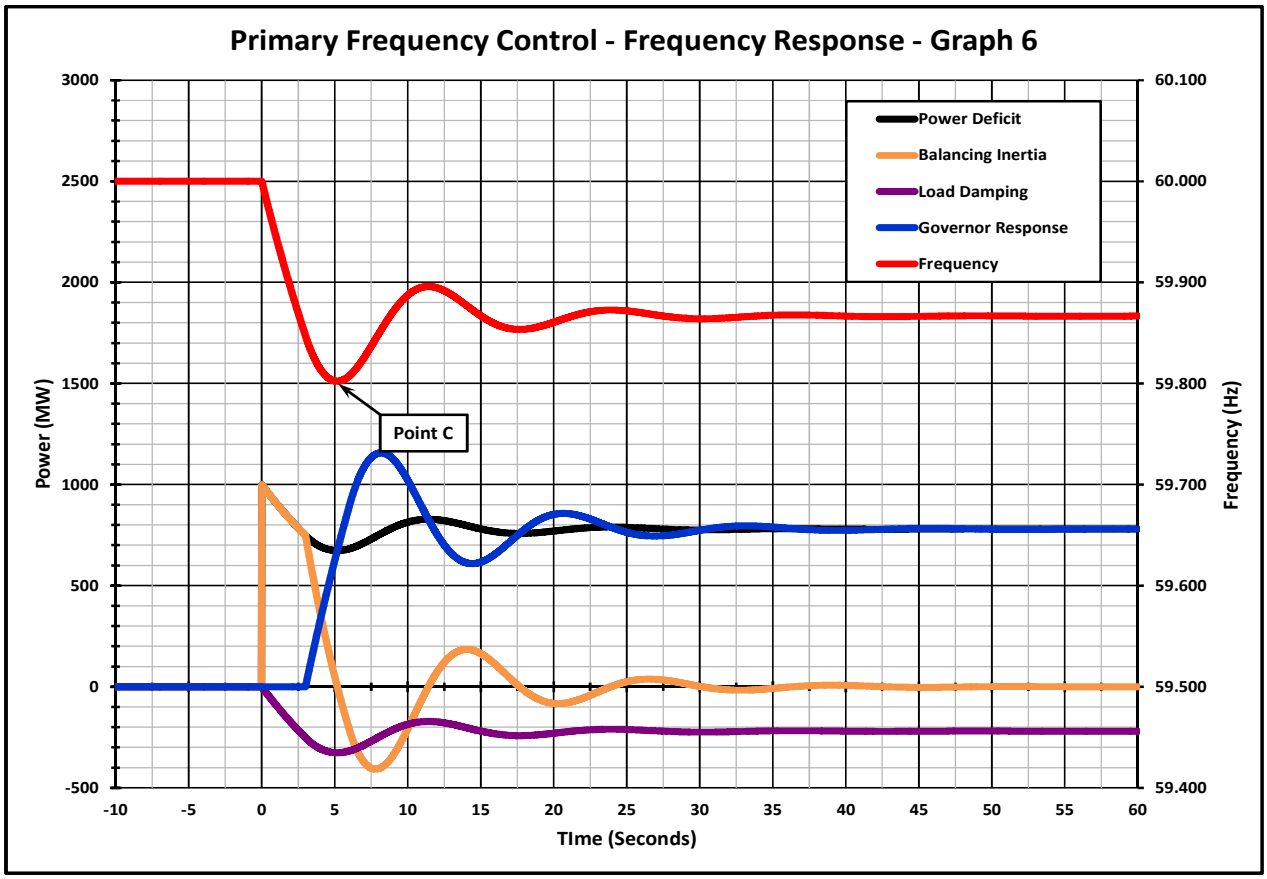
This point, at which the frequency is first arrested, is defined as "Point C" and Frequency Response calculated at this point is called the "**arrested frequency response**." The arrested frequency is normally the minimum (maximum for load loss events) frequency that will be

experienced during a Disturbance event. From a reliability perspective, this minimum frequency is the frequency that is of concern. Adequate reliability requires that frequency at the time frequency is arrested remain above the under-frequency relay settings so as not to trip these relays and the firm load interrupted by them. Frequency Response delivered after frequency is arrested at this minimum level provides less reliability value than Frequency Response delivered before Point C, but greater value than Secondary Frequency Control power and energy which is delivered minutes later.

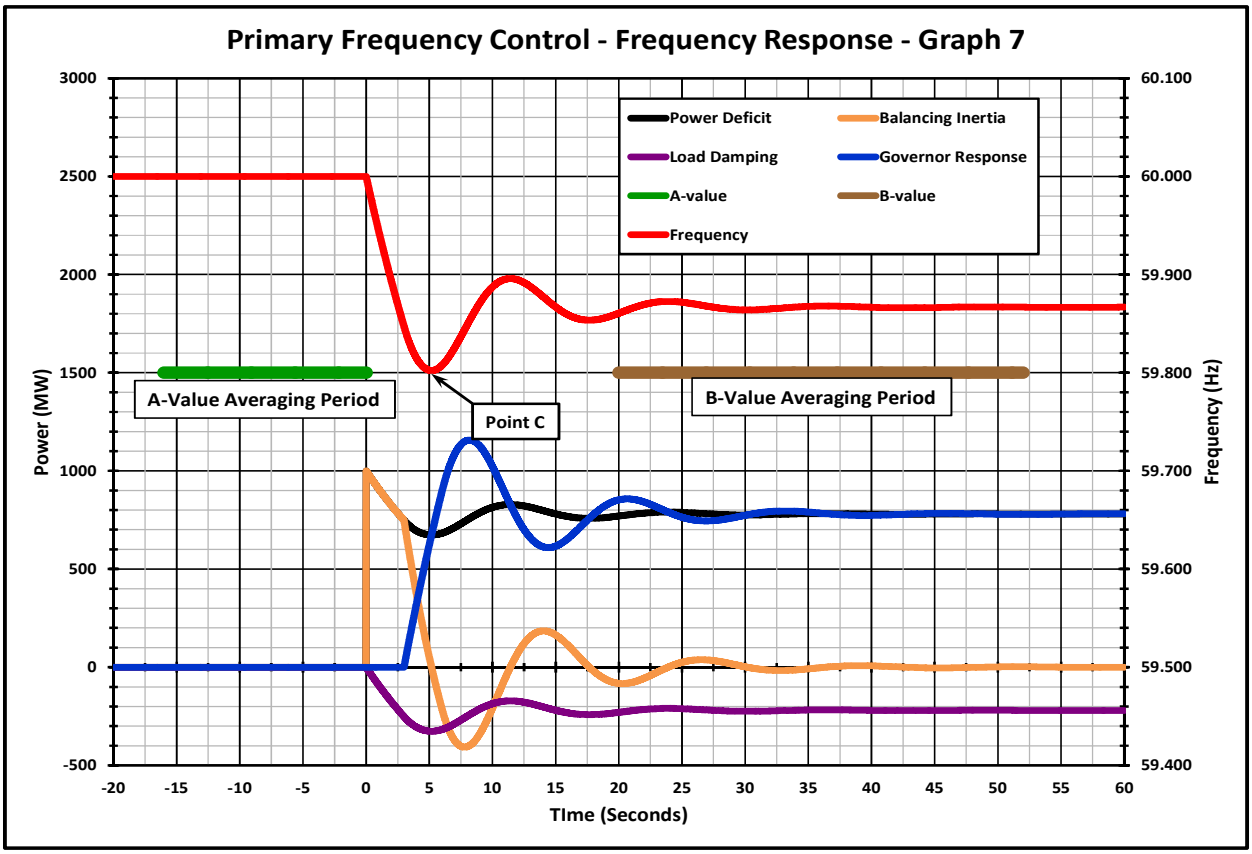
Once the frequency decline is arrested, the governors continue to respond because of the time delay associated with their Governor Response. This results in the frequency partially recovering from the minimum arrested value and results in an oscillating transient that follows the minimum frequency (arrested frequency) until power flows and frequency settle during the transient period that ends roughly 20 seconds after the Disturbance event. This post-disturbance transient period is included on the fifth illustrative graph, Primary Frequency Control – Frequency Response – Graph 5.



The total Disturbance event illustration is presented on the sixth graph, Primary Frequency Control – Frequency Response – Graph 6. Frequency and power contributions stabilize at the end of the transient period. Frequency Response calculated from data measured during this settled period is called the "Settled Frequency Response." The Settled Frequency Response is the best measure to use as an estimator for the "Frequency Bias Setting" discussed later.



The final Disturbance event illustration is presented on the seventh graph, Primary Frequency Control – Frequency Response – Graph 7. This graph shows the averaging periods used to estimate the pre-disturbance A-Value averaging period and the post-disturbance B-Value averaging period used to calculate the settled frequency response. A discussion of the measurement of Frequency Response immediately follows these graphs. That discussion includes consideration of the factors that affect the methods chosen to measure Frequency Response for implementation in a reliability standard.



Frequency Response Measurement (FRM)

The classic Frequency Response points A, C, and B, shown below in Fig. 1 Frequency Response Characteristic, are used for measurement as found in the Frequency Response Characteristic Survey Training Document within the NERC operating manual, found at http://www.nerc.com/files/opman_7-1-11.pdf. This traditional Frequency Response Measure has recently been more specifically termed "**settled frequency response**." This term has been used because it provides the best Frequency Response Measure to estimate the Frequency Bias Setting in Tie-line Bias Control based Automatic Generation Control Systems. However, the industry has recognized that there is considerable variability in measurement resulting from the selection of Point A and Point B in the traditional measure making the traditional measurement method unsuitable as the basis for an enforceable reliability standard in a real world setting of multiple Balancing Authority interconnections.

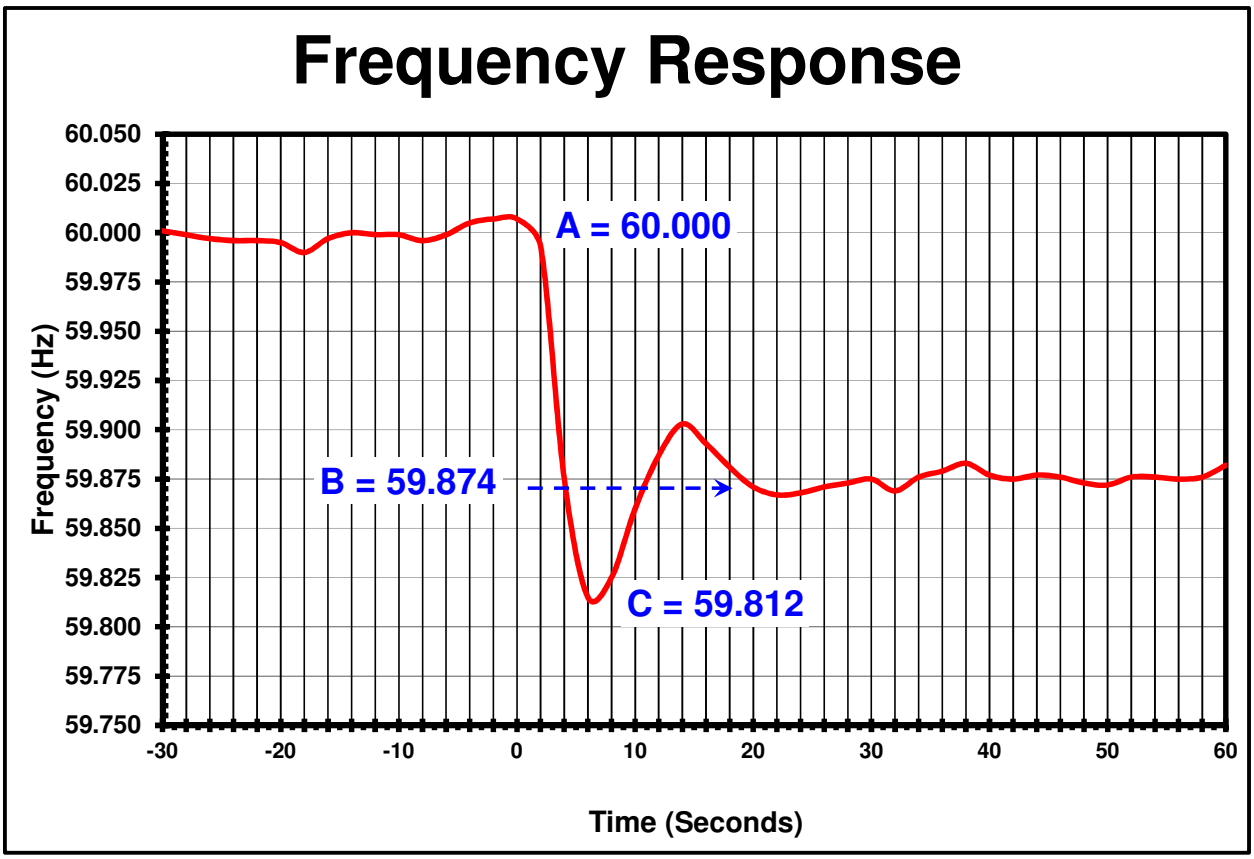


Figure 1. Frequency Response Characteristic

By contrast, measuring an Interconnection's settled frequency response is straightforward and fairly accurate. All that's needed to make the calculation is to know the size of a given contingency (MW), divide this value by the change in frequency and multiply the results by 10 since frequency response is expressed in MW/0.1Hz.

Measuring a BA's frequency response is more challenging. Prior to BAL-003-1, NERC's *Frequency Response Characteristic Survey Training Document* provided guidance to calculate Frequency Response. In short, it told the reader to identify the BA's interchange values "immediately before" and "immediately after" the Disturbance event and use the difference to calculate the MWs the BA deployed for the event. There are two challenges with this approach:

- Two people looking at the same data would come up with different values when assessing which exact points were immediately before and after the event.
- In practice, the actual response provided by the BA can change significantly in the window of time between point B and when secondary and tertiary control can assist in recovery.

Therefore, the measurement of settled frequency response has been standardized in a number of ways to limit the variability in measurement resulting from the poorly specified selection of Point A and Point B. It should be noted that t-0 has been defined as the first scan value that

shows a deviation in frequency of some significance, usually approaching about 10 mHz. The goal is such that the first scan prior to t-0 was unaffected by the deviation and appropriate for one of the averaging points.

- The A-value averaging period of approximately the previous 16 seconds prior to t-0 was selected to allow for an averaging of at least 2 scans for entities utilizing 6 second scan rates. (All time average period references in this document are for 2 second scan rates unless noted otherwise.)
- The B-value averaging period of approximately (t+20 to t+52 seconds) was selected to attempt to obtain the average of the data after primary frequency response was deployed and the transient completed(settled), but before significance influence of secondary control. Multiple periods were considered for averaging the B-value:
    - 12 to 24 sec
    - 18 to 30 sec
    - 20 to 40 sec
    - 18 to 52 sec
    - 20 to 52 sec

  It is necessary for all BAs from an interconnection to use the same averaging periods to provide consistent results. In addition, the SDT decided that until more experience is gained, it is also desirable for all interconnections to use the same averaging periods to allow comparison between interconnections.

The methods presented in this document only address the values required to calculate the frequency response associated with the frequency change between the initial frequency, A-Value, and the settling frequency, B-Value. No reasonable or consistent calculations can be made relating to the arresting frequency, C-Value, using Energy Management System (EMS) scan rate data as long as 6-seconds or tie-line flow values associated with the minimum value of the frequency response characteristic (C-value) as measured at the BA level.

Both the calculation of the frequency at Point A and the frequency at Point B began with the assumption that a 6-second scan rate was the source of the data. Once the averaging periods for a 6-second scan rate were selected, the averaging periods for the other scan rates were selected to provide as much consistency as possible between BAs with different scan rates.

The Frequency at Point A was initially defined as the average of the two scans immediately prior to the frequency event. All other averaging periods were selected to be as consistent as possible with this 12 second average scan from the 6-second scan rate method. In addition, the "**actual net interchange immediately before Disturbance**" is defined as the average of the same scans as used for the Point A frequency average.

The Frequency at Point B was then selected to be an average as long as the average of 6-second scan data as possible that would not begin until most of the hydro governor response had been delivered and would end before significant Automatic Generation Control (AGC) recovery response had been initiated as indicated by a consistent frequency restoration slope. The "**actual net interchange immediately after Disturbance**" is defined as the average of the same scans as used for the Point B frequency average.

B Averaging Period Selection:

Experience from the Electric Reliability Council of Texas ("ERCOT") and the field trail on other interconnections indicated that the 12 to 24 second and 18 to 30 second averaging periods were not suitable because they did not provide the consistency in results that the other averaging periods provided, and that the remaining measuring periods do not provide significantly different results from each other. The team believed that this was observed because the transients were not complete in all of the samples using these averaging periods.

The 18 to 52 second and 20 to 52 second averaging periods were compared to each other, with the 20 to 52 second period providing more consistent values, believed to result from the incomplete transient in some of the 18 to 52 second samples.

This left a choice between the 20 to 40 second and the 20 to 52 second averaging periods. The team recognized that there would be more AGC response in the 20 to 52 second period, but the team also recognized that the 20 to 52 second period would provide a better measure of squelched response from outer loop control action. The 20 to 52 second period was selected because it would indicate squelched response from outer-loop control and provide incentive to reduce response withdrawal. The final selections for the data averaging periods used in FRS Form 1 are shown in the table below.

Definitions of Frequency Values for Frequency Response Calculation

Scan Rate	T 0 Scan	A Value (average)	B Value (average)
6-Seconds	Identify first significant change in frequency as the T 0 scan	Average of T-1 through T-2 scans	Average of T+4 through T+8 scans
5-Seconds		Average of T-1 through T-2 scans	Average of T+5 through T+10 scans
4-Seconds		Average of T-1 through T-3 scans	Average of T+6 through T+12 scans
3-Seconds		Average of T-1 through T-5 scans	Average of T+7 through T+17 scans
2-Seconds		Average of T-1 through T-8 scans	Average of T+10 through T+26 scans

Consistent measurement of Primary Frequency Response is achievable for a selected number of events and can produce representative frequency response values, provided an appropriate sample size is used in the analysis. Available research investigating the minimum sample size to provide consistent measurements of Frequency Response has shown that a minimum sample size of 20 events should be adequate.

Measurement of Primary Frequency Response on an individual resource or load basis requires analysis of energy amounts that are often small and difficult to measure using current methods. In addition, the number of an interconnection's resources and loads providing their response could be problematic when compiling results for multiple events.

Measurement of Primary Frequency Response on an interconnection (System) basis is straight forward provided that an accurate frequency metering source is available and the magnitude of the resource/load imbalance is known in MWs.

Measurement on a Balancing Authority basis can be a challenge, since the determination of change in MWs is determined by the change in the individual BA's metered tie lines. Summation of tie lines is accomplished by summing the results of values obtained by the digital scanning of meters at intervals up to six seconds, resulting in a non-coincidental summing of values. Until the technology to GPS time stamp tie line values at the meter and the summing of those values for coincidental times is in use throughout the industry, it is necessary to use averaging of values described above to obtain consistent results.

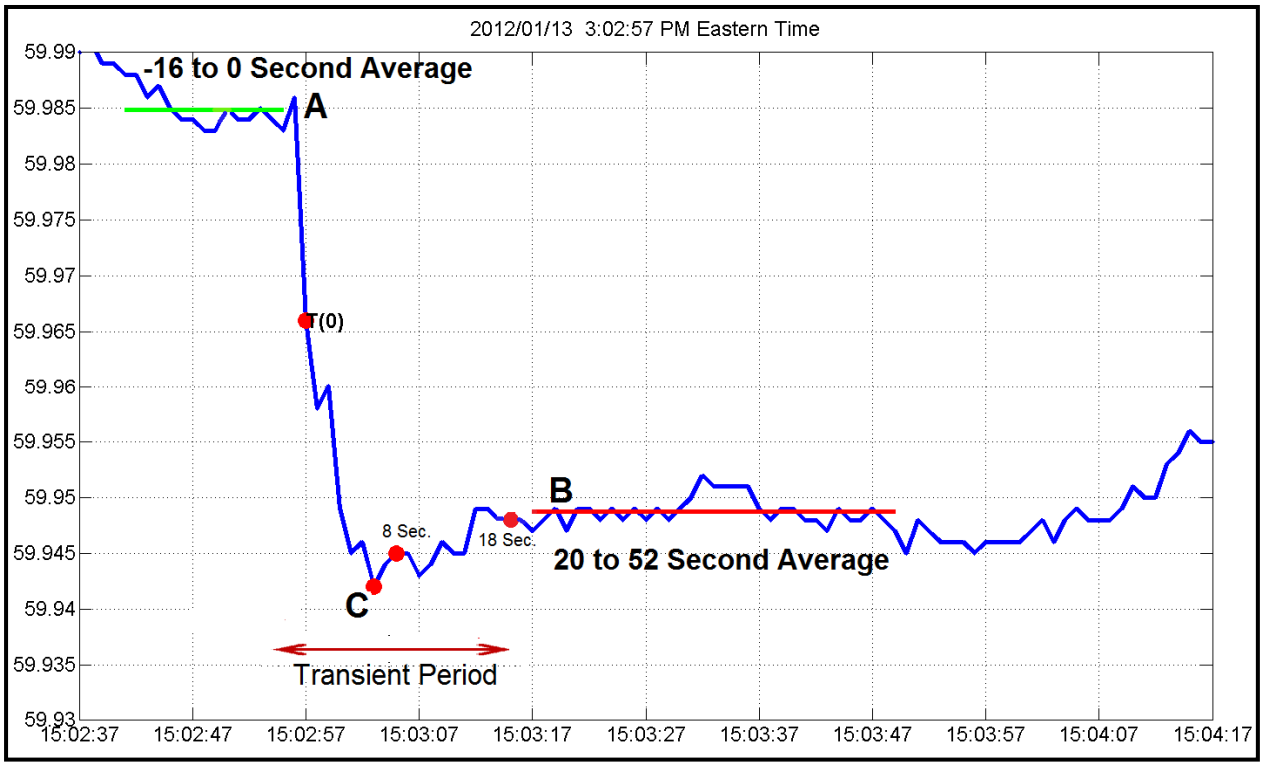


Figure 2. Frequency Response Measurement

The standardized measure is shown graphically in Fig. 2 Frequency Response Measurement with the averaging periods shown by the solid green and red lines on the graph. Since FERC directed a performance obligation for BAL-003-1, it is important to be more objective in the measurement process. The standardized calculation is available on FRS Form 2 for EMS scan rates of 2, 3, 4, 5, and 6 seconds at http://www.nerc.com/filez/standards/Frequency_Response.html.

Arrested Frequency Response

There is another measure of Frequency Response that is of interest when developing a Frequency Response estimate that not only will be used for estimating the Frequency Bias Setting, but will also be used to assure reliability by operating in a manner that will bound interconnection frequency and prevent the operation of Under-frequency Relays. This Frequency Response Measure has recently been named "**arrested frequency response.**" This Frequency Response is significantly affected by the inertial Frequency Response, the governor Frequency Response and the time delays associated with the delivery of governor Frequency

Response. It is calculated by using the change in frequency between the initial frequency, A, and the maximum frequency change during the event, C, instead of using the change between A and B. Arrested Frequency Response is the correct response for determining the minimum Frequency Response related to under-frequency relay operation and the support of interconnection reliability. This is because it can be used to provide a direct estimate of the maximum frequency deviation an interconnection will experience for an initial frequency and a given size event in MW. Unfortunately, arrested frequency response cannot currently be measured using the existing EMS-based measurement infrastructure. This limitation exists because the scan rates currently used in industry EMSs are incapable of measuring the net actual interchange at the same instant that the maximum frequency deviation is reached. Fortunately, the ratio of arrested frequency response and settled frequency response tends to be stable on an interconnection. This allows the settled frequency response value to be used as a surrogate for the arrested frequency response and implement a reasonable measure upon which to base a standard. One consequence of using the settled frequency response as a surrogate for the arrested frequency response is the inclusion of a large reliability margin in Interconnection Frequency Response Obligation to allow for the difference between the settled frequency response as measured and the arrested frequency response that indicates reliability.

As measurement infrastructure improves one might expect the Frequency Response Obligation to transition to a measurement based directly on the arrested frequency response while the Frequency Bias Setting will continue to be based on the settled frequency response. However, at this time, the measurement devices and methods in use do not support the necessary level of accuracy to estimate arrested frequency response contribution for an individual Balancing Authority.

Frequency Response Definition and Examples

Limitations of the measurement infrastructure determine the measurement methods recommended in this standard. The measurement limitations provide opportunities to improve the Frequency Response as measured in the standard without contributing to an improvement in Frequency Response that contributes to reliability. These definitions and examples provide a basis for determining which contributions to Frequency Response contribute the most to improved reliability. They also provide the basis for determining on a case by case basis whether the individual contributors to the Frequency Response Measure are also contributing to reliability.

General Frequency Response Characteristics

In the simplest case Frequency Response includes any automatic response to changes in local frequency. If that response works to decrease that change in frequency, it is beneficial to reliability. If that response works to increase that change in frequency, it is detrimental to reliability. However, this definition does not address the relative value of one response as compared to other responses that may be provided in a specific case.

There are numerous characteristics associated with the Frequency Response that affect the reliability value and economic value of the response. These characteristics include:

1. **Inertial** – the response is inertial or approximates inertial response

Inertial response provides power without delay that is proportional to the frequency and the change in frequency. Therefore, power provided by electronic control as synthetic Inertial response must be proportional to the frequency and change in frequency and be provided without a time delay.

2. **Immediate** – no unnecessary intentional time delays or reduction in the rate of response delivery
    a. time delay before the beginning of the response
    Turbines that convert heat or kinetic energy have time delays related to the time delay from the time that the control valves are moved to initiate the change in power and the time that the power is delivered to the generator. These times are usually associated with the time it takes a change in mass flow to travel from the control valve to the first blades of the turbine in the turbine generator.

    b. reduction in the rate of response delivery
    There are natural delays associated with the rate of response delivery that are related to the mass flow travel from the first turbine blades to the last turbine blades. In addition, some turbines have intentional delays designed into the control system to slow the rate of change in the delivery of the kinetic energy or fuel to the turbine to prevent the turbine or other equipment from being damaged, hydro turbines, or to prevent the turbine from tripping due to excessive rate of change, gas turbines.

3. **Proportional** – the amount of the total response is proportional to the frequency error
    a. No Deadband – the response is proportional across the entire frequency range
    b. Deadband – the response is only proportional outside of a defined deadband

4. **Bi-directional** – the response occurs to both increases and decreases in frequency

5. **Continuous** – there are no discontinuities in the delivery of the response (no step changes)

6. **Sustained** – the response is sustained until frequency is returned to schedule

Frequency Response Reliability Value

This section contains a more detailed discussion of the various characteristics of Frequency Response listed in the previous section. It also provides an indication of the relative value of these characteristics with respect to their contribution to reliability. Finally, it includes some examples of the described responses.

Inertial Response is provided from the stored energy in the rotating mass of the turbine-generators and synchronous motors on the interconnection. It limits the rate of change of frequency until sufficient Frequency Response can be supplied to arrest the change in frequency. Its reliability value increases as the time delay associated with the delivery of other Frequency Response on the interconnection increases. If those time delays are minimal, then the value of inertial response is low. If all time delays associated with the Frequency Response could be eliminated, then inertial response would have little value.

The reliability value of Inertial Response is the greatest on small interconnections because the size of the Disturbance events is larger relative to the inertia of the interconnection. Electronic controls have been developed to provide synthetic inertial response from the stored energy in asynchronous generators to supplement the natural inertial response. Some Type III & IV Wind Turbines have this capability. In addition, electronically controlled SCRs have been developed that can store energy in the electrical system and release this stored energy to supply synthetic inertial response when required.

Immediate Response is provided by load damping and because the time delays associated with its delivery are very short (related to the speed of electrical signal in the electrical system); load damping requires very little inertial response to limit arrested frequency effectively. Synthetic immediate response can also be supplied from loads because in many cases, there is no mass flow time delay associated with the load process providing the power and energy reduction. Therefore, loads can provide an immediate response with a higher reliability value than generators with time delays required by the physics of the turbine-generator.

Governor response has time delays associated with its delivery. Governor response provided with shorter time delays has a higher reliability value because those shorter time delays require less inertial response to arrest frequency. Governor response is provided by the turbine-generators on the interconnection. Time delays associated with governor response vary depending on the type of turbine-generator providing the response.

The longest time delays are usually associated with high head hydro turbine-generators that require long times from the governor action until the additional mass flow through the turbine. These units may also have the longest delivery time associated with the full delivery of response because of the timing designed into the governor response.[5]

Intermediate time delays are usually associated with steam turbine-generators. The response begins when the steam control valves are adjusted and the steam mass flows from the valves to the first high pressure turbine blades. The delivery times associated with the full delivery of response may require the steam to flow through high, intermediate and low pressure turbines including reheat flows before full power is delivered. These times are shorter than those of the hydro turbine-generators in general, but not as fast as the times associated with gas turbines.[6]

Gas turbines typically have the shortest time delays, because control is provided by injecting more or less fuel into the turbine combustor and adjusting the air control dampers. These control changes can be initiated rapidly and the mass flow has the shortest path to the turbine

[5] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-6 – 1-9.

[6] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-4 – 1-6.

blades. There may be timing limitations related to the rate of change in output of the gas turbine-generator to maintain flame stability in some cases slowing the rate of change.[7]

Synthetic Governor Response can be supplied by certain loads and storage systems. The immediacy of the response is normally limited only by the electronic controls used to activate the desired response. Synthetic response, when it can be supplied immediately without significant time delay, has a higher reliability value because it requires less inertial response to achieve smaller arrested frequency deviations.

Proportional Response indicates that the response provided is proportional in magnitude to the frequency error. Response deadbands cause a non-proportional response and reduce the value of the response with respect to reliability. Contrary to general consensus, deadbands do not reduce the amount of Frequency Response that must be provided, they only transfer the responsibility for providing that Frequency Response from one source on the interconnection to another. For a given response, the response with the smaller deadband has the greater reliability value. Therefore, deadbands should be set to the smallest value that supports overall reliable operation including the reliable operation of the generator.

Electronic controls have also been developed to provide synthetic governor response. When these controls are applied to certain loads or stored energy systems, they can be programmed to provide synthetic governor response similar to the proportional response of a turbine-generator governor. Governor response in generators is limited to a small percentage of the output of the generating unit, while synthetic governor response could be applied to much larger percentages of loads or storage devices providing such response.

Load damping provides a proportional response.

Continuous Response is response that has no discontinuous (step) changes in the frequency versus response curve. Step changes (Non-continuous Response) in the Governor Response curve can lead to frequency instabilities at frequencies near the changes. The ERCOT Interconnection observed this and has since prohibited the use of governor response characteristics incorporating step responses.

Step responses also occur with the implementation of load interruption using under-frequency or over-frequency relays.

Bi-directional Response is response that occurs in both directions, when the frequency is increasing and when the frequency is decreasing. A uni-directional response is a response that only occurs once when frequency is decreasing or when frequency is increasing.

Inertial response, governor response and load damping are all bi-directional responses. Certain loads are capable of providing proportional bi-directional response while others are only capable of providing non-proportional bi-directional response.

[7] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-16 – 1-19.

The ERCOT Load Resource program is a uni-directional response program. Loads are only tripped when frequency declines below a given set-point. When frequency is restored above that set-point, the loads must be manually reconnected. As a consequence, the Frequency Response only occurs once with declining frequency and does not oppose the increase in frequency after the initial decline. If there should be a frequency oscillation, the uni-directional response will not contribute to the opposition of a second frequency decline across the set-point during an oscillation event. Once a uni-directional response has occurred, it is unavailable for a second decline before reset.

Step or proportional responses implemented bi-directionally can lead to frequency instability when there is less continuous frequency response than the magnitude of the change in continuous response between the trip and reset frequencies in step, or the proportional response rate of change is greater than the underlying continuous response. A step bi-directional response will have the load reconnected as frequency recovers from the event thus opposing the increase in frequency during recovery, and also resetting the load response for the next frequency decline automatically. Bi-directional response obviously has a greater reliability value than uni-directional response.

Sustained Response is provided at its full value until frequency is restored to its scheduled value. On today's interconnections, few frequency responses are fully sustained until frequency has been restored to its scheduled value. On steam based turbine-generators, the steam pressure may drop after a time as the result of the additional steam flow from governor action. However, in general this has not been a problem because most responses are incomplete at the time that frequency has been initially arrested and the additional response has generally been sufficient to make up for more than the these unpreventable reductions in response. However, the intentional withdrawal of response before frequency has been restored to schedule can cause a decline in frequency beyond that which would be otherwise expected. This intentional withdrawal of response is highly detrimental to reliability. Therefore, it can be concluded in general that sustained response has a higher reliability value than un-sustained response.

On an interconnection, the withdrawal of response due to the loss of steam pressure on the steam units may be offset by the slower response of hydro turbine-generators. In these cases, the reliability of the combined response provides a greater reliability value than the individual response of each type. The steam turbine-generators provide a fast response that may be reduced, while the hydro turbine-generators provide a slower response, contributing less to the arresting response, offsetting any reduction by the steam turbine-generators to assure a sustained response.

Sustained Response must also be considered for any resource that has a limited duration associated with its response. The amount of stored energy available from a resource may limit its ability to sustain response for a duration of time necessary to support reliability.

Frequency Response Cost Factors

In every system of exchange there are two sides; the supply side and the demand side. The supply side provides the services used by the demand side. In the case of Frequency Response,

the supply side includes all providers of Frequency Response and the demand side includes all participants that create the need for Frequency Response.

Frequency Response Costs – Supply Side

There are a number of factors that affect the cost of providing Frequency Response from resources. Since there is a cost associated with those factors, some method of appropriate compensation could be made available to those resources providing Frequency Response. Without compensation, providers of Frequency Response will be put in the position of incurring additional cost that can be avoided only by reducing or eliminating the response they provide. These costs are incurred independently of whether provided for in a formal Regional Transmission Organization/Independent System Operator (RTO/ISO) market or in a traditional BA subject to the FERC pro-forma tariffs.

It is the responsibility of the BA or the RTO/ISO to acquire the necessary amount of Frequency Response to support reliability in the most cost effective manner. This function is performed best when the suppliers are evaluated based on the value of the Frequency Response they provide and compensated appropriately for that Frequency Response. Suppliers provide Frequency Response when they are assured that they will receive fair compensation. Before considering how to perform this evaluation and compensation, the costs associated with providing Frequency Response should be understood and evaluated with respect to the level of reliability they offer.

Some cost factors that have been identified for providing Frequency Response include:

1. **Capacity Opportunity Cost** – the costs, including opportunity costs, associated with reserving capacity to provide Frequency Response. These costs are usually associated with the alternative use of the same capacity to provide energy or other ancillary services. There may also be capacity opportunity costs associated with the loss in average capacity by a load providing Frequency Response.
2. **Fuel Cost** – The cost of fuel used to provide the Frequency Response. The costs for fuel to provide Frequency Response can result in energy costs significantly different from the system marginal energy cost, both higher and lower. This is the case when Frequency Response is provided by resources that are not at the system marginal cost.
3. **Energy Efficiency Penalty Costs** – the costs associated with the loss in efficiency when the resource is operated in a mode that supports the delivery of Frequency Response. This cost is usually in the form of additional fuel use to provide the same amount of energy. An example is the difference between operating a steam turbine in valve control mode with an active governor and sliding pressure mode with valves wide open and no active governor control except for over-speed. This cost is incurred for all of the energy provided by the resource, not just the energy provided for Frequency Response. There may be additional energy costs associated with a load providing Frequency Response from loss in efficiency of their process when load is reduced.
4. **Capacity Efficiency Penalty Costs** – the costs associated with any reduction in capacity resulting from the loss of capacity associated with the loss in energy efficiency. When efficiency is lost, capacity may be lost at the same time because of limitations in the amount of input energy that can be provided to the resource.

5. **Maintenance Costs** – the operation of the resource in a manner necessary to provide Frequency Response may result in increases in the maintenance costs associated with the resource.
6. **Emissions Costs** – the additional costs incurred to manage any additional emissions that result when the resource is providing Frequency Response or stands ready to provide Frequency Response.

A good contract for the acquisition of Frequency Response from a resource will provide appropriate compensation to the resource for all of the costs the resource incurs to provide Frequency Response. It will also provide a method to evaluate the least cost mix of resources necessary to provide the minimum required Frequency Response for maintaining reliability. Finally, it will provide the least complex method of evaluation considering the complexity and efficiency of the acquisition process.

Frequency Response Costs – Demand Side

Not only are there costs associated with acquiring Frequency Response from the supplying resources, there are costs associated with the amount of Frequency Response that must be acquired and influenced by those participants that create the need for Frequency Response. If the costs of acquiring Frequency Response from the supply resources can be assigned to those parties that create the need for Frequency Response, there is the promise that the amount of Frequency Response required to maintain reliability can be minimized. The considerations are the same as those that are driving the development of "real time pricing" and "dynamic pricing". If the costs are passed on to those contributing to the need for Frequency Response, incentives are created to reduce the need for Frequency Response making interconnection operations less expensive and more reliable. The problem is to balance both cost and complexity against reliability on both the supply side and the demand side.

Rationale by Requirement

Requirement 1

R1. Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or Balancing Authority that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation.

Background and Rationale

R1 is intended to meet the following primary objectives:

- Determine whether a Balancing Authority (BA) has sufficient Frequency Response for reliable operations.
- Provide the feeder information needed to calculate CPS limits and Frequency Bias Settings.

Primary Objective

With regard to the first objective, FRS Form 1 and the process in Attachment A provide the method for determining the Interconnections' necessary amount of Frequency Response and allocating it to the Balancing Authorities. The field trial for BAL-003-1 is testing an allocation methodology based on the amount of load and generation in the BA. This is to accommodate the wide spectrum of BAs from generation-only all the way to load-only.

Frequency Response Sharing Groups (FRSGs)

This standard proposes an entity called FRSG, which is defined as:

> *A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.*

This standard allows Balancing Authorities to cooperatively form FRSGs as a means to jointly meet the FRS. There is no obligation to form or be a part of FRSGs. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of FERC's Order No. 693 directives.

FRSG performance may be calculated one of two ways:

- Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or
- Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual event performance.

Frequency Response Obligation and Calculation

The basic Frequency Response Obligation is based on annual load and generation data reported in FERC Form 714 (where applicable, see below for non-jurisdictional entities) for the previous full calendar year. The basic allocation formula used by NERC is:

$$\mathrm{FRO_{BA}} = \mathrm{FRO_{Int}} \times \frac{\text{Annual Gen}_{\mathrm{BA}} + \text{Annual Load}_{\mathrm{BA}}}{\text{Annual Gen}_{\mathrm{Int}} + \text{Annual Load}_{\mathrm{Int}}}$$

Where:

- Annual $\mathrm{Gen_{BA}}$ is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
- Annual $\mathrm{Load_{BA}}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
- Annual $\mathrm{Gen_{Int}}$ is the sum of all Annual $\mathrm{Gen_{BA}}$ values reported in that interconnection.
- Annual $\mathrm{Load_{Int}}$ is the sum of all Annual $\mathrm{Load_{BA}}$ values reported in that interconnection.

Balancing Authorities that are not FERC jurisdictional should use the Form 714 Instructions to assemble and submit equivalent data. Until the BAL-003-1 process outlined in Attachment 1 is implemented, Balancing Authorities can approximate their FRO by multiplying their Interconnection's FRO by their share of Interconnection Bias. The data used for this calculation should be for the most recently filed Form 714. As an example, a report to NERC in January 2013 would use the Form 714 data filed in 2012, which utilized data from 2011.

Balancing Authorities that merge or that transfer load or generation need to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation for the Interconnection remains the same and so that CPS limits can be adjusted.

Attachment A proposes the following Interconnection event criteria as a basis to determine an Interconnection's Frequency Response Obligation:

- Largest category C loss-of-resource (N-2) event.
- Largest total generating plant with common voltage switchyard.
- Largest loss of generation in the interconnection in the last 10 years.

With regard to the second objective above (determining Frequency Bias Settings and CPS limits), Balancing Authorities have been asked to perform annual reviews of their Frequency Bias Settings by measuring their Frequency Response, dating back to Policy 1. This obligation was carried forward into BAL-003-01.b. While the associated training document provided useful information, it left many of the details to the judgment of the person doing the analysis. The FRS Form 1 and FRS Form 2 provide a consistent, objective process for calculating Frequency Response to develop an annual measure, the FRM.

The FRM will be computed from Single Event Frequency Response Data (SEFRD), defined as: "the data from an individual event from a Balancing Authority that is used to calculate its Frequency Response, expressed in MW/0.1Hz". The SEFRD for a typical Balancing Authority in an Interconnection with more than one Balancing Authority is basically the change of its net actual interchange on its tie lines with its adjacent Balancing Authorities divided by the change in interconnection frequency. (Some Balancing Authorities may choose to apply corrections to their net actual interchange values to account for factors such as nonconforming loads. FRS Form 1 shows the types of adjustments that are allowed.)

A standardized sampling interval of approximately 20 to 52 seconds will be used in the computation of SEFRD values. Microsoft Excel® spreadsheet interfaces for EMS scan rates of 2 through 6 seconds are provided to support the computation.

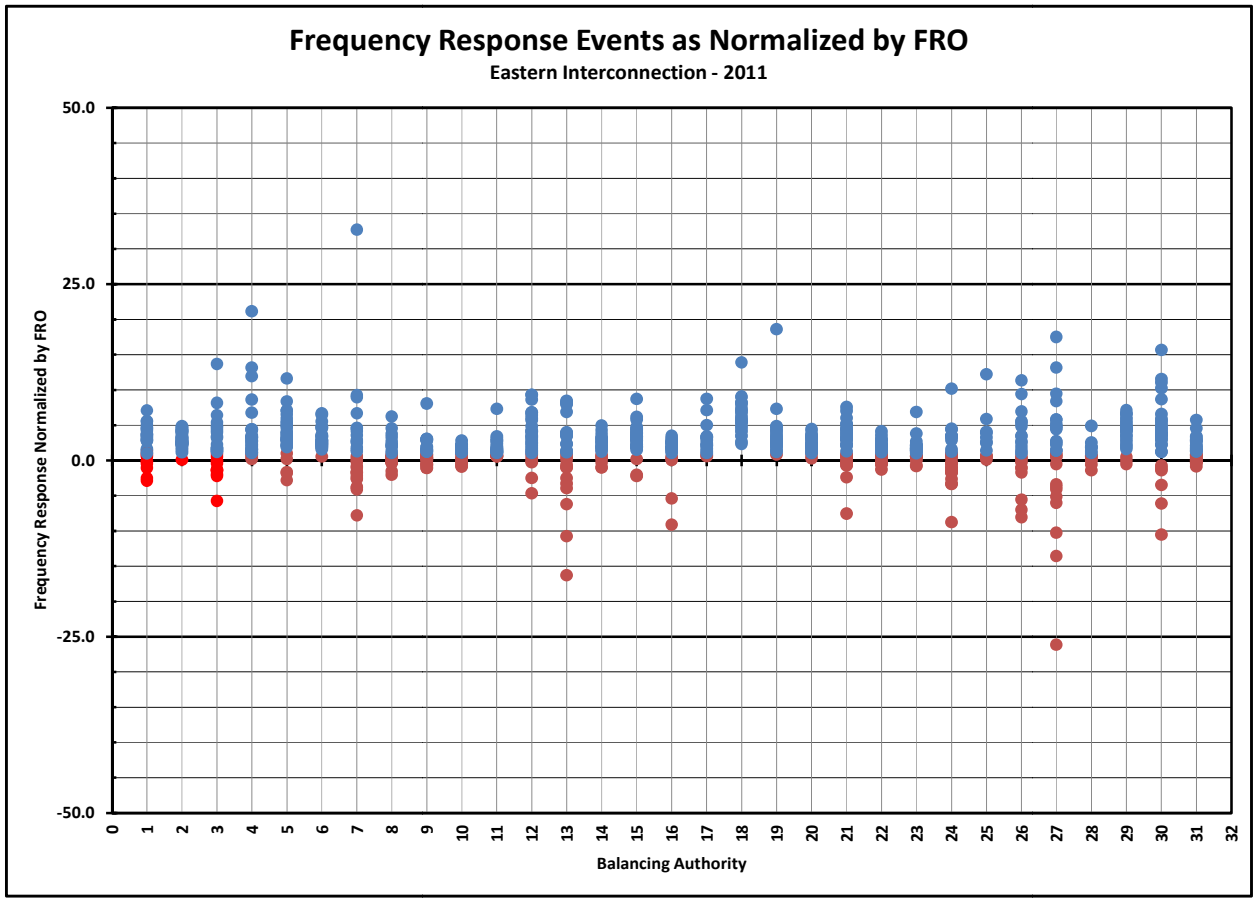
Single Event Frequency Response Data[8]

The use of a "single event measure" was considered early in the development of the FRS for compliance because a single event measure could be enforced for each event on the interconnection making compliance enforcement a simpler process. The variability of the measurement of Frequency Response for an individual BA for an individual Disturbance event was evaluated to determine its suitability for use as a compliance measure. The individual Disturbance events were normalized and plotted for each BA on the Eastern and Western Interconnections. This data was plotted with a dot representing each event. Events with a measured Frequency Response above the FRO were shown as blue dots and events with a measured Frequency Response below the FRO were shown as red dots. In order to show the full variability of the results the plots have been provided with two scales, a large scale to show all of the events and small scale to show the events closer to the FRO or a value of 1.0. This data is presented on four charts titled Frequency Response Events as Normalized by FRO.

Analysis of this data indicates a single event based compliance measure is unsuitable for compliance evaluation when the data has the large degree of variability shown in these charts. Based on the field trial data provided, only 3 out of 19 BAs on the Western Interconnection would be compliant for all events with a standard based on a single event measure. Only 1 out of 31 BAs on the Eastern Interconnection would be compliant for all events with a standard based on a single event measure. The general consensus of the industry is that there is not a reliability issue with insufficient Frequency Response on any of the North American Interconnections at this time. Therefore, it is unreasonable to even consider a standard that would indicate over 90% of the BAs in North American to be non-compliant with respect to maintaining sufficient Frequency Response to maintain adequate reliability.

In an attempt to balance the workload of Balancing Authorities with the need for accuracy in the FRM, the standard will require at least 20 samples selected during the course of the year to compute the FRM. Research conducted by the FRSDT indicated that a Balancing Authority's FRM will converge to a reasonably stable value with at least 20 samples.

[8] Single Event Analysis based on results of Frequency Response Standard Field Trial Analysis, September 17, 2012.


Frequency Response Events as Normalized by FRO
Eastern Interconnection - 2011
Frequency Response Normalized by FRO
50.0
25.0
0.0
-25.0
-50.0
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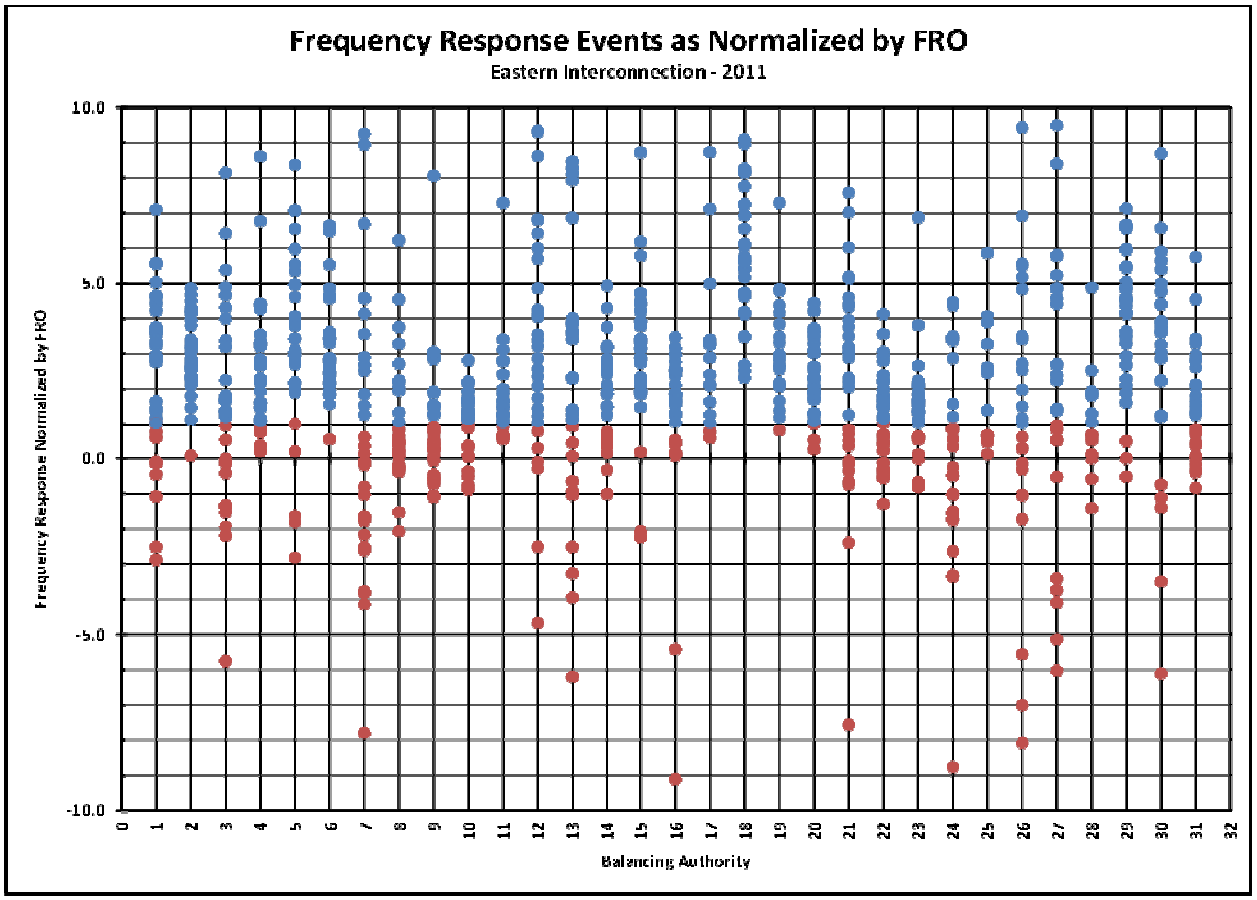
Balancing Authority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Eastern Interconnection - 2011
Frequency Response Normalized by FRO
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0.0
-5.0
-10.0
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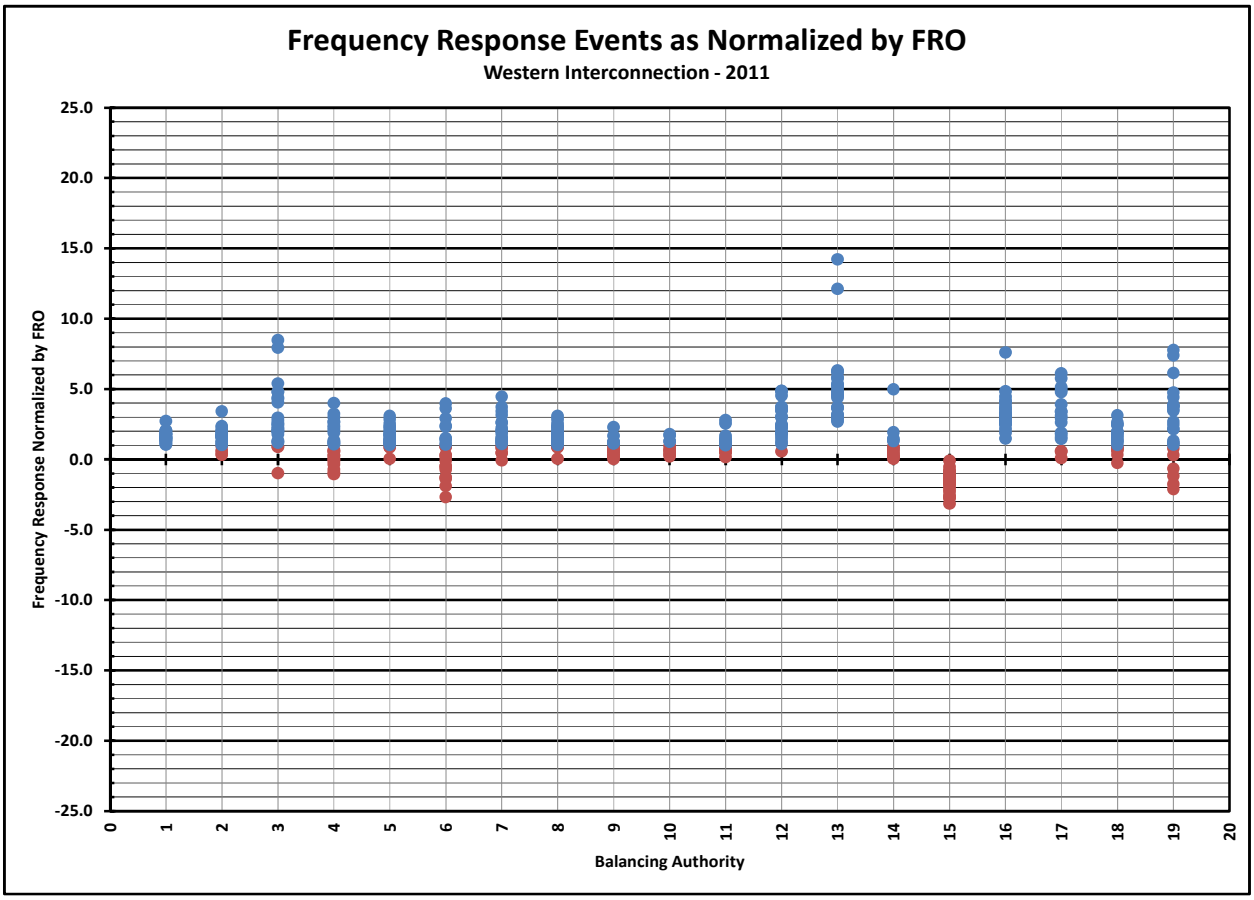
Balancing Authority


Frequency Response Events as Normalized by FRO
Western Interconnection - 2011
Frequency Response Normalized by FRO
25.0
20.0
15.0
10.0
5.0
0.0
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-10.0
-15.0
-20.0
-25.0
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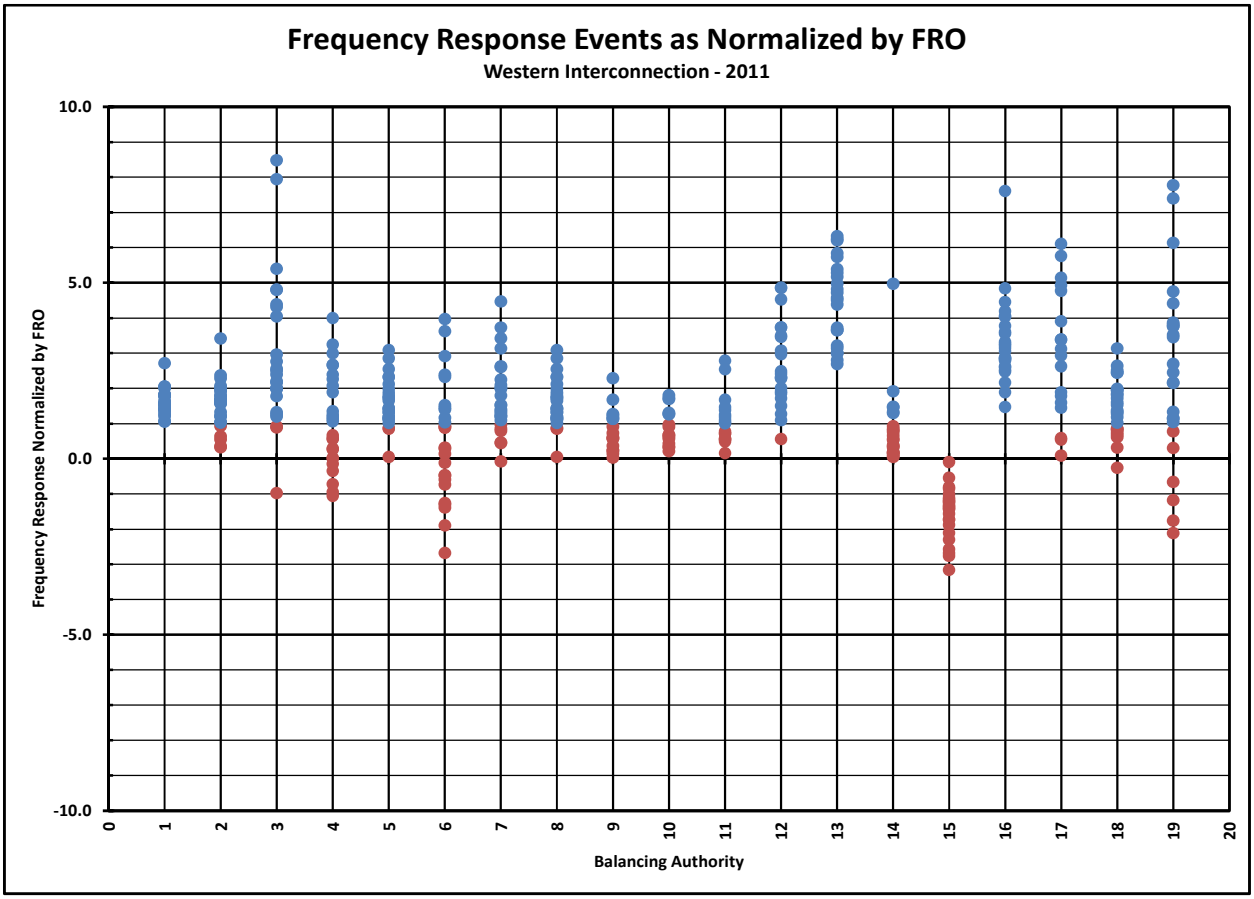
Balancing Authority


Frequency Response Events as Normalized by FRO
Western Interconnection - 2011
Frequency Response Normalized by FRO
10.0
5.0
0.0
-5.0
-10.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Balancing Authority

Sample Size
In order to support field trial evaluations of sample size, sampling intervals, and aggregation techniques, the FRSDT will be retrieving scan rate data from the Balancing Authorities for each SEFRD. Additional frequency events may also be requested for research purposes, though they will not be included in the FRM computation.

FERC Order No. 693 directed the ERO (at P 375) to define the number of Frequency Response surveys that were conducted each year and to define a necessary amount of Frequency Response. R1 addresses both of these directives:

- There is a single annual survey of at least 20 events each year.
- The FRM calculated on FRS Form 1 is compared by the ERO against the FRO determined 12 months earlier (when the last FRS Form 1 was submitted) to verify the Balancing Authority provided its share of Interconnection Frequency Response.

Median as the Standard's Measure of Balancing Authority Performance
The FRSDT evaluated different approaches for "averaging" individual event observations to compute a technically sound estimate of Frequency Response Measure. The MW contribution for a single BA in a multi-BA Interconnection is small compared to the minute to minute changes in load, interchange and generation. For example, a 3000 MW BA in the Eastern Interconnection may only be called on to contribute 10MW for the loss of a 1000MW. The 10 MW of governor and load response may easily be masked as a coincident change in load.

In general, statisticians use the median as the best measure of central tendency when a population has outliers. Two independent reviews by the FRSDT has shown the Median to be less influenced by noise in the measurement process and the team has chosen the median as the initial metric for calculating the BAs' Frequency Response Measure.

The FRSDT performed extensive empirical studies and engaged in lively discussions in an attempt to determine the best aggregation technique for a sample set size of at least 20 events. Mean, median, and linear regression techniques were used on a trial basis with the data that was available during the early phases of the effort.

A key characteristic of the "aggregation challenge" is related to the use of actual net interchange data for measuring frequency response. The tie line flow measurements are varying continuously due to other operational phenomena occurring concurrently with the provision of frequency response. (*See* Appendix 1 for details.) All samples have "noise" in them, as most operational personnel who have computed the frequency response of their BA can attest. What has also become apparent to the FRSDT is that while the majority of the frequency response samples have similar levels of noise in them, a few of the samples may have much larger errors in them than the others that result in unrepresentative results. And with the sample set size of interest, it is common to have unrepresentative errors in these few samples to be very large and asymmetric. For example, one BA's subject matter expert observed recently that 4 out of 31 samples had a much larger error contribution than the other 27 samples, and that 3 out of 4 of the very high error samples grossly underestimated the frequency response. The median value demonstrated greater resiliency to this data quality problem than the mean with this data set. (The median has also demonstrated superiority to

linear regression in the presence of these described data quality problems in other analyses conducted by the FRSDT, but the linear regression showed better performance than the mean.)

The above can be demonstrated with a relatively simple example. Let's assume that a Balancing Authority's true frequency response has an average value of -200 MW/ .1 Hz. Let's also assume that this Balancing Authority installed "special" perfect metering on key loads and generators, so that we could know the true frequency response of each sample. And then we will compare them with that measured by typical tie line flow metering, with the kind of noise and error that occurs commonly and "not so commonly". Let's start with the following 4 samples having a common level of noise, with MW/ .1 Hz as the unit of measurement.

Perfect measurement	Noise	Samples from tie lines
-190	-30	-220
-210	-20	-230
-220	10	-210
-180	20	-160
-200	Mean	-205
-200	Median	-215

Now let's add a fifth sample, which is highly contaminated with noise and error that grossly underestimates frequency response.

Perfect measurement	Noise	Samples from tie lines
-190	-30	-220
-210	-20	-230
-220	10	-210
-180	20	-160
-200	250	+50
-200	Mean	-154
-200	Median	-210

It is clear from the above simplistic example that the mean drops by about 25% while the median is affected minimally by the single highly contaminated value.

Based on the analyses performed thus far, the FRSDT believes that the median's superior resiliency to this type of data quality problem makes it the best aggregation technique at this time. However, the FRSDT sees merit and promise in future research with sample filtering combined with a technique such as linear regression.

When compared with the mean, linear regression shows superior performance with respect to the elimination of noise because the measured data is weighted by the size of the frequency change associated with the event. Since the noise is independent from frequency change, the greater weighting on larger events provides a superior technique for reducing the effect of noise on the results.

However, linear regression does not provide a better method when dealing with a few samples with large magnitudes of noise and unrepresentative error. There are only two alternatives to improve over the use of median when dealing with these larger unrepresentative errors:

1. Increase the sample size, or
2. Actively eliminate outliers due to unrepresentative error.

Unfortunately, the first alternative, increasing the sample size is not available because significantly more sample events are not available within the measurement time period of one year. Linear regression techniques are being investigated that have an active outlier elimination algorithm that would eliminate data that lie outside ranges of the 96th percentile and 99th percentile, for example.

Still, the use of linear regression has value in the context of this standard. The NERC Resources Subcommittee will use linear regression to evaluate Interconnection frequency response, particularly to evaluate trends, seasonal impacts, time of day influences, etc. The Good Practices and Tools section of this document outlines how a BA can use linear regression to develop a predictive tool for its operators.

Additional discussion on this topic is contained in "Appendix 1 – Data Quality Concerns Related to the Use of Actual Net Interchange Value" of this document.

The NERC Frequency Response Initiative Report addressed the relative merits of using the median versus linear regression for aggregating single event frequency response samples into a frequency response measurement score for compliance evaluation. This report provided 11 evaluation criteria as a basis for recommending the use of linear regression instead of the median for the frequency response measurement aggregation technique. The FRSDT made its own assessment on the basis of these evaluation criteria on September 20, 2012, but concluded that the median would be the best aggregation technique to use initially when the relative importance of each criterion was considered. A brief summary of the FRSDT majority consensus on the basis of each evaluation criterion is provided below.

- Provides two dimensional measurement – The FRSDT agrees that the two dimensional concept is a useful way to perceive frequency response characteristics, and that it may be useful for potential future modeling activities. Better data quality would increase support for such future efforts, and the use of the median for initial compliance evaluations within BAL-003-1 should not hinder any such effort. The FRSDT perceived this as a mild advantage for linear regression.
- Represents nonlinear characteristics – With considerations similar to those applied to the previous criterion, the FRSDT perceived this as a mild advantage for linear regression.
- Provides a single best estimator – The FRSDT gave minimal importance to the characteristic of the median averaging the middle values when used with an even number of samples.
- Is part of a linear system - With considerations similar to those applied to the first two criteria, the FRSDT perceived this as a mild advantage for linear regression (particularly in the modeling area.)
- Represents bimodal distributions – The FRSDT gave minimal weight of this criterion, as a change in Balancing Authority footprint does not seem to be addressed adequately by any aggregation technique.
- Quality statistics available – The FRSDT perceived this as a mild advantage for linear regression in that the statistics would be coupled directly to the compliance evaluation. The FRSDT also included this criterion as part of the modeling advantages cited above.

The FRSDT supports collecting data and performing quality statistical analysis. If it is determined that the use of the median, as opposed to a mean or linear regression aggregation, is yielding undesirable consequences, the FRSDT recommends that other aggregation techniques be re-evaluated at that time.

- Reducing influence of noise - This is the dominant concern of the FRSDT, and it perceives the median to have a major advantage over linear regression in addressing noise in the change in actual net interchange calculation. The FRSDT bases this judgment on: prior FRSDT studies that have shown that the median produces more stable results; the data used in the NERC Frequency Response Initiative document exhibits large quantities of noise; prior efforts of FRSDT members in performing frequency response sampling for their own Balancing Authorities over many years; and similar observations of noise in the CERTS frequency Monitoring Application. The FRSDT has serious concerns that the influence of noise has a greater tendency to yield a "false positive" compliance violation with linear regression than with the median. Also, limited studies performed by the FRSDT indicates the possibility that the resultant frequency response measure would yield more measurement variation across years with linear regression versus the median while the actual Balancing Authority performance remains unchanged.
- Reducing the influence of outliers – This is related to the previous criterion. The FRSDT recognizes four main sources of noise: concurrent operating phenomena (described elsewhere in this document), transient tie line flows for nearby contingencies, data acquisition time skew in tie line data measurements, and time skew and data compression issues in archiving techniques and tools such as PI. Some outliers may be caused in part by true variation in the actual frequency response, and it is desirable to include those in the frequency response measure. The FRSDT supports efforts in the near future to distinguish between outliers caused by noise versus true frequency response, and progress in this area may make it feasible and desirable to replace the median with linear regression, or some other validated technique. The FRSDT does note that this is a substantial undertaking, and it would require substantial input from a sufficient number of experts to help distinguish noise from true frequency response.
- Easy to calculate – The FRSDT perceives this to be a minor to moderate advantage for the median. However, more complex (but reasonably so) techniques would receive more support if clear progress can be made in noise elimination.
- Familiar indicator – The FRSDT perceives this to be a minor to moderate advantage for the median. However, more complex (but reasonably so) techniques would receive more support if clear progress can be made as a result of noise elimination.
- Currently used as a measure in BAL-003 – The present standard refers to an average and does not provide specific guidance on the computation of that average, but the FRSDT puts minimal weight on this evaluation criterion.

In summary, the FRSDT perceives an approximate balance between the modeling advantage for linear regression and the simplicity advantage of the median. However, the clear determinant in endorsing the use of the median is the data quality issue related to concurrent operational phenomena, transient tie line flows, and data acquisition and archiving limitations.

FERC Order No. 693 also directed the Standard (at P 375) to identify methods for Balancing Authorities to obtain Frequency Response. Requirement R1 allows Balancing Authorities to participate in Frequency Response Sharing Groups (FRSGs) to provide or obtain Frequency Response. These may be the same FRSGs that cooperate for BAL-002-0 or may be FRSGs that form for the purposes of BAL-003-1.

If BAs participate as an FRSG for BAL-003-1, compliance is based on the sum of the participants' performance.

Two other ways that BAs could obtain Frequency Response are through Supplemental Service or Overlap Regulation Service:

- No special action is needed if a BA provides or receives supplemental regulation. If the regulation occurs via Pseudo Tie, the transfer occurs automatically as part of Net Actual Interchange (NIA) and in response to information transferred from recipient to provider.
- If a BA provides overlap regulation, its FRS Form 1 will include the Frequency Bias setting as well as peak load and generation of the combined Balancing Authority Areas. The FRM event data will be calculated on the sum of the provider's and recipient's performance.

In the Violation Severity Levels for Requirement R1, the impact of a BA not having enough frequency response depends on two factors:

- Does the Interconnection have sufficient response?
- How short is the BA in providing its FRO?

The VSL takes these factors into account. While the VSLs look different than some other standards, an explanation would be helpful.

VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plane as single-BA Interconnections.

Consider a small BA whose performance is 70% of its FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response, because this would treat multi-BA Interconnections more harshly than single BA Interconnections on a significant scale.

The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively.

Requirement 2

R2. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined in accordance with Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO.

Background and Rationale

Attachment A of the Standard discusses the process the ERO will follow to validate the BA's FRS Form 1 data and publish the official Frequency Bias Settings. Historically, it has taken multiple rounds of validation and outreach to confirm each BA's data due to transcription errors, misunderstanding of instructions, and other issues. While BAs historically submit Bias Setting data by January 1, it often takes one or more months to complete the process.

The target is to have BAs submit their data by January 10. The BAs are given 30 days to assemble their data since the BAs are dependent on the ERO to provide them with FRS Form 1, and there may be process delays in distributing the forms since they rely on identification of frequency events through November 30 of the preceding year.

Frequency Bias Settings generally change little from year to year. Given the fact that BAs can encounter staffing or EMS change issues coincident with the date the ERO sets for new Frequency Bias Setting implementation, the standard provides a 24 hour window on each side of the target date.

To recap the annual process:

1. The ERO posts the official list of frequency events to be used for this Standard in early December. The FRS Form 1 for each Interconnection will be posted shortly thereafter.

2. The Balancing Authority submits its revised annual Frequency Bias Setting value to NERC by January 10.

3. The ERO and the Resources Subcommittee validate Frequency Bias Setting values, perform error checking, and calculate, validate, and update CPS2 L10 values. This data collection and validation process can take as long as two months.

4. Once the L10 and Frequency Bias Setting values are validated, The ERO posts the values for the upcoming year and also informs the Balancing Authorities of the date on which to implement revised Frequency Bias Setting values. Implementation typically would be on or about March 1st of each year.

BAL-003-0.1b standard requires a minimum Frequency Bias Setting equal in absolute value to one percent of the Balancing Authority's estimated yearly peak demand (or maximum generation level if native load is not served). For most Balancing Authorities this calculated amount of Frequency Bias is significantly greater in absolute value than their actual Frequency Response characteristic (which represents an over-bias condition) resulting in over-control

since a larger magnitude response is realized. This is especially true in the Eastern Interconnection where this condition requires excessive secondary frequency control response which degrades overall system performance and increases operating cost as compared to requiring an appropriate balance of primary and secondary frequency control response.

Balancing Authorities were given a minimum Frequency Bias Setting obligation because there had never been a mandatory Frequency Response Obligation. This historic "one percent of peak per 0.1Hz" obligation, dating back to NERC's predecessor, NAPSIC, was intended to ensure all BAs provide some support to Interconnection frequency.

The ideal system control state exists when the Frequency Bias Setting of the Balancing Authority exactly matches the actual Frequency Response characteristic of the Balancing Authority. If this is not achievable, over-bias is significantly better from a control perspective than under-bias with the caveat that Frequency Bias is set relatively close in magnitude to the Balancing Authority actual Frequency Response characteristic. Setting the Frequency Bias to better approximate the Balancing Authority natural Frequency Response characteristic will improve the quality and accuracy of ACE control, CPS & DCS and general AGC System control response. This is the technical basis for recommending an adjustment to the long standing "1% of peak/0.1Hz" Frequency Bias Setting. The Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard is intended to bring the Balancing Authorities' Frequency Bias Setting closer to their natural Frequency Response. Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard balances the following objectives:

- Bring the Frequency Bias Setting and Frequency Response closer together.
- Allow time to analyze impact on other Standards (CPS, BAAL and to a lesser extent DCS) by adjustments in the minimum Frequency Bias Setting, by accommodating only minor adjustments.
- Do not allow the Frequency Bias Setting minimum to drop below natural Frequency Response, because under-biasing could affect an Interconnection adversely.

Additional flexibility has been added to the Frequency Bias Setting based on the actual Frequency Response (FRM) by allowing the Frequency Bias Setting to have a value in the range from 100% of FRM to 125% of FRM. This change has been included for the following reasons:

- When the new standardized measurement method is applied to BAs with a Frequency Response close to the interconnection minimum response, the requirement to use FRM is as likely to result in a Frequency Bias Setting below the actual response as it is to result in a response above the actual response. From a reliability perspective, it is

always better to have a Frequency Bias Setting slightly above the actual Frequency Response.

- As with single BA interconnections, the tuning of the control system may require that the BA implement a Frequency Response Setting slightly greater in absolute terms than its actual Frequency Response to get the best performance.

- The new standardized measurement method for determining FRM in some cases results in a measured Frequency Response significantly lower than the previous methods used by some BAs. It is desirable to not require significant change in the Frequency Bias Setting for these BAs that experience a reduction in their measured Frequency Response.

Requirement 3

R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is:

- *Less than zero at all times, and*
- *Equal to or more negative than its Frequency Response Obligation when the Frequency varies from 60 Hz by more that +/- 0.036 Hz.*

Background and Rationale

In multi-Balancing Authority interconnections, the Frequency Bias Setting should be coordinated among all BAs on the interconnection. When there is a minimum Frequency Bias Setting requirement, it should apply for all BAs. However, BAs using a variable Frequency Bias Setting may have non-linearity in their actual response for a number of reasons including the dead-bands implemented on their generator governors. The measurement to ensure that these BAs are conforming to the interconnection minimum is adjusted to remove the dead-band range from the calculated average Frequency Bias Setting actually used. For BAs using variable bias, FRS Form 1 has a data entry location for the previous year's average monthly Bias. The Balancing Authority and the ERO can compare this value to the previous year's Frequency Bias Setting minimum to ensure R3 has been met.

On single BA interconnections, there is no need to coordinate the Frequency Bias Setting with other BAs. This eliminates the need to maintain a minimum Frequency Bias Setting for any reason other than meeting the reliability requirement as specified by the Frequency Response Obligation.

Requirement 4

R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either:

- *The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or*
- *The Frequency Bias Setting as shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.*

Background and Rationale

This requirement reflects the operating principles first established by NERC Policy 1 and is similar to Requirement R6 of the approved BAL-003-0.1b standard. Overlap Regulation Service is a method of providing regulation service in which the Balancing Authority providing the regulation service incorporates another Balancing Authority's actual interchange, frequency response, and schedules into the providing Balancing Authority's AGC/ACE equation.

As noted earlier, a BA that is providing Overlap Regulation will report the sum of the Bias Settings in its FRS Form 1. Balancing Authorities receiving Overlap Regulation Service have an ACE and Frequency Bias Setting equal to zero (0).

How this Standard Meets the FERC Order 693 Directives

FERC Directive

The following is the relevant paragraph of Order No. 693.

> *Accordingly, the Commission approves Reliability Standard BAL-003-0 as mandatory and enforceable. In addition, the Commission directs the ERO to develop a modification to BAL-003-0 through the Reliability Standards development process that: (1) includes Levels of Non-Compliance; (2) determines the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other requirements of the Reliability Standard are being met, and to modify Measure M1 based on that determination and (3) defines the necessary amount of Frequency Response needed for Reliable Operation for each balancing authority with methods of obtaining and measuring that the frequency response is achieved.*

1. Levels of Non-Compliance

VRFs and VSLs are an equally effective way of assigning compliance elements to the standard.

2. Determine the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other Requirements of the Reliability Standard are met

BAL-003 V0 R2 (the basis of Order No. 693) deals with the calculation of Frequency Bias Setting such that it reflects natural Frequency Response.

The drafting team has determined that a sample size on the order of at least 20 events is necessary to have a high confidence in the estimate of a BA's Frequency Response. Selection of the frequency excursion events used for analysis will be done via a method outlined in Attachment A to the Standard.

On average, these events will represent the largest 2-3 "clean" frequency excursions occurring each month.

Since Frequency Bias Setting is an annual obligation, the survey of the at least 20 frequency excursion events will occur once each year.

3. Define the necessary amount of Frequency Response needed for Reliable Operation for each Balancing Authority with methods of obtaining and measuring that the frequency response is achieved

Necessary Amount of Frequency Response

The drafting team has proposed the following approach to defining the necessary amount of frequency response. In general, the goal is to avoid triggering the first step of under-frequency load shedding (UFLS) in the given Interconnection for reasonable contingencies expected. The

methodology for determining each Interconnection's and Balancing Authority's obligation is outlined in Attachment A to the Standard.

It should be noted the standard cannot guarantee there will never be a triggering of UFLS as the magnitude of "point C" differs throughout an interconnection during a disturbance and there are local areas that see much wider swings in frequency.

The contingency protection criterion is the largest reasonably expected contingency in the Interconnection. This can be based on the largest observed credible contingency in the previous 10 years or the largest Category C event for the Interconnection.

Attachment A to the standard presents the base obligation by Interconnection and adds a Reliability Margin. The Reliability Margin included addresses the difference between Points B and C and accounts for variables.

For multiple BA interconnections, the Frequency Response Obligation is allocated to BAs based on size. This allocation will be based on the following calculation:

$$\mathrm{FRO_{BA}} = \mathrm{FRO_{Int}} \times \frac{\text{Annual Gen}_{\mathrm{BA}} + \text{Annual Load}_{\mathrm{BA}}}{\text{Annual Gen}_{\mathrm{Int}} + \text{Annual Load}_{\mathrm{Int}}}$$

Methods of Obtaining Frequency Response

The drafting team believes the following are valid methods of obtaining Frequency Response:

- Regulation services.
- Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration.
- Through a tariff (e.g. Frequency Response and regulation service).
- From generators through an interconnection agreement.
- Contract with an internal resource or loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response).

Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation.

Measuring that the Frequency Response is Achieved

FRS Form 1 and the underlying data retained by the BA will be used for measuring whether Frequency Response was provided. FRS Form 1 will provide the guidance on how to account for and measure Frequency Response.

Going Beyond the Directive

Based on the combined operating experience of the SDT, the drafting team consensus is that each Interconnection has sufficient Frequency Response. If margins decline, there may be a need for additional standards or tools. The drafting team and the Resources Subcommittee are working with the ERO on its Frequency Response Initiative to develop processes and good practices so the Interconnections are prepared. These good practices and tools are described in the following section.

The drafting team is also evaluating a risk-based approach for basing the Interconnection Frequency Response Obligation on an historic probability density of frequency error, and for allocating the obligation on the basis of the Balancing Authority's average annual ACE share of frequency error. This allocation method uses the inverse of the rationale for allocating the CPS1 epsilon requirement by Bias share.

Good Practices and Tools

Background

This section outlines tips and tools to help Balancing authorities meet the Frequency Response Standard or to operate more reliably. If you have suggested additions, please send them to balancing@nerc.com.

Identifying and Estimating Frequency Responsive Reserves

Knowing the quantity and depth of frequency responsive reserves in real time is a possible next step to being better prepared for the next event. The challenge in achieving this is having the knowledge of the capabilities of all sources of frequency response. Presently the primary source of Frequency Response remains with the generation resources in our fleets.

Understanding how each of these sources performs to changes in system frequency and knowing their limitations would improve the BA's ability to measure frequency responsive reserves. Presently there are only guidelines, criteria and protocols in some regions of the industry that identify specific settings and performance expectations of Primary Frequency Response of resources.

One method of gaining a better understanding of performance is to measure performance during actual events that occur on the system. Measuring performance during actual events would only provide feedback for performance during that specific event and would not provide insight into depth of response or other limitations.

Repeated measurements will increase confidence in expected performance. NERC modeling standards are in process to be revised that will improve the BA's insight into predicting available frequency responsive reserves. However, knowing how resources are operated, what modes of operation provide sustained Primary Frequency Response and knowing the operating range of this response would give the BA the knowledge to accurately predict frequency response and the amount of frequency responsive reserves available in real time.

Some benefits have been realized by communicating to generation resources (GO) the importance of operating in modes that allow Primary Frequency Response to be sustained by the control systems of the resource. Other improvements in implementation of Primary Frequency Response have been achieved through improved settings on turbine governors through the elimination of "step" frequency response with the simultaneous reduction in governor dead-band settings.

Improvements in the full AGC control loop of the generating resource, which accounts for the expected Primary Frequency Response, have improved the delivery of quality Primary Frequency Response while minimizing secondary control actions of generators. Some of these actions can provide quick improvement in delivery of Primary Frequency Response.

Once Primary Frequency Response sources are known, the BA could calculate available reserves that are frequency responsive. Planning for these reserves during normal and emergency operations could be developed and added to the normal planning process.

Using FRS Form 1 Data

The information collected for this standard can be supplemented by a few data points to provide the Balancing Authority useful tools and information. The BA could do a regression analysis of its frequency response against the following values:

- Load (value A).
- Interchange (Value A).
- Total generation.
- Spinning reserve.

While the last two values above are not part of Form 1, they should be readily available. Small BAs might even include headroom on its larger generators as part of the regression.

The regression would provide a formula the BA could program in its EMS to present the operator a real time estimate of the BA's Frequency Response.

Statistical outliers in the regression would point to cases meriting further inspection to find causes of low Frequency Response or opportunities for improvement.

Tools

Single generating resource performance evaluation tools for steam turbine, combustion turbine (simple cycle or combined cycle) and for intermittent resources are available at the following link. http://texasre.org/standards_rules/standardsdev/rsc/sar003/Pages/Default.aspx.

These tools and the regional standard associated with them are in their final stages of development in the Texas region.

These tools will be posted on the NERC website.

References

NERC *Frequency Response Characteristic Survey Training Document* (Found in the NERC Operating Manual)

NERC Resources Subcommittee Position Paper on Frequency Response

NERC TIS Report *Interconnection Criteria for Frequency Response Requirements (for the Determination Interconnection Frequency Response Obligations (IFRO)*

Frequency Response Standard Field Trial Analysis, September 17, 2012

Appendix 1 - Data Quality Concerns Related To The Use Of The Actual Net Interchange Value

Actual net interchange for a typical Balancing Authority (BA) is the summation of its tie lines to other BAs. In some cases, there are pseudo-ties in it which reflect the effective removal or addition of load and/or generation from another BA, or it could include supplemental regulation as well. But in the typical scenario, actual net interchange values that are extracted from EMS data archiving can be influenced by data latency times in the data acquisition process, and also any timestamp skewing in the archival process.

Of greater concern, however, are the inevitable variations of other operating phenomena occurring concurrently with a frequency event. The impacts of these phenomena are superimposed on actual net interchange values along with the frequency response that we wish to measure through the use of the actual net interchange value.

To explore this issue further, let's begin with the idealized condition:

- frequency is fairly stable at some value near or a little below 60 Hz
- ACE of the non-contingent BA of interest is 0 and has been 0 for an extended period, and AGC control signals have not been issued recently
- Actual net interchange is "on schedule", and there are no schedule changes in the immediate future
- BA load is flat
- All generators not providing AGC are at their targets
- Variable generation such as wind and solar are not varying
- Operators have not directed any manual movements of generation recently

And when the contingency occurs in this idealized state, the change in actual net interchange will be measuring only the decline in load due to lesser frequency and generator governor response, and, none of the contaminating influences. While the ACE may become negative due to the actual frequency response being less than that called for by the frequency bias setting within the BA's AGC system, this contaminating influence on measuring frequency response will not appear in the actual net interchange value if the measurement interval ends before the generation on AGC responds.

Now let's explore the sensitivity of the resultant frequency response sampling to the relaxation of these idealized circumstances.

1. The "60 Hz load" increases moderately due to time of day concurrent with the frequency event. If the frequency event happens before AGC or operator-directed manual load adjustments occur, then the actual net interchange will be reduced by the moderate increase in load and the frequency response will be underestimated. But if the frequency event happens while AGC response and/or manual adjustments occur, then the actual net interchange will be increased by the AGC response (and/or manual adjustments) and the frequency response will be overestimated.

2. The “60 Hz load” decreases moderately due to time of day concurrent with the frequency event. If the frequency event happens before AGC or operator-directed manual load adjustments occur, then the actual net interchange will be increased by the moderate reduction in load and the frequency response will be overestimated. But if the frequency event happens while AGC response and/or manual adjustments occur, then the actual net interchange will be decreased by the AGC response (and/or manual adjustments) and the frequency response will be underestimated.
3. In anticipation of increasing load during the next hour, the operator increases manual generation before the load actually appears. If the frequency event happens while the generation “leading” the load is increasing, then the actual net interchange will be increased by the increase in manual generation and the frequency response will be overestimated. But if the frequency event occurs when the result of AGC signals sent to offset the operator’s leading actions take effect, then the actual net interchange will be decreased and the frequency response is underestimated.
4. In anticipation of decreasing load during the next hour, the operator decreases manual generation before the load actually declines. If the frequency event happens while the generation “leading” the load downward is decreasing, then the actual net interchange will be decreased by the reduction in manual generation and the frequency response will be underestimated. But if the frequency event occurs when the result of AGC signals sent to offset the operator’s leading actions take effect, then the actual net interchange will be increased and the frequency response is overestimated.
5. A schedule change to export more energy is made at 5 minutes before the top of the hour. The BA’s “60 Hz load” is not changing. The schedule change is small enough that the operator is relying on upward movement of generators on AGC to provide the additional energy to be exported. The time at which the AGC generators actually begin to provide the additional energy is dependent on how much time passes before the AGC algorithm gets out of its deadbands, the individual generator control errors get large enough for sending out the control signal, and maybe 20 seconds to 3 minutes for the response to be effected. The key point here is that it is not clear when the effects of a schedule change, as manifested in a change in generation and then ultimately a change in actual net interchange, will occur.
6. With the expected penetration of wind in the near future, unanticipated changes in their output will tend to affect actual net interchange and add noise to the frequency response observation process.

To a greater or lesser extent, 1 through 4 above are happening continuously for the most part with most BAs in the Eastern and Western Interconnections. The frequency response is buried within the typical hour to hour operational cacophony superimposed on actual net interchange values. The choice of metrics will be important to artfully extract frequency response from the noise and other unrepresentative error.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Frequency Response Standard Background Document

November, 2012

RELIABILITY | ACCOUNTABILITY




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Table of Contents

Introduction

This document provides background on the development, testing and implementation of BAL-003-1 - Frequency Response Standard (FRS).[1] The intent is to explain the rationale and considerations for the Requirements of this standard and their associated compliance information. The document also provides good practices and tips for Balancing Authorities ("BAs") with regard to Frequency Response.

In Order No. 693, the Federal Energy Regulatory Commission ("FERC" or the "Commission") directed additional changes to BAL-003.[2] This document explains how compliance with those directives are met by BAL-003-1.

The original Standards Authorization Request ("SAR"), finalized on June 30, 2007, assumed there was adequate Frequency Response in all the North American Interconnections. The goal of the SAR was to update the Standard to make the measurement process of frequency response more objective and to provide this objective data to Planners and Operators for improved modeling. The updated models will improve understanding of the trends in Frequency Response to determine if reliability limits are being approached. The Standard would also lay the process groundwork for a transition to a performance-based Standard if reliability limits are approached.

This document will be periodically updated by the FRS Drafting Team (FRSDT) until the Standard is approved. Once approved, this document will then be maintained and updated by the ERO and the NERC Resources Subcommittee to be used as a reference and training resource.

Background

This section discusses the different components of frequency control and the individual components of Primary Frequency Control also known as Frequency Response.

Frequency Control

Most system operators generally have a good understanding of frequency control and Bias Setting as outlined in the balancing standards and the references to them in the NERC Operating Manual. Frequency control can be divided into four overlapping windows of time as outlined below.

> **Primary Frequency Control (Frequency Response) –** Actions provided by the Interconnection to arrest and stabilize frequency in response to frequency deviations. Primary Control comes from automatic generator governor response (also known as speed

[1] Unless otherwise designated herein, all capitalized terms shall have the meaning set forth in the Glossary of Terms Used in NERC Reliability Standards, available here: http://www.nerc.com/files/Glossary_of_Terms.pdf.

[2] *Mandatory Reliability Standards for the Bulk-Power System*, Order No. 693, FERC Stats. & Regs. ¶ 31,242 at PP 368-375, *order on reh'g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007).

regulation), load response (typically from motors), and other devices that provide an immediate response based on local (device-level) control systems.

Secondary Frequency Control – Actions provided by an individual BA or its Reserve Sharing Group to correct the resource – load unbalance that created the original frequency deviation, which will restore both Scheduled Frequency and Primary Frequency Response. Secondary Control comes from either manual or automated dispatch from a centralized control system.

Tertiary Frequency Control – Actions provided by Balancing Authorities on a balanced basis that are coordinated so there is a net zero effect on Area Control Error (ACE). Examples of Tertiary Control include dispatching generation to serve native load; economic dispatch; dispatching generation to affect Interchange; and re-dispatching generation. Tertiary Control actions are intended to replace Secondary Control Response by reconfiguring reserves.

Time Control includes small offsets to scheduled frequency to keep long term average frequency at 60 Hz.

Primary Frequency Control – Frequency Response

Primary Frequency Control, also known generally as **Frequency Response**, is the first stage of overall frequency control and is the response of resources and load to a locally sensed change in frequency in order to arrest that change in frequency. Frequency Response is automatic, not driven by any centralized system, and begins within seconds rather than minutes. Different resources, loads, and systems provide Frequency Response with different response times, based on current system conditions such as total resource/load and their respective mix.

The proposed NERC Glossary of Terms defines **Frequency Response** as:

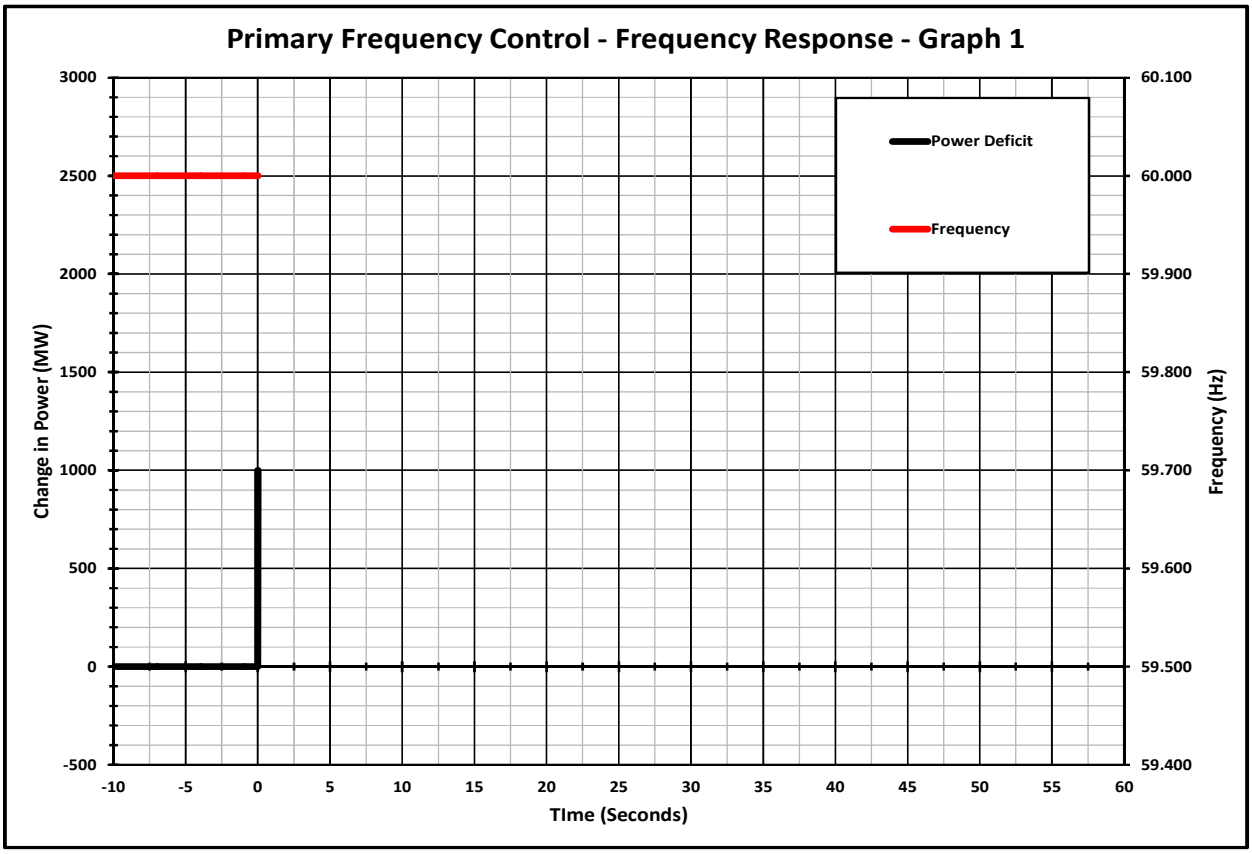
- (Equipment) The immediate and automatic reaction or response of power from a system or power from elements of the system to a change in locally sensed system frequency.
- (System) The sum of the change in demand, and the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 Hertz (MW/0.1 Hz).

As noted above, Frequency Response is the characteristic of load and generation within Balancing Authorities and Interconnections. It reacts or responds with changes in power to attempted changes in load-resource balance that result in changes to system frequency. Because the loss of a large generator is much more likely than a sudden loss of an equivalent amount of load, Frequency Response is typically discussed in the context of a loss of a large generator. Included within Frequency Response are many components of that response. Understanding Frequency Response and the FRS requires an understanding of each of these components and how they relate to each other.

Frequency Response Illustration

The following simple example is presented to illustrate the components of Frequency Response in graphical form. It includes a series of seven graphs that illustrate the various components of

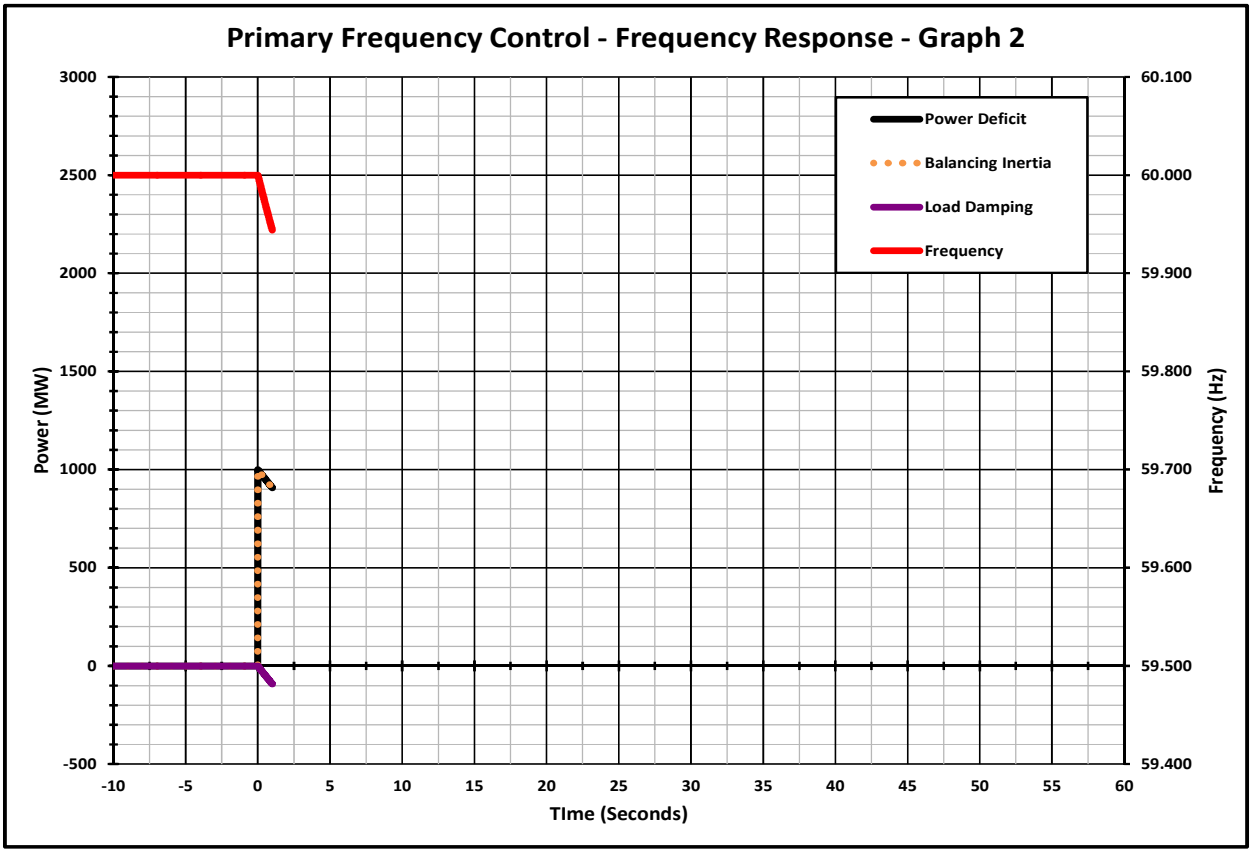
Frequency Response and a brief discussion of each describing how these components react to attempted changes in the load-resource balance and resulting changes in system frequency. The illustration is based on an assumed Disturbance event of the sudden loss of 1000 MW of generation. Although a large event is used to illustrate the response components, even small frequently occurring events will result in similar reactions or responses. The magnitude of the event only affects the shape of the curves on the graph; it does not obviate the need for Frequency Response.



The first graph, Primary Frequency Control – Frequency Response – Graph 1, presents a sudden loss of generation of 1000 MW. The components are presented relative to time as shown on the horizontal Time axis in seconds. This simplified example assumes a Disturbance event of the sudden loss of generation resulting from a breaker trip that instantaneously removes 1000 MW of generation from the interconnection. This sudden loss is illustrated by the power deficit line shown in black using the MW scale on the left. Interconnection frequency is illustrated by the frequency line shown in red using the Hertz scale on the right. Since the Scheduled Frequency is normally 60 Hz, it is assumed that this is the frequency when the Disturbance event occurs.

Even though the generation has tripped and power injected by the generator has been removed from the interconnection, the loads continue to use the same amount of power. The

"Law of Conservation of Energy"[3] requires that the 1000 MW must be supplied to the interconnection if energy balance is to be "conserved". This additional 1000 MW of power is produced by extracting kinetic energy that was stored in the rotating mass of all of the synchronized generators and motors on the interconnection – essentially using this equipment as a giant flywheel. The extracted energy supplies the "balancing inertia"[4] power required to maintain the power and energy balance on the interconnection. This balancing inertia power is produced by the generators' spinning inertial mass' resistance to the slowdown in speed of the rotating equipment on the interconnection that both provides the stored kinetic energy and reduces the frequency of the interconnection. This is illustrated in the second graph, Primary Frequency Control – Frequency Response – Graph 2, by the orange dots representing the balancing inertia power that exactly overlay and offset the power deficit.



As the frequency decreases, synchronized motors slow, as does the work they are providing, resulting in a decrease in load called "load damping." This load damping is the reason that the power deficit initially declines. Synchronously operated motors will contribute to load damping. Variable speed drives that are decoupled from the interconnection frequency do not

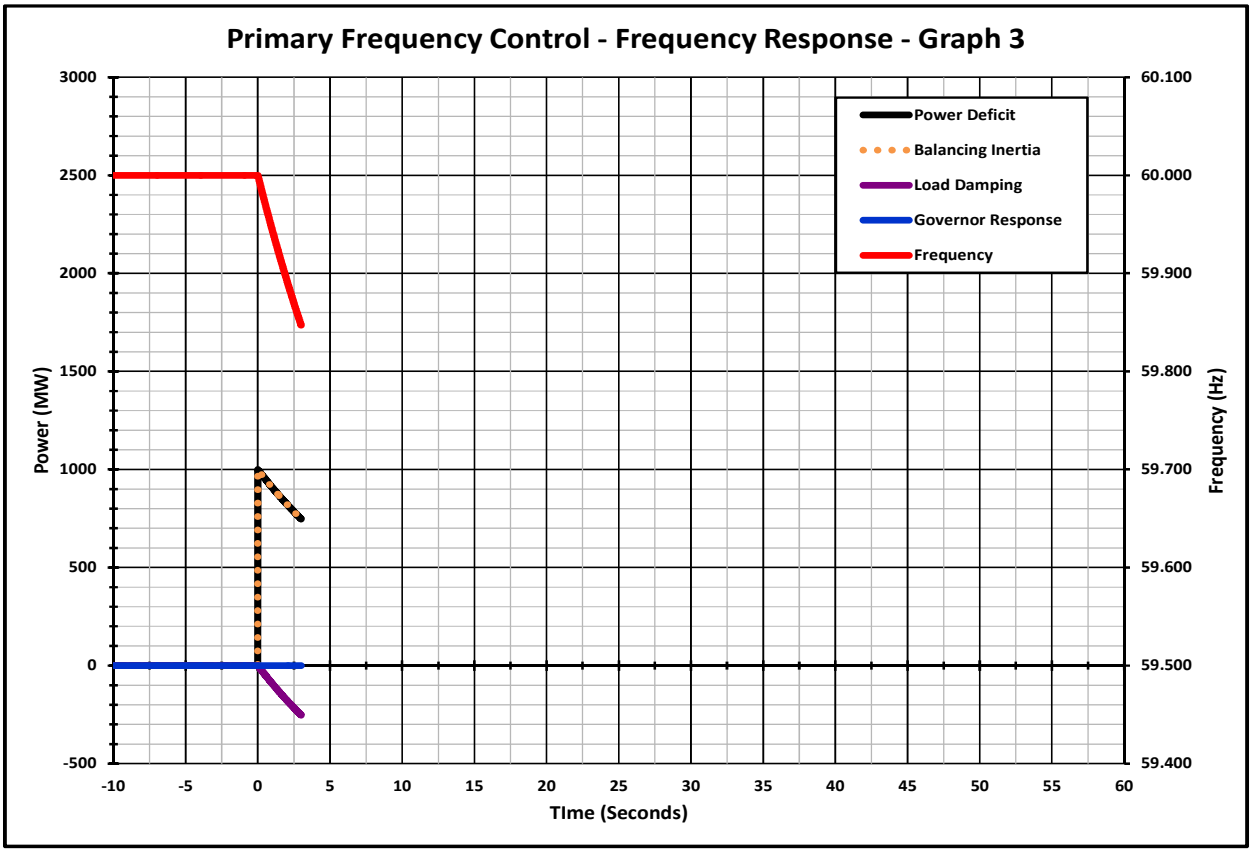
[3] The "Law of Conservation of Energy" is applied here in the form of power. If energy must be conserved, then power which is the first derivative of energy with respect to time, must also be conserved.

[4] The term "balancing Inertia" is coined here from the terms "inertial frequency response" and "balancing energy". Inertial frequency response is a common term used to describe the power supplied for this portion of the frequency response and balancing energy is a term used to describe the market energy supposedly purchased to restore energy balance.

contribute to load damping. In general, any load that does not change with interconnection frequency including resistive load will not contribute to load damping or Frequency Response.

It is important to note that the power deficit equals exactly the balancing inertia, indicating that there is no power or energy imbalance at any time during this process. What is normally considered as "balancing power or energy" is actually power or energy required to correct the frequency error from scheduled frequency. Any apparent power or energy imbalance is corrected instantaneously by the balancing inertia power and energy extracted from the interconnection. Thus the balancing function is really a frequency control function described as a balancing function because ACE is calculated in MWs instead of Hertz, frequency error.

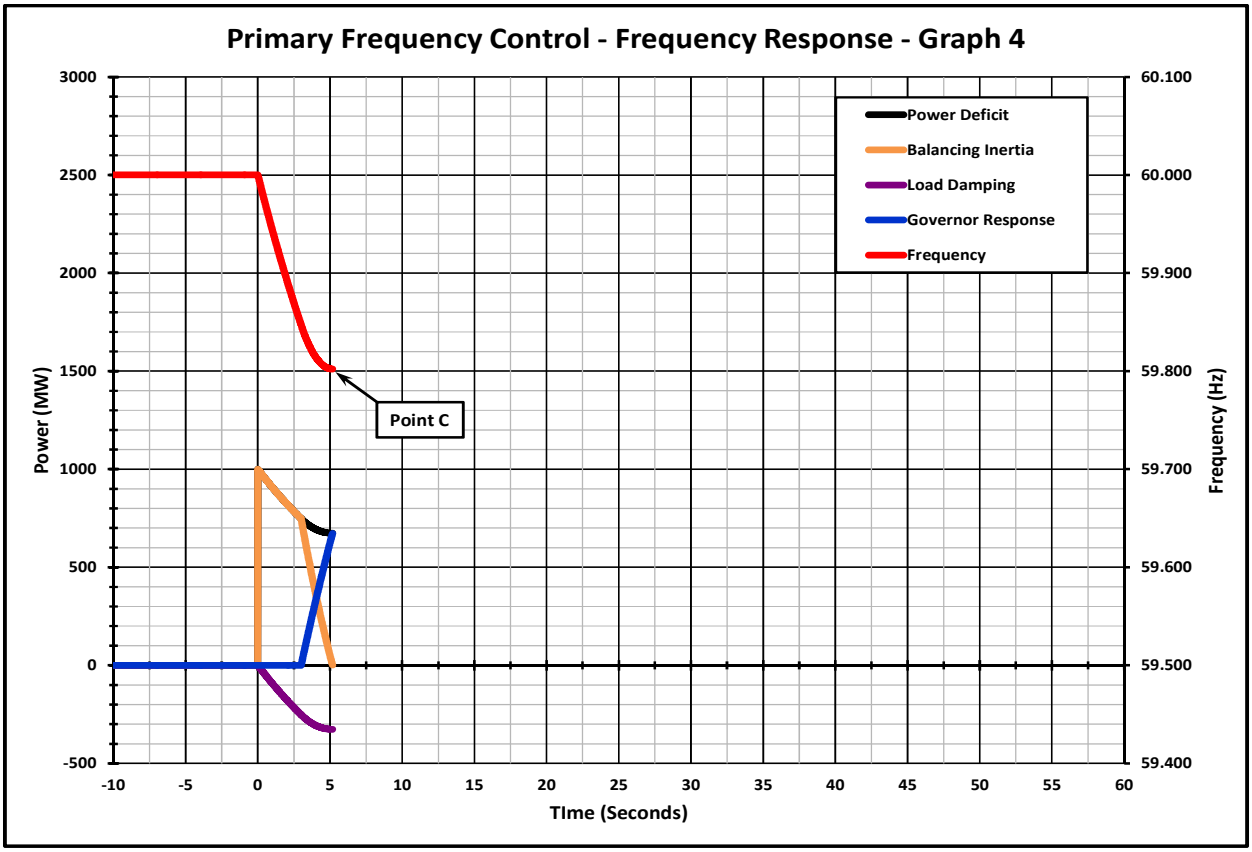
During the initial seconds of the Disturbance event, the governors have yet to respond to the frequency decline. This is illustrated with the Blue line on the third graph, Primary Frequency Control – Frequency Response – Graph 3, showing Governor Response. This time delay results from the time that it takes the controller to adjust the equipment and the time it takes the mass to flow from the source of the energy (main steam control valve for steam turbines, the combustor for gas turbines, or the gate valve for hydro turbines) to the turbine-generator blades where the power is converted to electrical energy.



Note that the frequency continues to decline due to the ongoing extraction by balancing inertia power of energy from the rotating turbine-generators and synchronous motors on the interconnection. The reduction in load also continues as the effect of load damping continues

to reduce the load while frequency declines. During this time delay (before the governor response begins) the balancing inertia limits the rate of change of frequency.

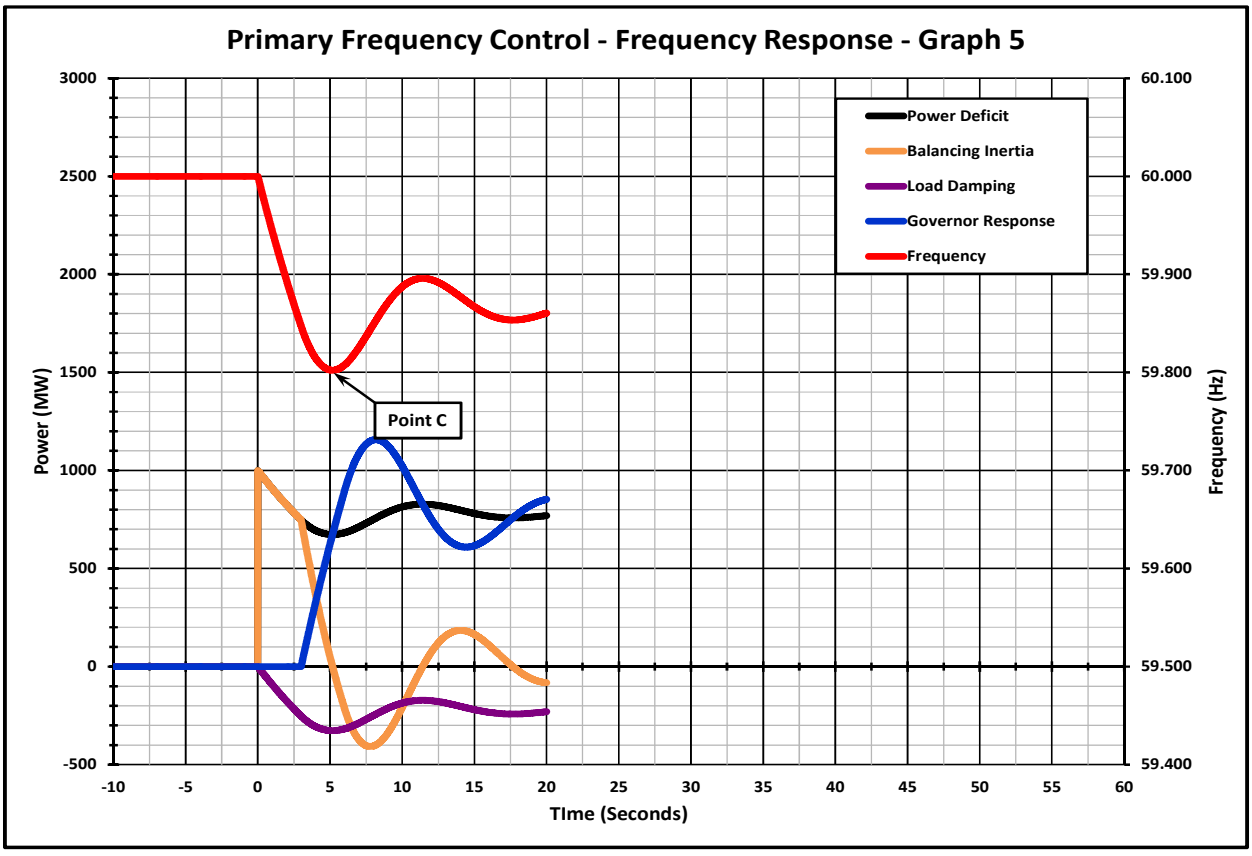
After a short time delay, the governor response begins to increase rapidly in response to the initial rapid decline in frequency, as illustrated on the fourth graph, Primary Frequency Control – Frequency Response – Graph 4. Governor response exactly offsets the power deficit at the point in time that the frequency decline is arrested. At this point in time, the balancing inertia has provided its contribution to reliability and its power contribution is reduced to zero as it is replaced by the governor response. If the time delay associated with the delivery of governor response is reduced, the amount of balancing inertia required to limit the change in frequency by the Disturbance event can also be reduced. This supports the conclusion that balancing inertia is required to manage the time delays associated with the delivery of Frequency Response. Not only is the rapid delivery of Frequency Response important, but the shortening of the time delay associated with its delivery is also important. Therefore, two important components of Frequency Response are 1) how long the time delay is before the initial delivery of response begins; and 2) how much of the response is delivered before the frequency change is arrested.



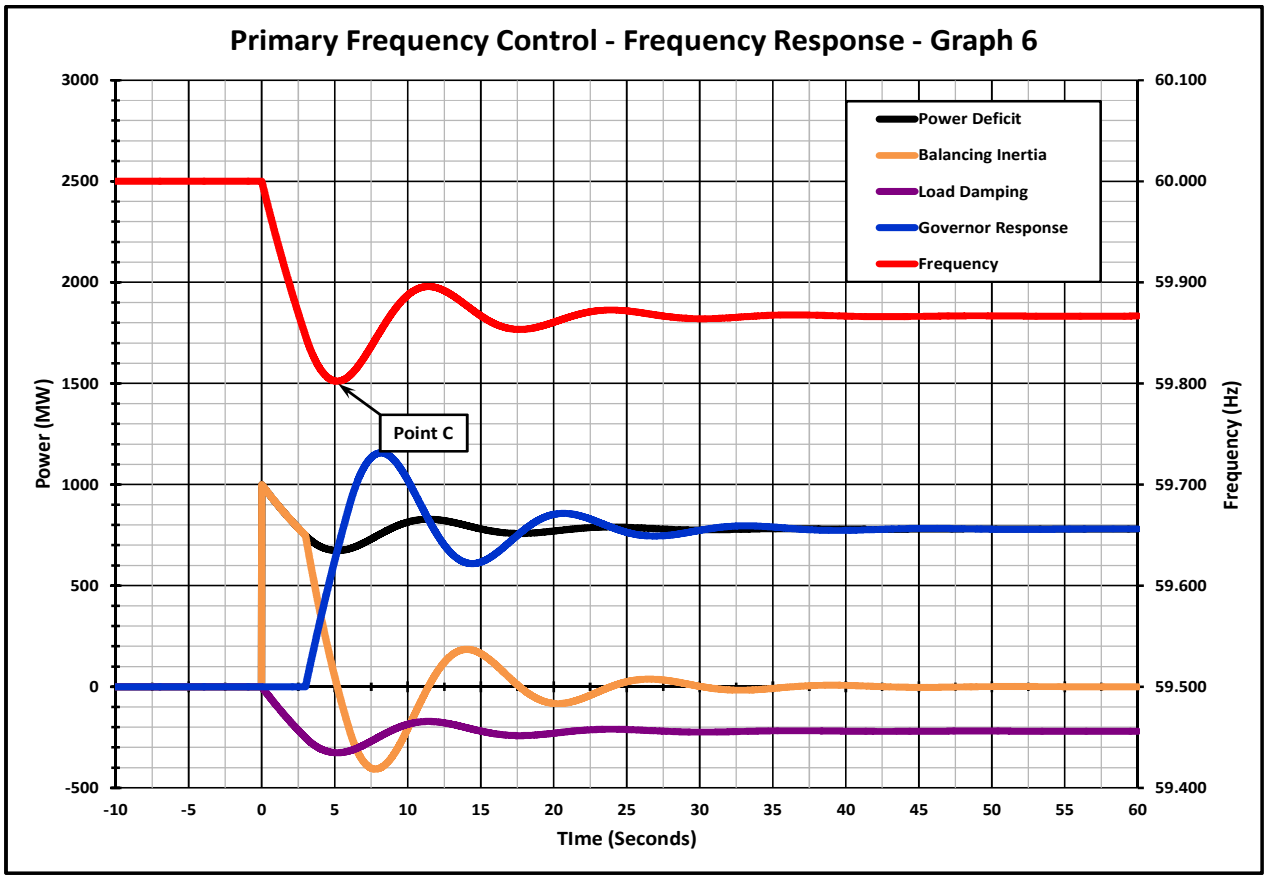
This point, at which the frequency is first arrested, is defined as "Point C" and Frequency Response calculated at this point is called the "**arrested frequency response**." The arrested frequency is normally the minimum (maximum for load loss events) frequency that will be

experienced during a Disturbance event. From a reliability perspective, this minimum frequency is the frequency that is of concern. Adequate reliability requires that frequency at the time frequency is arrested remain above the under-frequency relay settings so as not to trip these relays and the firm load interrupted by them. Frequency Response delivered after frequency is arrested at this minimum level provides less reliability value than Frequency Response delivered before Point C, but greater value than Secondary Frequency Control power and energy which is delivered minutes later.

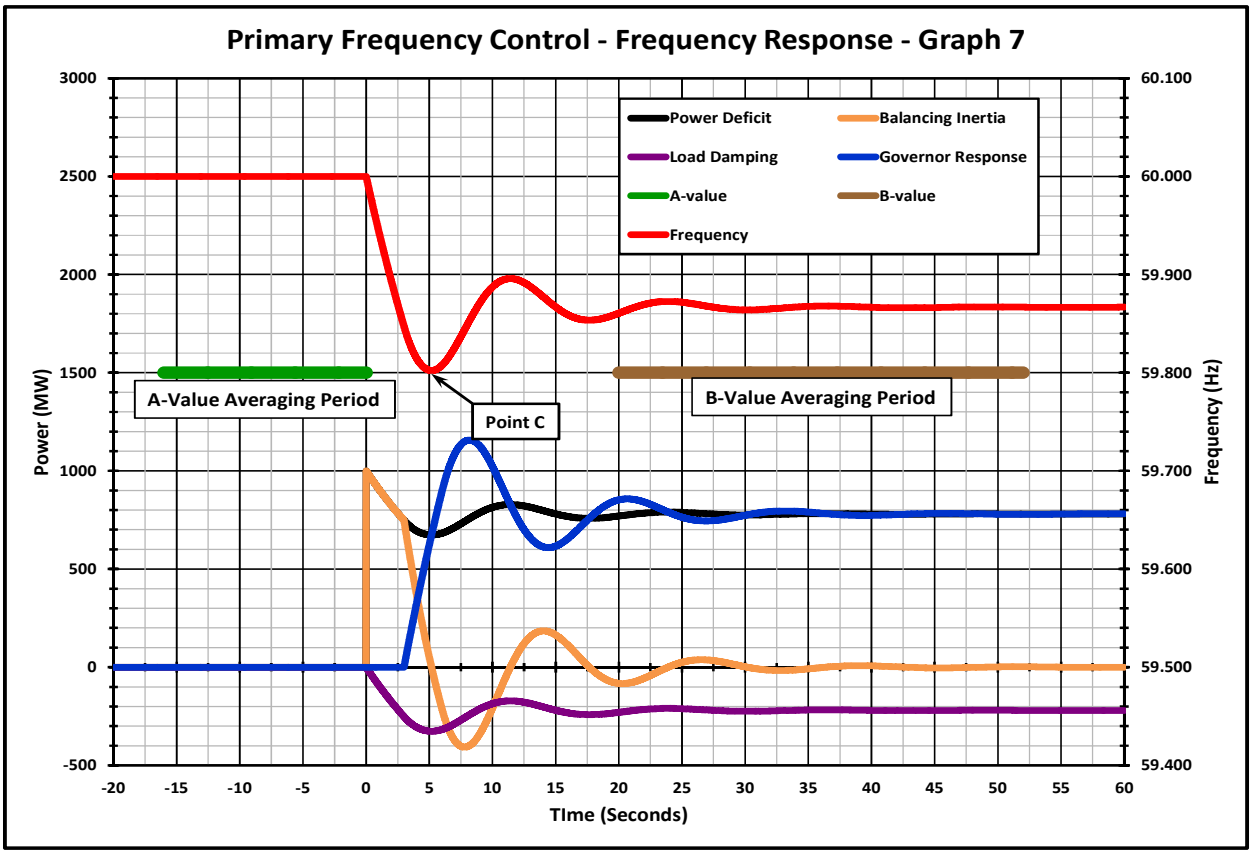
Once the frequency decline is arrested, the governors continue to respond because of the time delay associated with their Governor Response. This results in the frequency partially recovering from the minimum arrested value and results in an oscillating transient that follows the minimum frequency (arrested frequency) until power flows and frequency settle during the transient period that ends roughly 20 seconds after the Disturbance event. This post-disturbance transient period is included on the fifth illustrative graph, Primary Frequency Control – Frequency Response – Graph 5.



The total Disturbance event illustration is presented on the sixth graph, Primary Frequency Control – Frequency Response – Graph 6. Frequency and power contributions stabilize at the end of the transient period. Frequency Response calculated from data measured during this settled period is called the "Settled Frequency Response." The Settled Frequency Response is the best measure to use as an estimator for the "Frequency Bias Setting" discussed later.



The final Disturbance event illustration is presented on the seventh graph, Primary Frequency Control – Frequency Response – Graph 7. This graph shows the averaging periods used to estimate the pre-disturbance A-Value averaging period and the post-disturbance B-Value averaging period used to calculate the settled frequency response. A discussion of the measurement of Frequency Response immediately follows these graphs. That discussion includes consideration of the factors that affect the methods chosen to measure Frequency Response for implementation in a reliability standard.



Frequency Response Measurement (FRM)

The classic Frequency Response points A, C, and B, shown below in Fig. 1 Frequency Response Characteristic, are used for measurement as found in the Frequency Response Characteristic Survey Training Document within the NERC operating manual, found at http://www.nerc.com/files/opman_7-1-11.pdf. This traditional Frequency Response Measure has recently been more specifically termed "**settled frequency response**." This term has been used because it provides the best Frequency Response Measure to estimate the Frequency Bias Setting in Tie-line Bias Control based Automatic Generation Control Systems. However, the industry has recognized that there is considerable variability in measurement resulting from the selection of Point A and Point B in the traditional measure making the traditional measurement method unsuitable as the basis for an enforceable reliability standard in a real world setting of multiple Balancing Authority interconnections.

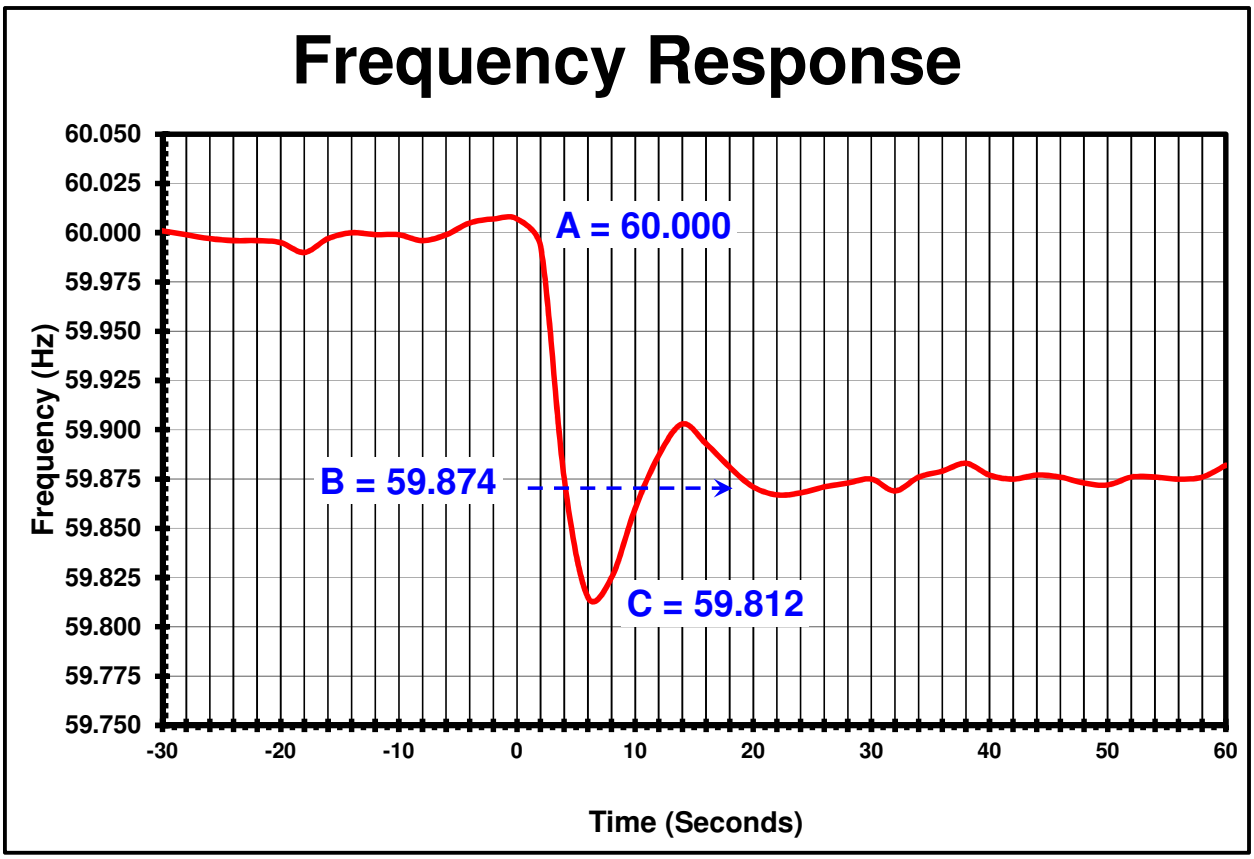


Figure 1. Frequency Response Characteristic

By contrast, measuring an Interconnection's settled frequency response is straightforward and fairly accurate. All that's needed to make the calculation is to know the size of a given contingency (MW), divide this value by the change in frequency and multiply the results by 10 since frequency response is expressed in MW/0.1Hz.

Measuring a BA's frequency response is more challenging. Prior to BAL-003-1, NERC's *Frequency Response Characteristic Survey Training Document* provided guidance to calculate Frequency Response. In short, it told the reader to identify the BA's interchange values "immediately before" and "immediately after" the Disturbance event and use the difference to calculate the MWs the BA deployed for the event. There are two challenges with this approach:

- Two people looking at the same data would come up with different values when assessing which exact points were immediately before and after the event.
- In practice, the actual response provided by the BA can change significantly in the window of time between point B and when secondary and tertiary control can assist in recovery.

Therefore, the measurement of settled frequency response has been standardized in a number of ways to limit the variability in measurement resulting from the poorly specified selection of Point A and Point B. It should be noted that t-0 has been defined as the first scan value that

shows a deviation in frequency of some significance, usually approaching about 10 mHz. The goal is such that the first scan prior to t-0 was unaffected by the deviation and appropriate for one of the averaging points.

- The A-value averaging period of approximately the previous 16 seconds prior to t-0 was selected to allow for an averaging of at least 2 scans for entities utilizing 6 second scan rates. (All time average period references in this document are for 2 second scan rates unless noted otherwise.)
- The B-value averaging period of approximately (t+20 to t+52 seconds) was selected to attempt to obtain the average of the data after primary frequency response was deployed and the transient completed(settled), but before significance influence of secondary control. Multiple periods were considered for averaging the B-value:
    - 12 to 24 sec
    - 18 to 30 sec
    - 20 to 40 sec
    - 18 to 52 sec
    - 20 to 52 sec

  It is necessary for all BAs from an interconnection to use the same averaging periods to provide consistent results. In addition, the SDT decided that until more experience is gained, it is also desirable for all interconnections to use the same averaging periods to allow comparison between interconnections.

The methods presented in this document only address the values required to calculate the frequency response associated with the frequency change between the initial frequency, A-Value, and the settling frequency, B-Value. No reasonable or consistent calculations can be made relating to the arresting frequency, C-Value, using Energy Management System (EMS) scan rate data as long as 6-seconds or tie-line flow values associated with the minimum value of the frequency response characteristic (C-value) as measured at the BA level.

Both the calculation of the frequency at Point A and the frequency at Point B began with the assumption that a 6-second scan rate was the source of the data. Once the averaging periods for a 6-second scan rate were selected, the averaging periods for the other scan rates were selected to provide as much consistency as possible between BAs with different scan rates.

The Frequency at Point A was initially defined as the average of the two scans immediately prior to the frequency event. All other averaging periods were selected to be as consistent as possible with this 12 second average scan from the 6-second scan rate method. In addition, the "**actual net interchange immediately before Disturbance**" is defined as the average of the same scans as used for the Point A frequency average.

The Frequency at Point B was then selected to be an average as long as the average of 6-second scan data as possible that would not begin until most of the hydro governor response had been delivered and would end before significant Automatic Generation Control (AGC) recovery response had been initiated as indicated by a consistent frequency restoration slope. The "**actual net interchange immediately after Disturbance**" is defined as the average of the same scans as used for the Point B frequency average.

B Averaging Period Selection:

Experience from the Electric Reliability Council of Texas ("ERCOT") and the field trail on other interconnections indicated that the 12 to 24 second and 18 to 30 second averaging periods were not suitable because they did not provide the consistency in results that the other averaging periods provided, and that the remaining measuring periods do not provide significantly different results from each other. The team believed that this was observed because the transients were not complete in all of the samples using these averaging periods.

The 18 to 52 second and 20 to 52 second averaging periods were compared to each other, with the 20 to 52 second period providing more consistent values, believed to result from the incomplete transient in some of the 18 to 52 second samples.

This left a choice between the 20 to 40 second and the 20 to 52 second averaging periods. The team recognized that there would be more AGC response in the 20 to 52 second period, but the team also recognized that the 20 to 52 second period would provide a better measure of squelched response from outer loop control action. The 20 to 52 second period was selected because it would indicate squelched response from outer-loop control and provide incentive to reduce response withdrawal. The final selections for the data averaging periods used in FRS Form 1 are shown in the table below.

Definitions of Frequency Values for Frequency Response Calculation

Scan Rate	T 0 Scan	A Value (average)	B Value (average)
6-Seconds	Identify first significant change in frequency as the T 0 scan	Average of T-1 through T-2 scans	Average of T+4 through T+8 scans
5-Seconds		Average of T-1 through T-2 scans	Average of T+5 through T+10 scans
4-Seconds		Average of T-1 through T-3 scans	Average of T+6 through T+12 scans
3-Seconds		Average of T-1 through T-5 scans	Average of T+7 through T+17 scans
2-Seconds		Average of T-1 through T-8 scans	Average of T+10 through T+26 scans

Consistent measurement of Primary Frequency Response is achievable for a selected number of events and can produce representative frequency response values, provided an appropriate sample size is used in the analysis. Available research investigating the minimum sample size to provide consistent measurements of Frequency Response has shown that a minimum sample size of 20 events should be adequate.

Measurement of Primary Frequency Response on an individual resource or load basis requires analysis of energy amounts that are often small and difficult to measure using current methods. In addition, the number of an interconnection's resources and loads providing their response could be problematic when compiling results for multiple events.

Measurement of Primary Frequency Response on an interconnection (System) basis is straight forward provided that an accurate frequency metering source is available and the magnitude of the resource/load imbalance is known in MWs.

Measurement on a Balancing Authority basis can be a challenge, since the determination of change in MWs is determined by the change in the individual BA's metered tie lines. Summation of tie lines is accomplished by summing the results of values obtained by the digital scanning of meters at intervals up to six seconds, resulting in a non-coincidental summing of values. Until the technology to GPS time stamp tie line values at the meter and the summing of those values for coincidental times is in use throughout the industry, it is necessary to use averaging of values described above to obtain consistent results.

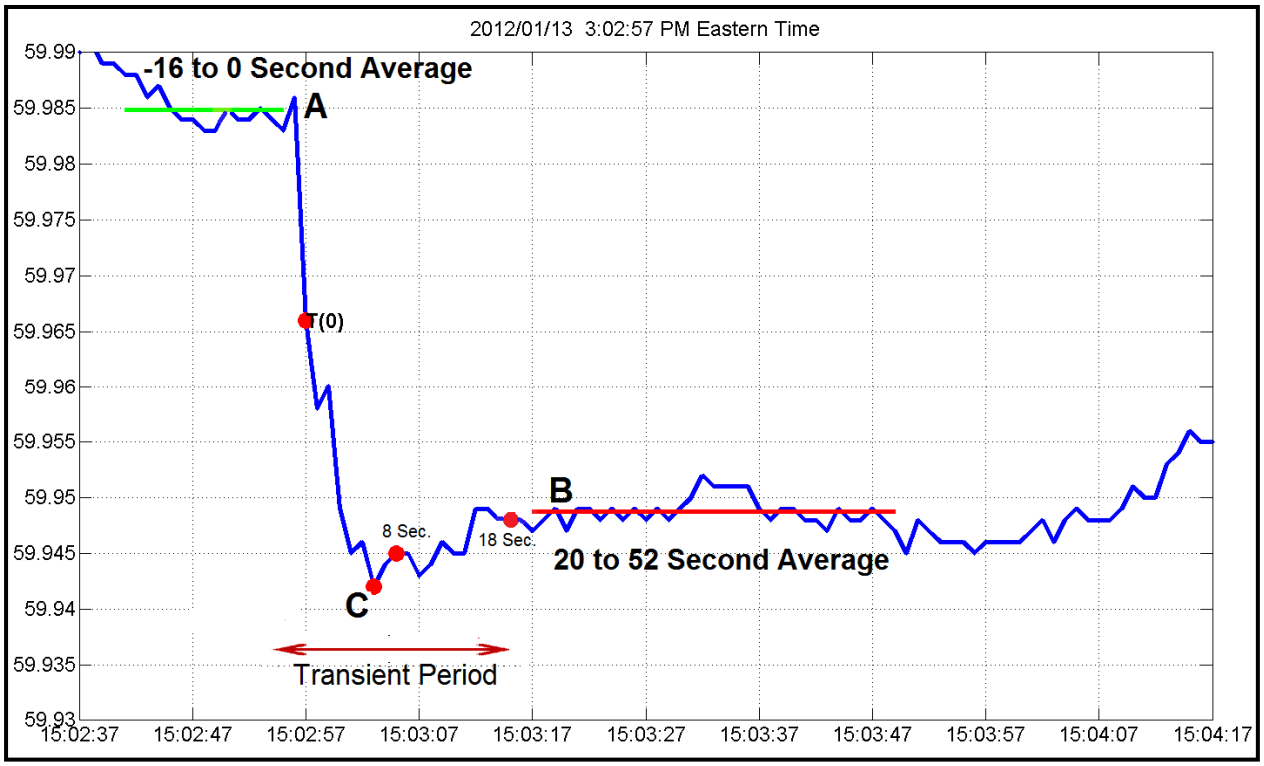


Figure 2. Frequency Response Measurement

The standardized measure is shown graphically in Fig. 2 Frequency Response Measurement with the averaging periods shown by the solid ~~blue~~ green and red lines on the graph. Since FERC directed a performance obligation for BAL-003-1, it is important to be more objective in the measurement process. The standardized calculation is available on FRS Form 2 for EMS scan rates of 2, 3, 4, 5, and 6 seconds at http://www.nerc.com/filez/standards/Frequency_Response.html.

Arrested Frequency Response

There is another measure of Frequency Response that is of interest when developing a Frequency Response estimate that not only will be used for estimating the Frequency Bias Setting, but will also be used to assure reliability by operating in a manner that will bound interconnection frequency and prevent the operation of Under-frequency Relays. This Frequency Response Measure has recently been named "**arrested frequency response.**" This Frequency Response is significantly affected by the inertial Frequency Response, the governor Frequency Response and the time delays associated with the delivery of governor Frequency

Response. It is calculated by using the change in frequency between the initial frequency, A, and the maximum frequency change during the event, C, instead of using the change between A and B. Arrested Frequency Response is the correct response for determining the minimum Frequency Response related to under-frequency relay operation and the support of interconnection reliability. This is because it can be used to provide a direct estimate of the maximum frequency deviation an interconnection will experience for an initial frequency and a given size event in MW. Unfortunately, arrested frequency response cannot currently be measured using the existing EMS-based measurement infrastructure. This limitation exists because the scan rates currently used in industry EMSs are incapable of measuring the net actual interchange at the same instant that the maximum frequency deviation is reached. Fortunately, the ratio of arrested frequency response and settled frequency response tends to be stable on an interconnection. This allows the settled frequency response value to be used as a surrogate for the arrested frequency response and implement a reasonable measure upon which to base a standard. One consequence of using the settled frequency response as a surrogate for the arrested frequency response is the inclusion of a large reliability margin in Interconnection Frequency Response Obligation to allow for the difference between the settled frequency response as measured and the arrested frequency response that indicates reliability.

As measurement infrastructure improves one might expect the Frequency Response Obligation to transition to a measurement based directly on the arrested frequency response while the Frequency Bias Setting will continue to be based on the settled frequency response. However, at this time, the measurement devices and methods in use do not support the necessary level of accuracy to estimate arrested frequency response contribution for an individual Balancing Authority.

Frequency Response Definition and Examples

Limitations of the measurement infrastructure determine the measurement methods recommended in this standard. The measurement limitations provide opportunities to improve the Frequency Response as measured in the standard without contributing to an improvement in Frequency Response that contributes to reliability. These definitions and examples provide a basis for determining which contributions to Frequency Response contribute the most to improved reliability. They also provide the basis for determining on a case by case basis whether the individual contributors to the Frequency Response Measure are also contributing to reliability.

General Frequency Response Characteristics

In the simplest case Frequency Response includes any automatic response to changes in local frequency. If that response works to decrease that change in frequency, it is beneficial to reliability. If that response works to increase that change in frequency, it is detrimental to reliability. However, this definition does not address the relative value of one response as compared to other responses that may be provided in a specific case.

There are numerous characteristics associated with the Frequency Response that affect the reliability value and economic value of the response. These characteristics include:

1. **Inertial** – the response is inertial or approximates inertial response

Inertial response provides power without delay that is proportional to the frequency and the change in frequency. Therefore, power provided by electronic control as synthetic Inertial response must be proportional to the frequency and change in frequency and be provided without a time delay.

2. **Immediate** – no unnecessary intentional time delays or reduction in the rate of response delivery
    a. time delay before the beginning of the response
    Turbines that convert heat or kinetic energy have time delays related to the time delay from the time that the control valves are moved to initiate the change in power and the time that the power is delivered to the generator. These times are usually associated with the time it takes a change in mass flow to travel from the control valve to the first blades of the turbine in the turbine generator.

    b. reduction in the rate of response delivery
    There are natural delays associated with the rate of response delivery that are related to the mass flow travel from the first turbine blades to the last turbine blades. In addition, some turbines have intentional delays designed into the control system to slow the rate of change in the delivery of the kinetic energy or fuel to the turbine to prevent the turbine or other equipment from being damaged, hydro turbines, or to prevent the turbine from tripping due to excessive rate of change, gas turbines.

3. **Proportional** – the amount of the total response is proportional to the frequency error
    a. No Deadband – the response is proportional across the entire frequency range
    b. Deadband – the response is only proportional outside of a defined deadband

4. **Bi-directional** – the response occurs to both increases and decreases in frequency

5. **Continuous** – there are no discontinuities in the delivery of the response (no step changes)

6. **Sustained** – the response is sustained until frequency is returned to schedule

Frequency Response Reliability Value

This section contains a more detailed discussion of the various characteristics of Frequency Response listed in the previous section. It also provides an indication of the relative value of these characteristics with respect to their contribution to reliability. Finally, it includes some examples of the described responses.

Inertial Response is provided from the stored energy in the rotating mass of the turbine-generators and synchronous motors on the interconnection. It limits the rate of change of frequency until sufficient Frequency Response can be supplied to arrest the change in frequency. Its reliability value increases as the time delay associated with the delivery of other Frequency Response on the interconnection increases. If those time delays are minimal, then the value of inertial response is low. If all time delays associated with the Frequency Response could be eliminated, then inertial response would have little value.

The reliability value of Inertial Response is the greatest on small interconnections because the size of the Disturbance events is larger relative to the inertia of the interconnection. Electronic controls have been developed to provide synthetic inertial response from the stored energy in asynchronous generators to supplement the natural inertial response. Some Type III & IV Wind Turbines have this capability. In addition, electronically controlled SCRs have been developed that can store energy in the electrical system and release this stored energy to supply synthetic inertial response when required.

Immediate Response is provided by load damping and because the time delays associated with its delivery are very short (related to the speed of electrical signal in the electrical system); load damping requires very little inertial response to limit arrested frequency effectively. Synthetic immediate response can also be supplied from loads because in many cases, there is no mass flow time delay associated with the load process providing the power and energy reduction. Therefore, loads can provide an immediate response with a higher reliability value than generators with time delays required by the physics of the turbine-generator.

Governor response has time delays associated with its delivery. Governor response provided with shorter time delays has a higher reliability value because those shorter time delays require less inertial response to arrest frequency. Governor response is provided by the turbine-generators on the interconnection. Time delays associated with governor response vary depending on the type of turbine-generator providing the response.

The longest time delays are usually associated with high head hydro turbine-generators that require long times from the governor action until the additional mass flow through the turbine. These units may also have the longest delivery time associated with the full delivery of response because of the timing designed into the governor response.[5]

Intermediate time delays are usually associated with steam turbine-generators. The response begins when the steam control valves are adjusted and the steam mass flows from the valves to the first high pressure turbine blades. The delivery times associated with the full delivery of response may require the steam to flow through high, intermediate and low pressure turbines including reheat flows before full power is delivered. These times are shorter than those of the hydro turbine-generators in general, but not as fast as the times associated with gas turbines.[6]

Gas turbines typically have the shortest time delays, because control is provided by injecting more or less fuel into the turbine combustor and adjusting the air control dampers. These control changes can be initiated rapidly and the mass flow has the shortest path to the turbine

[5] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-6 – 1-9.

[6] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-4 – 1-6.

blades. There may be timing limitations related to the rate of change in output of the gas turbine-generator to maintain flame stability in some cases slowing the rate of change.[7]

Synthetic Governor Response can be supplied by certain loads and storage systems. The immediacy of the response is normally limited only by the electronic controls used to activate the desired response. Synthetic response, when it can be supplied immediately without significant time delay, has a higher reliability value because it requires less inertial response to achieve smaller arrested frequency deviations.

Proportional Response indicates that the response provided is proportional in magnitude to the frequency error. Response deadbands cause a non-proportional response and reduce the value of the response with respect to reliability. Contrary to general consensus, deadbands do not reduce the amount of Frequency Response that must be provided, they only transfer the responsibility for providing that Frequency Response from one source on the interconnection to another. For a given response, the response with the smaller deadband has the greater reliability value. Therefore, deadbands should be set to the smallest value that supports overall reliable operation including the reliable operation of the generator.

Electronic controls have also been developed to provide synthetic governor response. When these controls are applied to certain loads or stored energy systems, they can be programmed to provide synthetic governor response similar to the proportional response of a turbine-generator governor. Governor response in generators is limited to a small percentage of the output of the generating unit, while synthetic governor response could be applied to much larger percentages of loads or storage devices providing such response.

Load damping provides a proportional response.

Continuous Response is response that has no discontinuous (step) changes in the frequency versus response curve. Step changes (Non-continuous Response) in the Governor Response curve can lead to frequency instabilities at frequencies near the changes. The ERCOT Interconnection observed this and has since prohibited the use of governor response characteristics incorporating step responses.

Step responses also occur with the implementation of load interruption using under-frequency or over-frequency relays.

Bi-directional Response is response that occurs in both directions, when the frequency is increasing and when the frequency is decreasing. A uni-directional response is a response that only occurs once when frequency is decreasing or when frequency is increasing.

Inertial response, governor response and load damping are all bi-directional responses. Certain loads are capable of providing proportional bi-directional response while others are only capable of providing non-proportional bi-directional response.

[7] Interconnected Power System Response to Generation Governing: Present Practice and Outstanding Concerns – Final Report, IEEE, May 2007, pp. 1-16 – 1-19.

The ERCOT Load Resource program is a uni-directional response program. Loads are only tripped when frequency declines below a given set-point. When frequency is restored above that set-point, the loads must be manually reconnected. As a consequence, the Frequency Response only occurs once with declining frequency and does not oppose the increase in frequency after the initial decline. If there should be a frequency oscillation, the uni-directional response will not contribute to the opposition of a second frequency decline across the set-point during an oscillation event. Once a uni-directional response has occurred, it is unavailable for a second decline before reset.

Step or proportional responses implemented bi-directionally can lead to frequency instability when there is less continuous frequency response than the magnitude of the change in continuous response between the trip and reset frequencies in step, or the proportional response rate of change is greater than the underlying continuous response. A step bi-directional response will have the load reconnected as frequency recovers from the event thus opposing the increase in frequency during recovery, and also resetting the load response for the next frequency decline automatically. Bi-directional response obviously has a greater reliability value than uni-directional response.

Sustained Response is provided at its full value until frequency is restored to its scheduled value. On today's interconnections, few frequency responses are fully sustained until frequency has been restored to its scheduled value. On steam based turbine-generators, the steam pressure may drop after a time as the result of the additional steam flow from governor action. However, in general this has not been a problem because most responses are incomplete at the time that frequency has been initially arrested and the additional response has generally been sufficient to make up for more than the these unpreventable reductions in response. However, the intentional withdrawal of response before frequency has been restored to schedule can cause a decline in frequency beyond that which would be otherwise expected. This intentional withdrawal of response is highly detrimental to reliability. Therefore, it can be concluded in general that sustained response has a higher reliability value than un-sustained response.

On an interconnection, the withdrawal of response due to the loss of steam pressure on the steam units may be offset by the slower response of hydro turbine-generators. In these cases, the reliability of the combined response provides a greater reliability value than the individual response of each type. The steam turbine-generators provide a fast response that may be reduced, while the hydro turbine-generators provide a slower response, contributing less to the arresting response, offsetting any reduction by the steam turbine-generators to assure a sustained response.

Sustained Response must also be considered for any resource that has a limited duration associated with its response. The amount of stored energy available from a resource may limit its ability to sustain response for a duration of time necessary to support reliability.

Frequency Response Cost Factors

In every system of exchange there are two sides; the supply side and the demand side. The supply side provides the services used by the demand side. In the case of Frequency Response,

the supply side includes all providers of Frequency Response and the demand side includes all participants that create the need for Frequency Response.

Frequency Response Costs – Supply Side

There are a number of factors that affect the cost of providing Frequency Response from resources. Since there is a cost associated with those factors, some method of appropriate compensation could be made available to those resources providing Frequency Response. Without compensation, providers of Frequency Response will be put in the position of incurring additional cost that can be avoided only by reducing or eliminating the response they provide. These costs are incurred independently of whether provided for in a formal Regional Transmission Organization/Independent System Operator (RTO/ISO) market or in a traditional BA subject to the FERC pro-forma tariffs.

It is the responsibility of the BA or the RTO/ISO to acquire the necessary amount of Frequency Response to support reliability in the most cost effective manner. This function is performed best when the suppliers are evaluated based on the value of the Frequency Response they provide and compensated appropriately for that Frequency Response. Suppliers provide Frequency Response when they are assured that they will receive fair compensation. Before considering how to perform this evaluation and compensation, the costs associated with providing Frequency Response should be understood and evaluated with respect to the level of reliability they offer.

Some cost factors that have been identified for providing Frequency Response include:

1. **Capacity Opportunity Cost** – the costs, including opportunity costs, associated with reserving capacity to provide Frequency Response. These costs are usually associated with the alternative use of the same capacity to provide energy or other ancillary services. There may also be capacity opportunity costs associated with the loss in average capacity by a load providing Frequency Response.
2. **Fuel Cost** – The cost of fuel used to provide the Frequency Response. The costs for fuel to provide Frequency Response can result in energy costs significantly different from the system marginal energy cost, both higher and lower. This is the case when Frequency Response is provided by resources that are not at the system marginal cost.
3. **Energy Efficiency Penalty Costs** – the costs associated with the loss in efficiency when the resource is operated in a mode that supports the delivery of Frequency Response. This cost is usually in the form of additional fuel use to provide the same amount of energy. An example is the difference between operating a steam turbine in valve control mode with an active governor and sliding pressure mode with valves wide open and no active governor control except for over-speed. This cost is incurred for all of the energy provided by the resource, not just the energy provided for Frequency Response. There may be additional energy costs associated with a load providing Frequency Response from loss in efficiency of their process when load is reduced.
4. **Capacity Efficiency Penalty Costs** – the costs associated with any reduction in capacity resulting from the loss of capacity associated with the loss in energy efficiency. When efficiency is lost, capacity may be lost at the same time because of limitations in the amount of input energy that can be provided to the resource.

5. **Maintenance Costs** – the operation of the resource in a manner necessary to provide Frequency Response may result in increases in the maintenance costs associated with the resource.
6. **Emissions Costs** – the additional costs incurred to manage any additional emissions that result when the resource is providing Frequency Response or stands ready to provide Frequency Response.

A good contract for the acquisition of Frequency Response from a resource will provide appropriate compensation to the resource for all of the costs the resource incurs to provide Frequency Response. It will also provide a method to evaluate the least cost mix of resources necessary to provide the minimum required Frequency Response for maintaining reliability. Finally, it will provide the least complex method of evaluation considering the complexity and efficiency of the acquisition process.

Frequency Response Costs – Demand Side

Not only are there costs associated with acquiring Frequency Response from the supplying resources, there are costs associated with the amount of Frequency Response that must be acquired and influenced by those participants that create the need for Frequency Response. If the costs of acquiring Frequency Response from the supply resources can be assigned to those parties that create the need for Frequency Response, there is the promise that the amount of Frequency Response required to maintain reliability can be minimized. The considerations are the same as those that are driving the development of "real time pricing" and "dynamic pricing". If the costs are passed on to those contributing to the need for Frequency Response, incentives are created to reduce the need for Frequency Response making interconnection operations less expensive and more reliable. The problem is to balance both cost and complexity against reliability on both the supply side and the demand side.

Rationale by Requirement

Requirement 1

R1. Each Frequency Response Sharing Group (FRSG) or Balancing Authority that is not a member of a FRSG shall achieve an annual Frequency Response Measure (FRM) (as calculated and reported in accordance with Attachment A) that is equal to or more negative than its Frequency Response Obligation (FRO) to ensure that sufficient Frequency Response is provided by each FRSG or Balancing Authority that is not a member of a FRSG to maintain Interconnection Frequency Response equal to or more negative than the Interconnection Frequency Response Obligation.

Background and Rationale

R1 is intended to meet the following primary objectives:

- Determine whether a Balancing Authority (BA) has sufficient Frequency Response for reliable operations.
- Provide the feeder information needed to calculate CPS limits and Frequency Bias Settings.

Primary Objective

With regard to the first objective, FRS Form 1 and the process in Attachment A provide the method for determining the Interconnections' necessary amount of Frequency Response and allocating it to the Balancing Authorities. The field trial for BAL-003-1 is testing an allocation methodology based on the amount of load and generation in the BA. This is to accommodate the wide spectrum of BAs from generation-only all the way to load-only.

Frequency Response Sharing Groups (FRSGs)

This standard proposes an entity called FRSG, which is defined as:

> *A group whose members consist of two or more Balancing Authorities that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.*

This standard allows Balancing Authorities to cooperatively form FRSGs as a means to jointly meet the FRS. There is no obligation to form or be a part of FRSGs. The members of the FRSG would determine how to allocate sanctions among its members. This standard does not mandate the formation of FRSGs, but allows them as a means to meet one of FERC's Order No. 693 directives.

FRSG performance may be calculated one of two ways:

- Calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or
- Jointly submit the individual BAs' Form 1s, with a summary spreadsheet that sums each participant's individual event performance.

Frequency Response Obligation and Calculation

The basic Frequency Response Obligation is based on annual load~~non-coincident peak load~~ and generation data reported in FERC Form 714 (where applicable, see below for non-jurisdictional entities) for the previous full calendar year. The basic allocation formula used by NERC is:

$$\mathrm{FRO_{BA}} = \mathrm{FRO_{Int}} \times \frac{\text{Annual Gen}_{\mathrm{BA}} + \text{Annual Load}_{\mathrm{BA}}}{\text{Annual Gen}_{\mathrm{Int}} + \text{Annual Load}_{\mathrm{Int}}}$$

Where:

- Annual $\mathrm{Gen_{BA}}$ is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
- Annual $\mathrm{Load_{BA}}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
- Annual $\mathrm{Gen_{Int}}$ is the sum of all Annual $\mathrm{Gen_{BA}}$ values reported in that interconnection.
- Annual $\mathrm{Load_{Int}}$ is the sum of all Annual $\mathrm{Load_{BA}}$ values reported in that interconnection.

Balancing Authorities that are not FERC jurisdictional should use the Form 714 Instructions to assemble and submit equivalent data. Until the BAL-003-1 process outlined in Attachment 1 is implemented, Balancing Authorities can approximate their FRO by multiplying their Interconnection's FRO by their share of Interconnection Bias. The data used for this calculation should be for the most recently filed Form 714. As an example, a report to NERC in January 2013 would use the Form 714 data filed in 2012, which utilized data from 2011.

Balancing Authorities that merge or that transfer load or generation need to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation for the Interconnection remains the same and so that CPS limits can be adjusted.

Attachment A proposes the following Interconnection event criteria as a basis to determine an Interconnection's Frequency Response Obligation:

- Largest category C loss-of-resource (N-2) event.
- Largest total generating plant with common voltage switchyard.
- Largest loss of generation in the interconnection in the last 10 years.

With regard to the second objective above (determining Frequency Bias Settings and CPS limits), Balancing Authorities have been asked to perform annual reviews of their Frequency Bias Settings by measuring their Frequency Response, dating back to Policy 1. This obligation was carried forward into BAL-003-01.b. While the associated training document provided useful information, it left many of the details to the judgment of the person doing the analysis. The FRS Form 1 and FRS Form 2 provide a consistent, objective process for calculating Frequency Response to develop an annual measure, the FRM.

The FRM will be computed from Single Event Frequency Response Data (SEFRD), defined as: "the data from an individual event from a Balancing Authority that is used to calculate its Frequency Response, expressed in MW/0.1Hz". The SEFRD for a typical Balancing Authority in an Interconnection with more than one Balancing Authority is basically the change of its net actual interchange on its tie lines with its adjacent Balancing Authorities divided by the change in interconnection frequency. (Some Balancing Authorities may choose to apply corrections to their net actual interchange values to account for factors such as nonconforming loads. FRS Form 1 shows the types of adjustments that are allowed.)

A standardized sampling interval of approximately 20 to 52 seconds will be used in the computation of SEFRD values. Microsoft Excel® spreadsheet interfaces for EMS scan rates of 2 through 6 seconds are provided to support the computation.

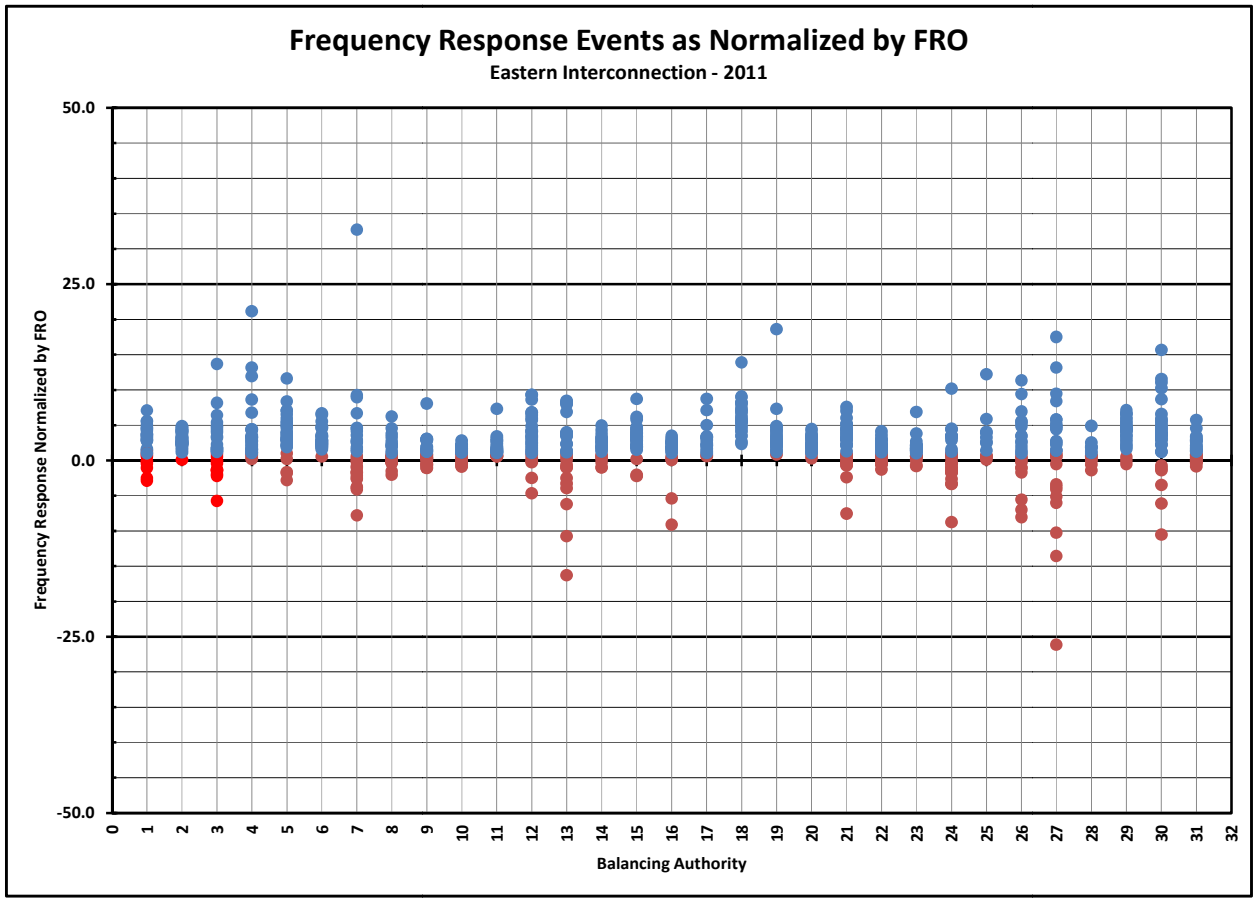
Single Event Frequency Response Data[8]

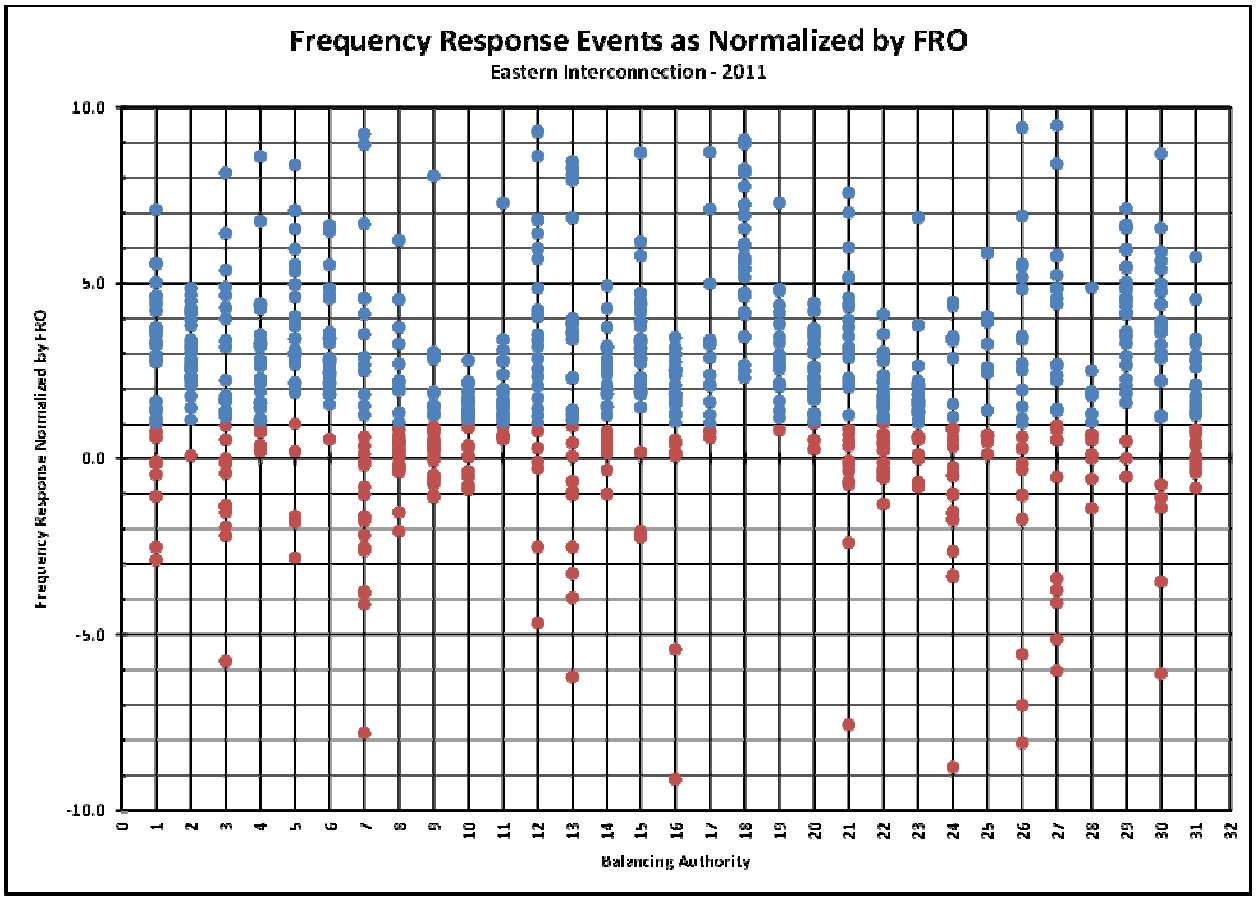
The use of a "single event measure" was considered early in the development of the FRS for compliance because a single event measure could be enforced for each event on the interconnection making compliance enforcement a simpler process. The variability of the measurement of Frequency Response for an individual BA for an individual Disturbance event was evaluated to determine its suitability for use as a compliance measure. The individual Disturbance events were normalized and plotted for each BA on the Eastern and Western Interconnections. This data was plotted with a dot representing each event. Events with a measured Frequency Response above the FRO were shown as blue dots and events with a measured Frequency Response below the FRO were shown as red dots. In order to show the full variability of the results the plots have been provided with two scales, a large scale to show all of the events and small scale to show the events closer to the FRO or a value of 1.0. This data is presented on four charts titled Frequency Response Events as Normalized by FRO.

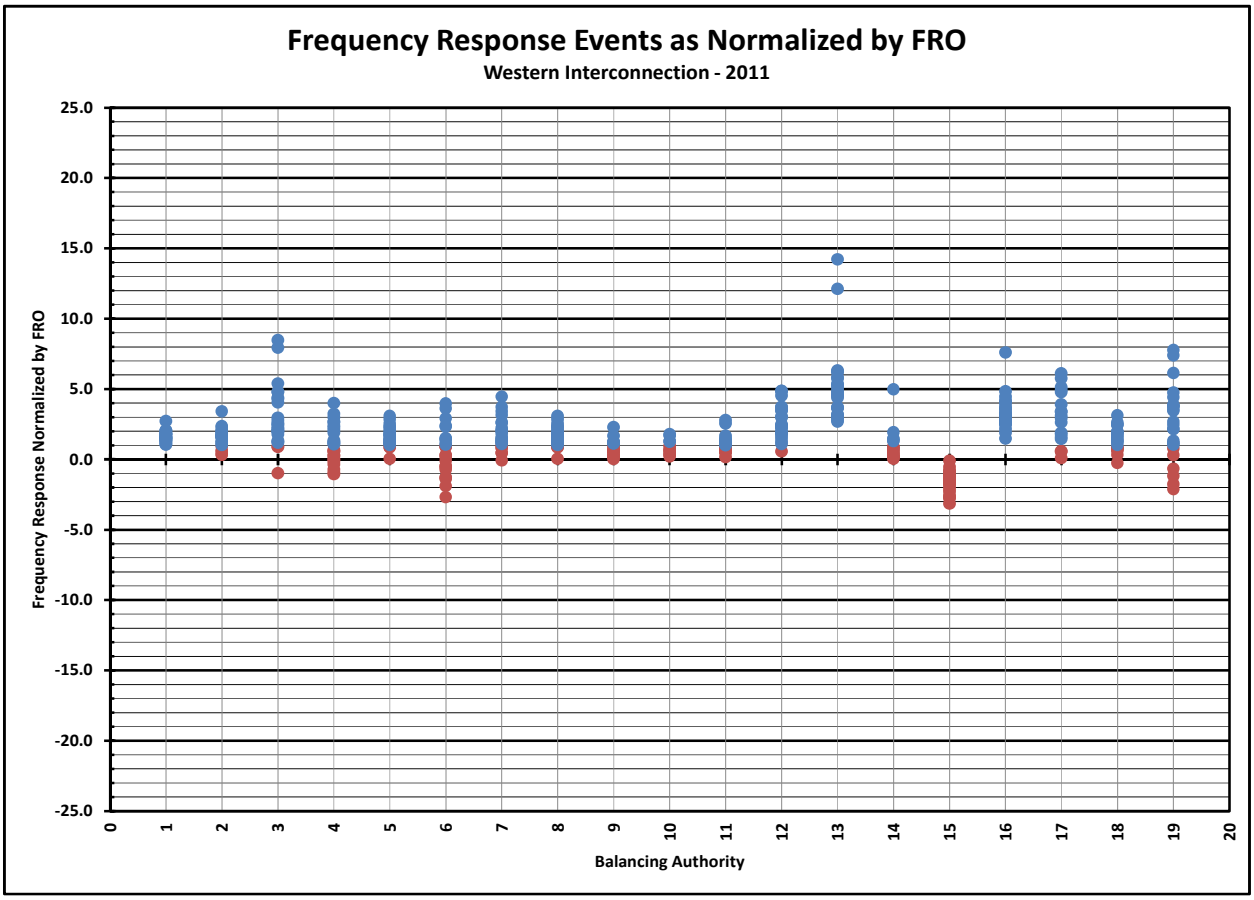
Analysis of this data indicates a single event based compliance measure is unsuitable for compliance evaluation when the data has the large degree of variability shown in these charts. Based on the field trial data provided, only 3 out of 19 BAs on the Western Interconnection would be compliant for all events with a standard based on a single event measure. Only 1 out of 31 BAs on the Eastern Interconnection would be compliant for all events with a standard based on a single event measure. The general consensus of the industry is that there is not a reliability issue with insufficient Frequency Response on any of the North American Interconnections at this time. Therefore, it is unreasonable to even consider a standard that would indicate over 90% of the BAs in North American to be non-compliant with respect to maintaining sufficient Frequency Response to maintain adequate reliability.

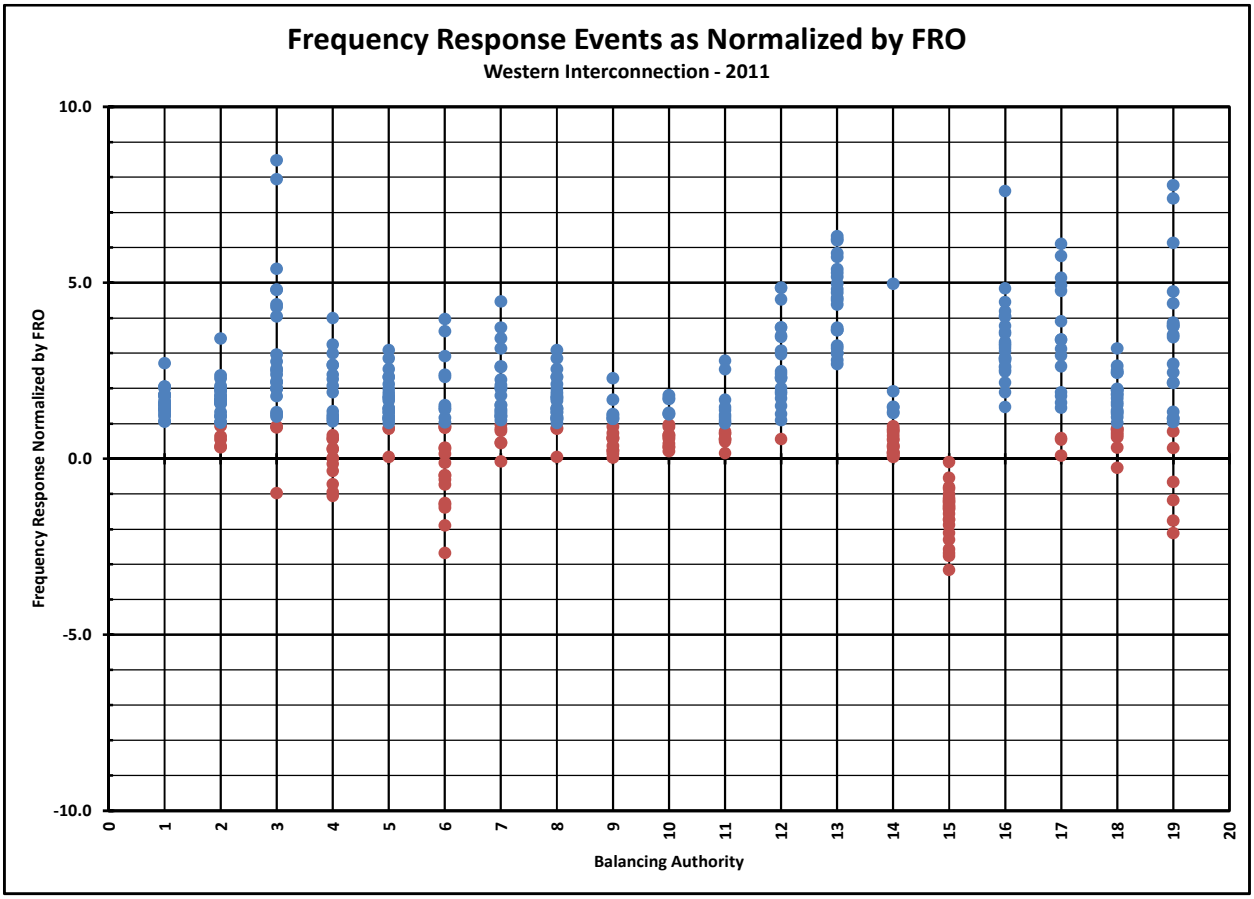
In an attempt to balance the workload of Balancing Authorities with the need for accuracy in the FRM, the standard will require at least 20 samples selected during the course of the year to compute the FRM. Research conducted by the FRSDT indicated that a Balancing Authority's FRM will converge to a reasonably stable value with at least 20 samples.

[8] Single Event Analysis based on results of Frequency Response Standard Field Trial Analysis, September 17, 2012.


Frequency Response Events as Normalized by FRO
Eastern Interconnection - 2011
Frequency Response Normalized by FRO
50.0
25.0
0.0
-25.0
-50.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Balancing Authority


Frequency Response Events as Normalized by FRO
Eastern Interconnection - 2011
Frequency Response Normalized by FRO
10.0
5.0
0.0
-5.0
-10.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Balancing Authority


Frequency Response Events as Normalized by FRO
Western Interconnection - 2011
Frequency Response Normalized by FRO
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Balancing Authority


Frequency Response Events as Normalized by FRO
Western Interconnection - 2011
Frequency Response Normalized by FRO
10.0
5.0
0.0
-5.0
-10.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Balancing Authority

Sample Size

In order to support field trial evaluations of sample size, sampling intervals, and aggregation techniques, the FRSDT will be retrieving scan rate data from the Balancing Authorities for each SEFRD. Additional frequency events may also be requested for research purposes, though they will not be included in the FRM computation.

FERC Order No. 693 directed the ERO (at P 375) to define the number of Frequency Response surveys that were conducted each year and to define a necessary amount of Frequency Response. R1 addresses both of these directives:

- There is a single annual survey of at least 20 events each year.
- The FRM calculated on FRS Form 1 is compared by the ERO against the FRO determined 12 months earlier (when the last FRS Form 1 was submitted) to verify the Balancing Authority provided its share of Interconnection Frequency Response.

Median as the Standard's Measure of Balancing Authority Performance

The FRSDT evaluated different approaches for "averaging" individual event observations to compute a technically sound estimate of Frequency Response Measure. The MW contribution for a single BA in a multi-BA Interconnection is small compared to the minute to minute changes in load, interchange and generation. For example, a 3000 MW BA in the ~~east~~ Eastern Interconnection may only be called on to contribute 10MW for the loss of a 1000MW. The 10 MW of governor and load response may easily be masked as a coincident change in load.

In general, statisticians use the median as the best measure of central tendency when a population has outliers. Two independent reviews by the FRSDT has shown the Median to be less influenced by noise in the measurement process and the team has chosen the median as the initial metric for calculating the BAs' Frequency Response Measure.

The FRSDT performed extensive empirical studies and engaged in lively discussions in an attempt to determine the best aggregation technique for a sample set size of at least 20 events. Mean, median, and linear regression techniques were used on a trial basis with the data that was available during the early phases of the effort.

A key characteristic of the "aggregation challenge" is related to the use of actual net interchange data for measuring frequency response. The tie line flow measurements are varying continuously due to other operational phenomena occurring concurrently with the provision of frequency response. (*See* Appendix 1 for details.) All samples have "noise" in them, as most operational personnel who have computed the frequency response of their BA can attest. What has also become apparent to the FRSDT is that while the majority of the frequency response samples have similar levels of noise in them, a few of the samples may have much larger errors in them than the others that result in unrepresentative results. And with the sample set size of interest, it is common to have unrepresentative errors in these few samples to be very large and asymmetric. For example, one BA's subject matter expert observed recently that 4 out of 31 samples had a much larger error contribution than the other 27 samples, and that 3 out of 4 of the very high error samples grossly underestimated the frequency response. The median value demonstrated greater resiliency to this data quality problem than the mean with this data set. (The median has also demonstrated superiority to

linear regression in the presence of these described data quality problems in other analyses conducted by the FRSDT, but the linear regression showed better performance than the mean.)

The above can be demonstrated with a relatively simple example. Let's assume that a Balancing Authority's true frequency response has an average value of -200 MW/ .1 Hz. Let's also assume that this Balancing Authority installed "special" perfect metering on key loads and generators, so that we could know the true frequency response of each sample. And then we will compare them with that measured by typical tie line flow metering, with the kind of noise and error that occurs commonly and "not so commonly". Let's start with the following 4 samples having a common level of noise, with MW/ .1 Hz as the unit of measurement.

Perfect measurement	Noise	Samples from tie lines
-190	-30	-220
-210	-20	-230
-220	10	-210
-180	20	-160
-200	Mean	-205
-200	Median	-215

Now let's add a fifth sample, which is highly contaminated with noise and error that grossly underestimates frequency response.

Perfect measurement	Noise	Samples from tie lines
-190	-30	-220
-210	-20	-230
-220	10	-210
-180	20	-160
-200	250	+50
-200	Mean	-154
-200	Median	-210

It is clear from the above simplistic example that the mean drops by about 25% while the median is affected minimally by the single highly contaminated value.

Based on the analyses performed thus far, the FRSDT believes that the median's superior resiliency to this type of data quality problem makes it the best aggregation technique at this time. However, the FRSDT sees merit and promise in future research with sample filtering combined with a technique such as linear regression.

When compared with the mean, linear regression shows superior performance with respect to the elimination of noise because the measured data is weighted by the size of the frequency change associated with the event. Since the noise is independent from frequency change, the greater weighting on larger events provides a superior technique for reducing the effect of noise on the results.

However, linear regression does not provide a better method when dealing with a few samples with large magnitudes of noise and unrepresentative error. There are only two alternatives to improve over the use of median when dealing with these larger unrepresentative errors:

1. Increase the sample size, or
2. Actively eliminate outliers due to unrepresentative error.

Unfortunately, the first alternative, increasing the sample size is not available because significantly more sample events are not available within the measurement time period of one year. Linear regression techniques are being investigated that have an active outlier elimination algorithm that would eliminate data that lie outside ranges of the 96th percentile and 99th percentile, for example.

Still, the use of linear regression has value in the context of this standard. The NERC Resources Subcommittee will use linear regression to evaluate Interconnection frequency response, particularly to evaluate trends, seasonal impacts, time of day influences, etc. The Good Practices and Tools section of this document outlines how a BA can use linear regression to develop a predictive tool for its operators.

Additional discussion on this topic is contained in "Appendix 1 – Data Quality Concerns Related to the Use of Actual Net Interchange Value" of this document.

The NERC Frequency Response Initiative Report addressed the relative merits of using the median versus linear regression for aggregating single event frequency response samples into a frequency response measurement score for compliance evaluation. This report provided 11 evaluation criteria as a basis for recommending the use of linear regression instead of the median for the frequency response measurement aggregation technique. The FRSDT made its own assessment on the basis of these evaluation criteria on September 20, 2012, but concluded that the median would be the best aggregation technique to use initially when the relative importance of each criterion was considered. A brief summary of the FRSDT majority consensus on the basis of each evaluation criterion is provided below.

- Provides two dimensional measurement – The FRSDT agrees that the two dimensional concept is a useful way to perceive frequency response characteristics, and that it may be useful for potential future modeling activities. Better data quality would increase support for such future efforts, and the use of the median for initial compliance evaluations within BAL-003-1 should not hinder any such effort. The FRSDT perceived this as a mild advantage for linear regression.
- Represents nonlinear characteristics – With considerations similar to those applied to the previous criterion, the FRSDT perceived this as a mild advantage for linear regression.
- Provides a single best estimator – The FRSDT ~~put~~ gave minimal importance to the characteristic of the median averaging the middle values when used with an even number of samples.
- Is part of a linear system - With considerations similar to those applied to the first two criteria, the FRSDT perceived this as a mild advantage for linear regression (particularly in the modeling area.)
- Represents bimodal distributions – The FRSDT ~~put~~ gave minimal weight of this criterion, as a change in Balancing Authority footprint does not seem to be addressed adequately by any aggregation technique.
- Quality statistics available – The FRSDT perceived this as a mild advantage for linear regression in that the statistics would be coupled directly to the compliance evaluation. The FRSDT also included this criterion as part of the modeling advantages cited above.

The FRSDT supports collecting data and performing quality statistical analysis. If it is determined that the use of the median, as opposed to a mean or linear regression aggregation, is yielding undesirable consequences, the FRSDT recommends that other aggregation techniques be re-evaluated at that time.

- Reducing influence of noise - This is the dominant concern of the FRSDT, and it perceives the median to have a major advantage over linear regression in addressing noise in the change in actual net interchange calculation. The FRSDT bases this judgment on: prior FRSDT studies that have shown that the median produces more stable results; the data used in the NERC Frequency Response Initiative document exhibits large quantities of noise; prior efforts of FRSDT members in performing frequency response sampling for their own Balancing Authorities over many years; and similar observations of noise in the CERTS frequency Monitoring Application. The FRSDT has serious concerns that the influence of noise has a greater tendency to yield a "false positive" compliance violation with linear regression than with the median. Also, limited studies performed by the FRSDT indicates the possibility that the resultant frequency response measure would yield more measurement variation across years with linear regression versus the median while the actual Balancing Authority performance remains unchanged.
- Reducing the influence of outliers – This is related to the previous criterion. The FRSDT recognizes four main sources of noise: concurrent operating phenomena (described elsewhere in this document), transient tie line flows for nearby contingencies, data acquisition time skew in tie line data measurements, and time skew and data compression issues in archiving techniques and tools such as PI. Some outliers may be caused in part by true variation in the actual frequency response, and it is desirable to include those in the frequency response measure. The FRSDT supports efforts in the near future to distinguish between outliers caused by noise versus true frequency response, and progress in this area may make it feasible and desirable to replace the median with linear regression, or some other validated technique. The FRSDT does note that this is a substantial undertaking, and it would require substantial input from a sufficient number of experts to help distinguish noise from true frequency response.
- Easy to calculate – The FRSDT perceives this to be a minor to moderate advantage for the median. However, more complex (but reasonably so) techniques would receive more support if clear progress can be made in noise elimination.
- Familiar indicator – The FRSDT perceives this to be a minor to moderate advantage for the median. However, more complex (but reasonably so) techniques would receive more support if clear progress can be made as a result of noise elimination.
- Currently used as a measure in BAL-003 – The present standard refers to an average and does not provide specific guidance on the computation of that average, but the FRSDT puts minimal weight on this evaluation criterion.

In summary, the FRSDT perceives an approximate balance between the modeling advantage for linear regression and the simplicity advantage of the median. However, the clear determinant in endorsing the use of the median is the data quality issue related to concurrent operational phenomena, transient tie line flows, and data acquisition and archiving limitations.

FERC Order No. 693 also directed the Standard (at P 375) to identify methods for Balancing Authorities to obtain Frequency Response. Requirement R1 allows Balancing Authorities to participate in Frequency Response Sharing Groups (FRSGs) to provide or obtain Frequency Response. These may be the same FRSGs that cooperate for BAL-002-0 or may be FRSGs that form for the purposes of BAL-003-1.

If BAs participate as an FRSG for BAL-003-1, compliance is based on the sum of the participants' performance.

Two other ways that BAs could obtain Frequency Response are through Supplemental Service or Overlap Regulation Service:

- No special action is needed if a BA provides or receives supplemental regulation. If the regulation occurs via Pseudo Tie, the transfer occurs automatically as part of Net Actual Interchange (NIA) and in response to information transferred from recipient to provider.
- If a BA provides overlap regulation, its FRS Form 1 will include the Frequency Bias setting as well as peak load and generation of the combined Balancing Authority Areas. The FRM event data will be calculated on the sum of the provider's and recipient's performance.

In the Violation Severity Levels for Requirement R1, the impact of a BA not having enough frequency response depends on two factors:

- Does the Interconnection have sufficient response?
- How short is the BA in providing its FRO?

The VSL takes these factors into account. While the VSLs look different than some other standards, an explanation would be helpful.

VSLs are a starting point for the enforcement process. The combination of the VSL and VRF is intended to measure a violation's impact on reliability and thus levy an appropriate sanction. Frequency Response is an interconnection-wide resource. The proposed VSLs are intended to put multi-BA Interconnections on the same plane as single-BA Interconnections.

Consider a small BA whose performance is 70% of its FRO. If all other BAs in the Interconnection are compliant, the small BA's performance has negligible impact on reliability, yet would be sanctioned at the same level as a BA who was responsible for its entire Interconnection. It is not rational to sanction this BA the same as a single BA Interconnection that had insufficient Frequency Response, because this would treat multi-BA Interconnections more harshly than single BA Interconnections on a significant scale.

The "Lower" and "Medium" VSLs say that the Interconnection has sufficient Frequency Response but individual BAs are deficient by small or larger amounts respectively. The High and Severe VSLs say the Interconnection does not meet the FRO and assesses sanctions based on whether the BA is deficient by a small or larger amount respectively.

Requirement 2

R2. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined in accordance with~~subject to~~ Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO.

Background and Rationale

Attachment A of the Standard discusses the process the ERO will follow to validate the BA's FRS Form 1 data and publish the official Frequency Bias Settings. Historically, it has taken multiple rounds of validation and outreach to confirm each BA's data due to transcription errors, misunderstanding of instructions, and other issues. While BAs historically submit Bias Setting data by January 1, it often takes one or more months to complete the process.

The target is to have BAs submit their data by January 10. The BAs are given 30 days to assemble their data since the BAs are dependent on the ERO to provide them with FRS Form 1, and there may be process delays in distributing the forms since they rely on identification of frequency events through November 30 of the preceding year.

Frequency Bias Settings generally change little from year to year. Given the fact that BAs can encounter staffing or EMS change issues coincident with the date the ERO sets for new Frequency Bias Setting implementation, the standard provides a 24 hour window on each side of the target date.

To recap the annual process:

1. The ERO posts the official list of frequency events to be used for this Standard in early December. The FRS Form 1 for each Interconnection will be posted shortly thereafter.

2. The Balancing Authority submits its revised annual Frequency Bias Setting value to NERC by January 10.

3. The ERO and the Resources Subcommittee validate Frequency Bias Setting values, perform error checking, and calculate, validate, and update CPS2 L10 values. This data collection and validation process can take as long as two months.

4. Once the L10 and Frequency Bias Setting values are validated, The ERO posts the values for the upcoming year and also informs the Balancing Authorities of the date on which to implement revised Frequency Bias Setting values. Implementation typically would be on or about March 1st of each year.

BAL-003-0.1b standard requires a minimum Frequency Bias Setting equal in absolute value to one percent of the Balancing Authority's estimated yearly peak demand (or maximum generation level if native load is not served). For most Balancing Authorities this calculated amount of Frequency Bias is significantly greater in absolute value than their actual Frequency Response characteristic (which represents an over-bias condition) resulting in over-control

since a larger magnitude response is realized. This is especially true in the Eastern Interconnection where this condition requires excessive secondary frequency control response which degrades overall system performance and increases operating cost as compared to requiring an appropriate balance of primary and secondary frequency control response.

Balancing Authorities were given a minimum Frequency Bias Setting obligation because there had never been a mandatory Frequency Response Obligation. This historic "one percent of peak per 0.1Hz" obligation, dating back to NERC's predecessor, NAPSIC, was intended to ensure all BAs provide some support to Interconnection frequency.

The ideal system control state exists when the Frequency Bias Setting of the Balancing Authority exactly matches the actual Frequency Response characteristic of the Balancing Authority. If this is not achievable, over-bias is significantly better from a control perspective than under-bias with the caveat that Frequency Bias is set relatively close in magnitude to the Balancing Authority actual Frequency Response characteristic. Setting the Frequency Bias to better approximate the Balancing Authority natural Frequency Response characteristic will improve the quality and accuracy of ACE control, CPS & DCS and general AGC System control response. This is the technical basis for recommending an adjustment to the long standing "1% of peak/0.1Hz" Frequency Bias Setting. The Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard is intended to bring the Balancing Authorities' Frequency Bias Setting closer to their natural Frequency Response. Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard balances the following objectives:

- Bring the Frequency Bias Setting and Frequency Response closer together.
- Allow time to analyze impact on other Standards (CPS, BAAL and to a lesser extent DCS) by adjustments in the minimum Frequency Bias Setting, by accommodating only minor adjustments.
- Do not allow the Frequency Bias Setting minimum to drop below natural Frequency Response, because under-biasing could affect an Interconnection adversely.

Additional flexibility has been added to the Frequency Bias Setting based on the actual Frequency Response (FRM) by allowing the Frequency Bias Setting to have a value in the range from 100% of FRM to 125% of FRM. This change has been included for the following reasons:

- When the new standardized measurement method is applied to BAs with a Frequency Response close to the interconnection minimum response, the requirement to use FRM is as likely to result in a Frequency Bias Setting below the actual response as it is to result in a response above the actual response. From a reliability perspective, it is

always better to have a Frequency Bias Setting slightly above the actual Frequency Response.

- As with single BA interconnections, the tuning of the control system may require that the BA implement a Frequency Response Setting slightly greater in absolute terms than its actual Frequency Response to get the best performance.

- The new standardized measurement method for determining FRM in some cases results in a measured Frequency Response significantly lower than the previous methods used by some BAs. It is desirable to not require significant change in the Frequency Bias Setting for these BAs that experience a reduction in their measured Frequency Response.

Requirement 3

R3. Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias Setting that is:

- *Less than zero at all times, and*
- *Equal to or more negative than its Frequency Response Obligation when the Frequency varies from 60 Hz by more that +/- 0.036 Hz.*

Background and Rationale

In multi-Balancing Authority interconnections, the Frequency Bias Setting should be coordinated among all BAs on the interconnection. When there is a minimum Frequency Bias Setting requirement, it should apply for all BAs. However, BAs using a variable Frequency Bias Setting may have non-linearity in their actual response for a number of reasons including the dead-bands implemented on their generator governors. The measurement to ensure that these BAs are conforming to the interconnection minimum is adjusted to remove the dead-band range from the calculated average Frequency Bias Setting actually used. For BAs using variable bias, FRS Form 1 has a data entry location for the previous year's average monthly Bias. The Balancing Authority and the ERO can compare this value to the previous year's Frequency Bias Setting minimum to ensure R3 has been met.

On single BA interconnections, there is no need to coordinate the Frequency Bias Setting with other BAs. This eliminates the need to maintain a minimum Frequency Bias Setting for any reason other than meeting the reliability requirement as specified by the Frequency Response Obligation.

Requirement 4

R4. Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either:

- *The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or*
- *The Frequency Bias Setting as shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.*

Background and Rationale

This requirement reflects the operating principles first established by NERC Policy 1 and is similar to Requirement R6 of the approved BAL-003-0.1b standard. Overlap Regulation Service is a method of providing regulation service in which the Balancing Authority providing the regulation service incorporates another Balancing Authority's actual interchange, frequency response, and schedules into the providing Balancing Authority's AGC/ACE equation.

As noted earlier, a BA that is providing Overlap Regulation will report the sum of the Bias Settings in its FRS Form 1. Balancing Authorities receiving Overlap Regulation Service have an ACE and Frequency Bias Setting equal to zero (0).

How this Standard Meets the FERC Order 693 Directives

FERC Directive

The following is the relevant paragraph of Order No. 693.

> *Accordingly, the Commission approves Reliability Standard BAL-003-0 as mandatory and enforceable. In addition, the Commission directs the ERO to develop a modification to BAL-003-0 through the Reliability Standards development process that: (1) includes Levels of Non-Compliance; (2) determines the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other requirements of the Reliability Standard are being met, and to modify Measure M1 based on that determination and (3) defines the necessary amount of Frequency Response needed for Reliable Operation for each balancing authority with methods of obtaining and measuring that the frequency response is achieved.*

1. Levels of Non-Compliance

VRFs and VSLs are an equally effective way of assigning compliance elements to the standard.

2. Determine the appropriate periodicity of frequency response surveys necessary to ensure that Requirement R2 and other Requirements of the Reliability Standard are met

BAL-003 V0 R2 (the basis of Order No. 693) deals with the calculation of Frequency Bias Setting such that it reflects natural Frequency Response.

The drafting team has determined that a sample size on the order of at least 20 events is necessary to have a high confidence in the estimate of a BA's Frequency Response. Selection of the frequency excursion events used for analysis will be done via a method outlined in Attachment A to the Standard.

On average, these events will represent the largest 2-3 "clean" frequency excursions occurring each month.

Since Frequency Bias Setting is an annual obligation, the survey of the at least 20 frequency excursion events will occur once each year.

3. Define the necessary amount of Frequency Response needed for Reliable Operation for each Balancing Authority with methods of obtaining and measuring that the frequency response is achieved

Necessary Amount of Frequency Response

The drafting team has proposed the following approach to defining the necessary amount of frequency response. In general, the goal is to avoid triggering the first step of under-frequency load shedding (UFLS) in the given Interconnection for reasonable contingencies expected. The

methodology for determining each Interconnection's and Balancing Authority's obligation is outlined in Attachment A to the Standard.

It should be noted the standard cannot guarantee there will never be a triggering of UFLS as the magnitude of "point C" differs throughout an interconnection during a disturbance and there are local areas that see much wider swings in frequency.

The contingency protection criterion is the largest reasonably expected contingency in the Interconnection. This can be based on the largest observed credible contingency in the previous 10 years or the largest Category C event for the Interconnection.

Attachment A to the standard presents the base obligation by Interconnection and adds a Reliability Margin. The Reliability Margin included addresses the difference between Points B and C and accounts for variables.

For multiple BA interconnections, the Frequency Response Obligation is allocated to BAs based on size. This allocation will be based on the following calculation:

$$\mathrm{FRO_{BA}} = \mathrm{FRO_{Int}} \times \frac{\text{Annual Gen}_{\mathrm{BA}} + \text{Annual Load}_{\mathrm{BA}}}{\text{Annual Gen}_{\mathrm{Int}} + \text{Annual Load}_{\mathrm{Int}}}$$

Methods of Obtaining Frequency Response

The drafting team believes the following are valid methods of obtaining Frequency Response:

- Regulation services.
- Contractual service. The drafting team has developed an approach to obtain a contractual share of Frequency Response from Adjacent Balancing Authorities. See FRS Form 1. While the final rules with regard to contractual services are being defined, the current expectation is that the ERO and the associated Region(s) should be notified beforehand and that the service be at least 6 months in duration.
- Through a tariff (e.g. Frequency Response and regulation service).
- From generators through an interconnection agreement.
- Contract with an internal resource or loads (The drafting team encourages the development of a NAESB business practice for Frequency Response service for linear (droop) and stepped (e.g. LaaR in Texas) response).

Since NERC standards should not prescribe or preclude any particular market related service, BAs and FRSGs may use whatever is most appropriate for their situation.

Measuring that the Frequency Response is Achieved

FRS Form 1 and the underlying data retained by the BA will be used for measuring whether Frequency Response was provided. FRS Form 1 will provide the guidance on how to account for and measure Frequency Response.

Going Beyond the Directive

Based on the combined operating experience of the SDT, the drafting team consensus is that each Interconnection has sufficient Frequency Response. If margins decline, there may be a need for additional standards or tools. The drafting team and the Resources Subcommittee are working with the ERO on its Frequency Response Initiative to develop processes and good practices so the Interconnections are prepared. These good practices and tools are described in the following section.

The drafting team is also evaluating a risk-based approach for basing the Interconnection Frequency Response Obligation on an historic probability density of frequency error, and for allocating the obligation on the basis of the Balancing Authority's average annual ACE share of frequency error. This allocation method uses the inverse of the rationale for allocating the CPS1 epsilon requirement by Bias share.

Good Practices and Tools

Background

This section outlines tips and tools to help Balancing authorities meet the Frequency Response Standard or to operate more reliably. If you have suggested additions, please send them to balancing@nerc.com.

Identifying and Estimating Frequency Responsive Reserves

Knowing the quantity and depth of frequency responsive reserves in real time is a possible next step to being better prepared for the next event. The challenge in achieving this is having the knowledge of the capabilities of all sources of frequency response. Presently the primary source of Frequency Response remains with the generation resources in our fleets.

Understanding how each of these sources performs to changes in system frequency and knowing their limitations would improve the BA's ability to measure frequency responsive reserves. Presently there are only guidelines, criteria and protocols in some regions of the industry that identify specific settings and performance expectations of Primary Frequency Response of resources.

One method of gaining a better understanding of performance is to measure performance during actual events that occur on the system. Measuring performance during actual events would only provide feedback for performance during that specific event and would not provide insight into depth of response or other limitations.

Repeated measurements will increase confidence in expected performance. NERC modeling standards are in process to be revised that will improve the BA's insight into predicting available frequency responsive reserves. However, knowing how resources are operated, what modes of operation provide sustained Primary Frequency Response and knowing the operating range of this response would give the BA the knowledge to accurately predict frequency response and the amount of frequency responsive reserves available in real time.

Some benefits have been realized by communicating to generation resources (GO) the importance of operating in modes that allow Primary Frequency Response to be sustained by the control systems of the resource. Other improvements in implementation of Primary Frequency Response have been achieved through improved settings on turbine governors through the elimination of "step" frequency response with the simultaneous reduction in governor dead-band settings.

Improvements in the full AGC control loop of the generating resource, which accounts for the expected Primary Frequency Response, have improved the delivery of quality Primary Frequency Response while minimizing secondary control actions of generators. Some of these actions can provide quick improvement in delivery of Primary Frequency Response.

Once Primary Frequency Response sources are known, the BA could calculate available reserves that are frequency responsive. Planning for these reserves during normal and emergency operations could be developed and added to the normal planning process.

Using FRS Form 1 Data

The information collected for this standard can be supplemented by a few data points to provide the Balancing Authority useful tools and information. The BA could do a regression analysis of its frequency response against the following values:

- Load (value A).
- Interchange (Value A).
- Total generation.
- Spinning reserve.

While the last two values above are not part of Form 1, they should be readily available. Small BAs might even include headroom on its larger generators as part of the regression.

The regression would provide a formula the BA could program in its EMS to present the operator a real time estimate of the BA's Frequency Response.

Statistical outliers in the regression would point to cases meriting further inspection to find causes of low Frequency Response or opportunities for improvement.

Tools

Single generating resource performance evaluation tools for steam turbine, combustion turbine (simple cycle or combined cycle) and for intermittent resources are available at the following link. http://texasre.org/standards_rules/standardsdev/rsc/sar003/Pages/Default.aspx.

These tools and the regional standard associated with them are in their final stages of development in the Texas region.

These tools will be posted on the NERC website.

References

NERC *Frequency Response Characteristic Survey Training Document* (Found in the NERC Operating Manual)

NERC Resources Subcommittee Position Paper on Frequency Response

NERC TIS Report *Interconnection Criteria for Frequency Response Requirements (for the Determination Interconnection Frequency Response Obligations (IFRO)*

Frequency Response Standard Field Trial Analysis, September 17, 2012

Appendix 1 - Data Quality Concerns Related To The Use Of The Actual Net Interchange Value

Actual net interchange for a typical Balancing Authority (BA) is the summation of its tie lines to other BAs. In some cases, there are pseudo-ties in it which reflect the effective removal or addition of load and/or generation from another BA, or it could include supplemental regulation as well. But in the typical scenario, actual net interchange values that are extracted from EMS data archiving can be influenced by data latency times in the data acquisition process, and also any timestamp skewing in the archival process.

Of greater concern, however, are the inevitable variations of other operating phenomena occurring concurrently with a frequency event. The impacts of these phenomena are superimposed on actual net interchange values along with the frequency response that we wish to measure through the use of the actual net interchange value.

To explore this issue further, let's begin with the idealized condition:

- frequency is fairly stable at some value near or a little below 60 Hz
- ACE of the non-contingent BA of interest is 0 and has been 0 for an extended period, and AGC control signals have not been issued recently
- Actual net interchange is "on schedule", and there are no schedule changes in the immediate future
- BA load is flat
- All generators not providing AGC are at their targets
- Variable generation such as wind and solar are not varying
- Operators have not directed any manual movements of generation recently

And when the contingency occurs in this idealized state, the change in actual net interchange will be measuring only the decline in load due to lesser frequency and generator governor response, and, none of the contaminating influences. While the ACE may become negative due to the actual frequency response being less than that called for by the frequency bias setting within the BA's AGC system, this contaminating influence on measuring frequency response will not appear in the actual net interchange value if the measurement interval ends before the generation on AGC responds.

Now let's explore the sensitivity of the resultant frequency response sampling to the relaxation of these idealized circumstances.

1. The "60 Hz load" increases moderately due to time of day concurrent with the frequency event. If the frequency event happens before AGC or operator-directed manual load adjustments occur, then the actual net interchange will be reduced by the moderate increase in load and the frequency response will be underestimated. But if the frequency event happens while AGC response and/or manual adjustments occur, then the actual net interchange will be increased by the AGC response (and/or manual adjustments) and the frequency response will be overestimated.

2. The “60 Hz load” decreases moderately due to time of day concurrent with the frequency event. If the frequency event happens before AGC or operator-directed manual load adjustments occur, then the actual net interchange will be increased by the moderate reduction in load and the frequency response will be overestimated. But if the frequency event happens while AGC response and/or manual adjustments occur, then the actual net interchange will be decreased by the AGC response (and/or manual adjustments) and the frequency response will be underestimated.
3. In anticipation of increasing load during the next hour, the operator increases manual generation before the load actually appears. If the frequency event happens while the generation “leading” the load is increasing, then the actual net interchange will be increased by the increase in manual generation and the frequency response will be overestimated. But if the frequency event occurs when the result of AGC signals sent to offset the operator’s leading actions take effect, then the actual net interchange will be decreased and the frequency response is underestimated.
4. In anticipation of decreasing load during the next hour, the operator decreases manual generation before the load actually declines. If the frequency event happens while the generation “leading” the load downward is decreasing, then the actual net interchange will be decreased by the reduction in manual generation and the frequency response will be underestimated. But if the frequency event occurs when the result of AGC signals sent to offset the operator’s leading actions take effect, then the actual net interchange will be increased and the frequency response is overestimated.
5. A schedule change to export more energy is made at 5 minutes before the top of the hour. The BA’s “60 Hz load” is not changing. The schedule change is small enough that the operator is relying on upward movement of generators on AGC to provide the additional energy to be exported. The time at which the AGC generators actually begin to provide the additional energy is dependent on how much time passes before the AGC algorithm gets out of its deadbands, the individual generator control errors get large enough for sending out the control signal, and maybe 20 seconds to 3 minutes for the response to be effected. The key point here is that it is not clear when the effects of a schedule change, as manifested in a change in generation and then ultimately a change in actual net interchange, will occur.
6. With the expected penetration of wind in the near future, unanticipated changes in their output will tend to affect actual net interchange and add noise to the frequency response observation process.

To a greater or lesser extent, 1 through 4 above are happening continuously for the most part with most BAs in the Eastern and Western Interconnections. The frequency response is buried within the typical hour to hour operational cacophony superimposed on actual net interchange values. The choice of metrics will be important to artfully extract frequency response from the noise and other unrepresentative error.

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Project 2007-12 Frequency Response BAL-003-1
Mapping Document

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
R1. Each Balancing Authority shall review its Frequency Bias Settings by January 1 of each year and recalculate its setting to reflect any change in the Frequency Response of the Balancing Authority Area. R1.1. The Balancing Authority may change its Frequency Bias Setting, and the method used to determine the setting, whenever any of the factors used to determine the current bias value change. R1.2. Each Balancing Authority shall report its Frequency Bias Setting, and method	This Requirement has been moved into BAL-003-1 Attachment A & FRS Form 1 as described in the Proposed Language Section	Attachment A Balancing Authorities that merge or that transfer load or generation are encouraged to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation to the Interconnection remains the same and so that CPS limits can be adjusted. Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
for determining that setting, to the NERC Operating Committee.		submit their FRS Form 1. AND FRS Form 1 Note : Balancing Authorities with variable Frequency Bias Settings shall calculate monthly average Frequency Bias Settings. The previous year's monthly averages will be reported annually on FRS Form 1.
R2. Each Balancing Authority shall establish and maintain a Frequency Bias Setting that is as close as practical to, or greater than, the Balancing Authority's Frequency Response. Frequency Bias may be calculated several ways: **R2.1.** The Balancing Authority may use a fixed Frequency Bias value which is based on a fixed, straight-line function of Tie Line deviation versus Frequency Deviation. The	This Requirement is included in BAL-003-1 as described in the Proposed Language Section.	**R2.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO. **R3.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias setting that is:

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
Balancing Authority shall determine the fixed value by observing and averaging the Frequency Response for several Disturbances during on-peak hours. **R2.2.** The Balancing Authority may use a variable (linear or non-linear) bias value, which is based on a variable function of Tie Line deviation to Frequency Deviation. The Balancing Authority shall determine the variable frequency bias value by analyzing Frequency Response as it varies with factors such as load, generation, governor characteristics, and frequency.		3.1 Less than zero at all times, and 3.2 Equal to or more negative than its Frequency Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz. AND Attachment A Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO each year to allow the ERO to validate the revised Frequency Bias Settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit their FRS Form 1. AND FRS Form 1

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
		Note : Balancing Authorities with variable Frequency Bias Settings shall calculate monthly average Frequency Bias Settings. The previous year's monthly averages will be reported annually on FRS Form 1. AND A portion of this Requirement is being phased out in accordance with the process detailed in the Procedure. This phase out is intended to bring the Frequency Bias Setting closer or equal to the natural Frequency Response.
R3. Each Balancing Authority shall operate its Automatic Generation Control (AGC) on Tie Line Frequency Bias, unless such operation is adverse to system or Interconnection reliability.	This Requirement has been removed from the BAL-003-1 standard.	This Requirement has been removed from proposed standard BAL-003-I. It is duplicative of BAL-005-0.1b Requirements R6 and R7. BAL-005-0.1b R6. The Balancing Authority's AGC shall compare total Net Actual Interchange to total Net Scheduled Interchange plus Frequency Bias obligation to determine the Balancing Authority's ACE. Single Balancing Authorities operating asynchronously may employ alternative ACE calculations such as (but not limited to) flat frequency control. If a Balancing Authority is unable to calculate ACE for more than 30 minutes it shall notify its

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
		Reliability Coordinator. R7. The Balancing Authority shall operate AGC continuously unless such operation adversely impacts the reliability of the Interconnection. If AGC has become inoperative, the Balancing Authority shall use manual control to adjust generation to maintain the Net Scheduled Interchange.
R4. Balancing Authorities that use Dynamic Scheduling or Pseudo-ties for jointly owned units shall reflect their respective share of the unit governor droop response in their respective Frequency Bias Setting. R4.1. Fixed schedules for Jointly Owned Units mandate that Balancing Authority (A) that contains the Jointly Owned Unit must incorporate the respective share of the unit governor droop response for any Balancing Authorities that have fixed	This Requirement has been removed from the BAL-003-1 standard.	This Requirement addresses how to calculate Frequency Bias Settings. This is no longer needed since the Frequency Bias Settings are calculated in FRS Form 1 using Frequency Response associated with the "official" list of events and a couple of "floor or ceiling" limits (% of peak load/gen and FRO). The entire calculation is built into the FRS Form 1 workbook.

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
schedules (B and C). R4.2. The Balancing Authorities that have a fixed schedule (B and C) but do not contain the Jointly Owned Unit shall not include their share of the governor droop response in their Frequency Bias Setting.		
R5. Balancing Authorities that serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of the Balancing Authority's estimated yearly peak demand per 0.1 Hz change. **R5.1.** Balancing Authorities that do not serve native load shall have a monthly average Frequency Bias Setting that is at least 1% of its estimated maximum generation level in the coming year per 0.1 Hz change.	This Requirement has been combined into Requirements R2 and R3 of BAL-003-1.	**R2.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection and is not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting shall implement the Frequency Bias Setting determined subject to Attachment A, as validated by the ERO, into its Area Control Error (ACE) calculation during the implementation period specified by the ERO. **R3.** Each Balancing Authority that is a member of a multiple Balancing Authority Interconnection, is not receiving Overlap Regulation Service and is utilizing a variable Frequency Bias Setting shall maintain a Frequency Bias setting that is: 3.1 Less than zero at all times, and 3.2 Equal to or more negative than its Frequency

Standard: BAL-003-1 Frequency Response and Frequency Bias Setting		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in BAL-003-1/Comments**
		Response Obligation when Frequency varies from 60 Hz by more than +/- 0.036 Hz.
R6. A Balancing Authority that is performing Overlap Regulation Service shall increase its Frequency Bias Setting to match the frequency response of the entire area being controlled. A Balancing Authority shall not change its Frequency Bias Setting when performing Supplemental Regulation Service.	This Requirement has been moved into BAL-003-1 Requirement R4.	**R4.** Each Balancing Authority that is performing Overlap Regulation Service shall modify its Frequency Bias Setting in its ACE calculation, in order to represent the Frequency Bias Setting for the combined Balancing Authority Area, to be equivalent to either: • The sum of the Frequency Bias Settings as shown on FRS Form 1 and FRS Form 2 for the participating Balancing Authorities as validated by the ERO, or • The Frequency Bias Setting as shown on FRS Form 1 and FRS Form 2 for the entirety of the participating Balancing Authorities' Areas.

Violation Risk Factor and Violation Severity Level Assignments

Project 2007-12 – Frequency Response

This document provides the drafting team's justification for assigning draft standard Requirement violation risk factors (VRFs) and violation severity levels (VSLs) for:

- BAL-003-1 — Frequency Response and Frequency Bias Setting

Each primary Requirement is assigned a VRF and a set of one or more VSLs. These elements support the determination of an initial value range for the Base Penalty Amount regarding violation of requirements in FERC-approved Reliability Standards, as defined in the ERO Sanction Guidelines.

Justification for Assignment of Violation Risk Factors

The Frequency Response Standard Drafting Team applied the following NERC criteria when proposing VRFs for the requirements under this project:

High Risk Requirement

A requirement that, if violated, could directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures; or, a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures, or could hinder restoration to a normal condition.

Medium Risk Requirement

A requirement that, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system. However, violation of a medium risk requirement is unlikely to lead to bulk electric system instability, separation, or cascading failures; or, a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly and adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. However, violation of a medium risk requirement is unlikely, under emergency, abnormal, or restoration conditions anticipated by the preparations, to lead to bulk electric system instability, separation, or cascading failures, nor to hinder restoration to a normal condition.

Lower Risk Requirement

A requirement that is administrative in nature and a requirement that, if violated, would not be expected to adversely affect the electrical state or capability of the bulk electric system, or the

ability to effectively monitor and control the bulk electric system; or, a requirement that is administrative in nature and a requirement in a planning time frame that, if violated, would not, under the emergency, abnormal, or restorative conditions anticipated by the preparations, be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. A planning requirement that is administrative in nature.

The SDT also considered consistency with the FERC Violation Risk Factor Guidelines for setting VRFs[1]:

Guideline (1) — Consistency with the Conclusions of the Final Blackout Report
The Commission seeks to ensure that Violation Risk Factors assigned to Requirements of Reliability Standards in these identified areas appropriately reflect their historical critical impact on the reliability of the Bulk-Power System.

In the VSL Order, FERC listed critical areas (from the Final Blackout Report) where violations could severely affect the reliability of the Bulk-Power System:[2]

- Emergency operations
- Vegetation management
- Operator personnel training
- Protection systems and their coordination
- Operating tools and backup facilities
- Reactive power and voltage control
- System modeling and data exchange
- Communication protocol and facilities
- Requirements to determine equipment ratings
- Synchronized data recorders
- Clearer criteria for operationally critical facilities
- Appropriate use of transmission loading relief

Guideline (2) — Consistency within a Reliability Standard
The Commission expects a rational connection between the sub-Requirement Violation Risk Factor assignments and the main Requirement Violation Risk Factor assignment.

Guideline (3) — Consistency among Reliability Standards
The Commission expects the assignment of Violation Risk Factors corresponding to Requirements that address similar reliability goals in different Reliability Standards would be treated comparably.

[1] North American Electric Reliability Corp., 119 FERC 61,145, order on reh'g and compliance filing, 120 FERC 61,145 (2007) ("VRF Rehearing Order").
[2] Id. at footnote 15.

Guideline (4) — Consistency with NERC's Definition of the Violation Risk Factor Level
Guideline (4) was developed to evaluate whether the assignment of a particular Violation Risk Factor level conforms to NERC's definition of that risk level.

Guideline (5) — Treatment of Requirements that Co-mingle More Than One Obligation
Where a single Requirement co-mingles a higher risk reliability objective and a lesser risk reliability objective, the VRF assignment for such Requirements must not be watered down to reflect the lower risk level associated with the less important objective of the Reliability Standard.

Justification for Assignment of Violation Severity Levels:

In developing the VSLs for the standards under this project, the SDT anticipated the evidence that would be reviewed during an audit, and developed its VSLs based on the noncompliance an auditor may find during a typical audit. The SDT based its assignment of VSLs on the following NERC criteria:

Lower	Moderate	High	Severe
Missing a minor element (or a small percentage) of the required performance The performance or product measured has significant value as it almost meets the full intent of the requirement.	Missing at least one significant element (or a moderate percentage) of the required performance. The performance or product measured still has significant value in meeting the intent of the requirement.	Missing more than one significant element (or is missing a high percentage) of the required performance or is missing a single vital component. The performance or product has limited value in meeting the intent of the requirement.	Missing most or all of the significant elements (or a significant percentage) of the required performance. The performance measured does not meet the intent of the requirement or the product delivered cannot be used in meeting the intent of the requirement.

FERC VSL guidelines are presented below, followed by an analysis of whether the VSLs proposed for each requirement in this standard meet the FERC Guidelines for assessing VSLs:

Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance

Compare the VSLs to any prior levels of non-compliance and avoid significant changes that may encourage a lower level of compliance than was required when levels of non-compliance were used.

Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties

A violation of a “binary” type requirement must be a “Severe” VSL.

Do not use ambiguous terms such as “minor” and “significant” to describe noncompliant performance.

Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement

VSLs should not expand on what is required in the requirement.

Guideline 4: Violation Severity Level Assignment Should Be Based on a Single Violation, Not on a Cumulative Number of Violations

Unless otherwise stated in the requirement, each instance of non-compliance with a requirement is a separate violation. Section 4 of the Sanction Guidelines states that assessing penalties per violation per day basis is the “default” for penalty calculations.

VRF and VSL Justification

BAL-003-1 VRF and VSL Justifications		
R1	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for the contingency. This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring calculated FRM to be equal to or more negative than FRO. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This requirement is similar in concept to the current enforceable BAL-003-0.1b standard Requirement R2 which specifies a Medium VRF.
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for the contingency. This is consistent with the NERC definition.
	FERC VRF G5	This requirement does not co-mingle reliability objectives.

	Discussion	
	Proposed Lower VSL	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO
	Proposed Moderate VSL	The summation of the Balancing Authorities' FRM within an Interconnection was equal to or more negative than the Interconnection's FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO
	Proposed High VSL	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 1% but by at most 30% or 15 MW/0.1 Hz, whichever one is the greater deviation from its FRO
	Proposed Severe VSL	The summation of the Balancing Authorities' FRM within an Interconnection did not meet its FRO and the Balancing Authority's, or Frequency Response Sharing Group's, FRM was less negative than its FRO by more than 30% or by more than 15 MW/0.1 Hz, whichever is the greater deviation from its FRO
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the calculated FRM being less negative than FRO.
	FERC VSL G1 Discussion	This is not applicable since there was not a Requirement mandating a certain level of Frequency Response prior to this standard.
	FERC VSL G2 Discussion	Proposed VSL's is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on the amount the calculated FRM is less negative than FRO.
	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider results of the calculation required. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

R2	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities to implement the Frequency Bias Setting validated by the ERO. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Lower VRF however BAL-003-1 Requirements R1, R3, and R4 specify a Medium VRF and the SDT believes it is appropriate for this Requirement to also possess a Medium VRF given the nature of the revision to BAL-003-0.1b.
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition.
	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.

	Proposed Lower VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting failed to implement the validated Frequency Bias Setting value into its ACE calculation within the implementation period specified but did so within 5 calendar days from the implementation period specified by the ERO.
	Proposed Moderate VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 5 calendar days but less than or equal to 15 calendar days from the implementation period specified by the ERO.
	Proposed High VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting implemented the validated Frequency Bias Setting value into its ACE calculation in more than 15 calendar days but less than or equal to 25 calendar days from the implementation period specified by the ERO.
	Proposed Severe VSL	The Balancing Authority in a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a fixed Frequency Bias Setting did not implement the validated Frequency Bias Setting value into its ACE calculation in more than 25 calendar days from the implementation period specified by the ERO.
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating increments for tardiness implementing the validated Frequency Bias Setting into the ACE calculation.
	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Lower VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL's is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on how late the validated Frequency Bias Setting is implemented.
	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider performance of required action. Proposed VSL's are consistent with the requirement.
	FERC VSL G4	Proposed VSL's are based on a single violation and not a cumulative

	Discussion	violation methodology.

R3	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting in its ACE equation and would provide support for a contingency. This is consistent with the NERC definition.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities to implement a Frequency Bias Setting validated by the ERO. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Lower VRF however BAL-003-1 Requirements R1, R2, and R4 specify a Medium VRF and the SDT believes it is appropriate for this Requirement to also possess a Medium VRF given the nature of the revision to BAL-003-0.1b.
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support for a contingency. This is consistent with the NERC definition.
	FERC VRF G5	This requirement does not co-mingle reliability objectives.

	Discussion	
	Proposed Lower VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 1% but by at most 10%.
	Proposed Moderate VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 10% but by at most 20%.
	Proposed High VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response Obligation by more than 20% but by at most 30%.
	Proposed Severe VSL	The Balancing Authority that is a member of a multiple Balancing Authority Interconnection and not receiving Overlap Regulation Service and uses a variable Frequency Bias Setting average Frequency Bias Setting during periods when the clock-minute average frequency was outside of the range 59.964 Hz to 60.036 Hz was less negative than its Frequency Response obligation by more than 30%..
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the calculated average Frequency Bias Setting being less negative than its minimum as defined in Attachment B.
	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R1 which specifies a Medium VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL is not binary. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based on the calculated average Frequency Bias Setting being less negative than its minimum as defined in Attachment B.

	FERC VSL G3 Discussion	Proposed VSL does not expand on what is required. The VSLs assigned only consider compliance with the Frequency Bias Setting calculation and implementation required. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

R4	Proposed VRF	Medium
	NERC VRF Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition. In addition, this Requirement VRF is consistent with the BAL-003-0 Requirement which has been approved by FERC.
	FERC VRF G1 Discussion	This Requirement is more administrative in nature requiring entities providing Overlap Regulation Services to correctly increase its Frequency Bias Setting. The requirement does not directly correlate to the list of critical areas identified in the FERC VRF Guideline 1. Guideline 1 appears to conflict with guideline 4. Guideline 1 identifies a list of topics that encompass nearly all topics within the NERC Reliability Standards and implies that these requirements should be assigned a High VRF. Guideline 4 directs assignment of VRFs based on the impact of a specific requirement on the reliability of the system. The SDT believes that Guideline 4 better reflects the intent for assigning VRFs for this standard since this approach is focused on the reliability impact of the requirement.
	FERC VRF G2 Discussion	Consistency within a Reliability Standard exists. This Requirement does not contain Parts. Requirement action is unique with respect to other standard requirements. All standard requirements have a common reliability focus relevant to Frequency Response and Frequency Bias Setting.
	FERC VRF G3 Discussion	The Requirement VRF is consistent with other BES standards addressing responsiveness. This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R6 which specifies a Medium VRF
	FERC VRF G4 Discussion	This Requirement, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system but would unlikely result in the bulk electric system instability, separation, or cascading failures since a Balancing Authority would have the

		previous year's Frequency Bias Setting already in its ACE equation and would provide support f the contingency. This is consistent with the NERC definition. In addition, this Requirement VRF is consistent with the BAL-003-0 Requirement which has been approved by FERC.
	FERC VRF G5 Discussion	This requirement does not co-mingle reliability objectives.
	Proposed Lower VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error less than 10% of the validated or calculated value.
	Proposed Moderate VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error more than 10% but less than or equal to 20% of the validated or calculated value
	Proposed High VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with combined footprint setting error more than 20% but less than or equal to 30% of the validated or calculated value.
	Proposed Severe VSL	The Balancing Authority incorrectly changed the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services with setting error more than 30% of the validated or calculated value. OR The Balancing Authority failed to change the Frequency Bias Setting value used in its ACE calculation when providing Overlap Regulation Services
	Compliance with NERC Revised VSL Guidelines	The NERC VSL guidelines are satisfied by incorporating percentage of noncompliance performance for the absolute value of the Balancing Authorities' calculated monthly average Frequency Bias Setting being below the minimum percentage specified by the ERO. The VSL also includes a binary requirement for failing to change the Frequency Bias Setting value when providing Overlap Regulation Services.
	FERC VSL G1 Discussion	This Requirement is similar in concept to the current enforceable BAL-003-0.1b Requirement R6 which specifies a Medium VRF. Proposed VSL's meet or exceed the current threshold of compliance.
	FERC VSL G2 Discussion	Proposed VSL's has both a percentage of noncompliance performance and binary element. The binary element is designated severe. Proposed VSL language does not include ambiguous terms and ensures uniformity and consistency in the determination of penalties based only on the amount the calculated monthly average Frequency Bias Setting is below the minimum percentage specified

		by the ERO or if the entity fails to change the Frequency Bias Setting value when providing Overlap Regulation Services.
	FERC VSL G3 Discussion	Proposed VSL's do not expand on what is required. The VSL's assigned only consider results of the calculation required and if the Frequency Bias Setting is correctly set when providing Overlap Regulation Services. Proposed VSL's are consistent with the requirement.
	FERC VSL G4 Discussion	Proposed VSL's are based on a single violation and not a cumulative violation methodology.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Frequency Response Initiative Report

The Reliability Role of Frequency Response

October 30, 2012

RELIABILITY | ACCOUNTABILITY




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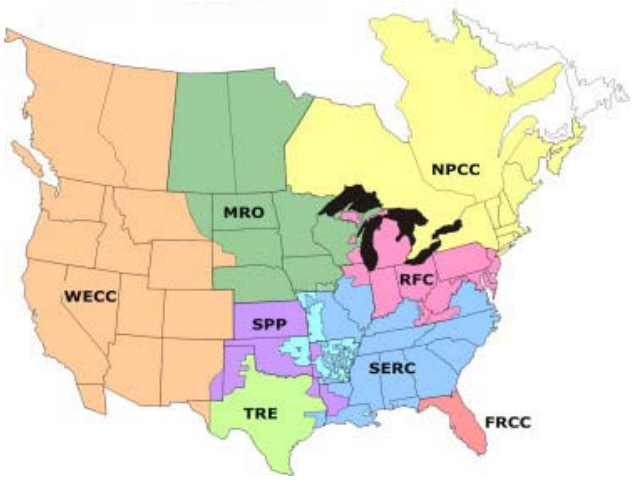
NERC's Mission

The North American Electric Reliability Corporation's (NERC) mission is to ensure the reliability of the North American bulk power system. NERC is the electric reliability organization (ERO) certified by the Federal Energy Regulatory Commission (FERC) to establish and enforce reliability standards for the bulk power system. NERC develops and enforces reliability standards; assesses adequacy annually via a 10-year forecast and summer and winter forecasts; monitors the bulk power system; and educates, trains, and certifies industry personnel. ERO activities in Canada related to the reliability of the bulk power system are recognized and overseen by the appropriate governmental authorities in that country.[1]

NERC assesses and reports on the reliability and adequacy of the North American bulk power system, which is divided into eight Regional areas, as shown on the map and table below. The users, owners, and operators of the bulk power system within these areas account for virtually all the electricity supplied in the United States, Canada, and a portion of Baja California Norte, Mexico.



Note: The highlighted area between SPP RE and SERC denotes overlapping Regional area boundaries. For example, some load-serving entities participate in one Region and their associated transmission owner/operators in another.

NERC Regional Entities	
FRCC Florida Reliability Coordinating Council	**SERC** SERC Reliability Corporation
MRO Midwest Reliability Organization	**SPP RE** Southwest Power Pool Regional Entity
NPCC Northeast Power Coordinating Council	**TRE** Texas Reliability Entity
RFC ReliabilityFirst Corporation	**WECC** Western Electricity Coordinating Council

[1] As of June 18, 2007, FERC granted NERC the legal authority to enforce reliability standards with all U.S. users, owners, and operators of the bulk power system, and made compliance with those standards mandatory and enforceable. In Canada, NERC has memorandums of understanding in place with provincial authorities in Ontario, New Brunswick, Nova Scotia, Québec, and Saskatchewan, and with the Canadian National Energy Board. NERC standards are mandatory and enforceable in Ontario and New Brunswick as a matter of provincial law. NERC has an agreement with Manitoba Hydro that makes reliability standards mandatory for that entity, and Manitoba has recently adopted legislation setting out a framework for standards to become mandatory for users, owners, and operators in the province. In addition, NERC has been designated the "electric reliability organization" under Alberta's Transportation Regulation, and certain reliability standards have been approved in that jurisdiction; others are pending. NERC and NPCC have been recognized as standards-setting bodies by the Régie de l'énergie of Québec, and Québec has the framework in place for reliability standards to become mandatory. Nova Scotia and British Columbia also have frameworks in place for reliability standards to become mandatory and enforceable. NERC is working with the other governmental authorities in Canada to achieve equivalent recognition.

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This report was approved by the Planning Committee October 4, 2012, via e-mail vote.

This report was accepted by the Operating Committee October 12, 2012, via e-mail vote.

Introduction

System planning and operations experts are anticipating significantly higher penetrations of renewable energy resources, most of which are electronically coupled to the grid. This presents some new and different technical challenges, particularly in the reduction of system inertia through the displacement of conventional generation resources during light load periods. Load management and other demand-side initiatives also continue to grow. Most importantly, a continued downward trend for frequency response over a number of years has raised concern that credible contingencies may result in frequency excursions that encroach on the first step of under-frequency load shedding (UFLS). Such large frequency excursions could also trigger undesirable reactions from frequency-sensitive smart grid loads and electronically coupled renewable resources. Taken together, it is clear that maintaining adequate frequency response for bulk power system reliability is becoming more important and complex. While the decline in frequency response has lessened in the last couple of years, it is important that the industry understands the growing complexities of frequency control and is ready with comprehensive strategies to stay ahead of any potential problems.

NERC has undertaken various activities over the past few years in an effort to understand the steady decline in frequency response, particularly in the Eastern Interconnection. While some significant insight has been gained and system-wide and technical improvements have been achieved in the Western Interconnection and ERCOT, a deeper and more dedicated effort is needed.

To comprehensively address the issues related to frequency response, NERC launched the Frequency Response Initiative in 2010. In addition to coordinating the myriad of efforts underway in standards development and performance analysis, the initiative includes performing in-depth analysis of interconnection-wide frequency response to achieve a better understanding of the factors influencing frequency performance across North America.

Basic objectives of the Frequency Response Initiative include:

- development of a clearer and more specific statement of frequency-related reliability factors, including better definitions for “ownership” of responsibility for frequency response;
- collection and provision of more granular frequency response data on and technical analyses of frequency-driven bulk power system events, including root cause analyses;
- metrics and benchmarks to improve frequency response performance tracking;
- increasing coordinated communication and outreach on the issue to include webinars and NERC alerts and to share lessons learned; and
- focused discussion on communication of emerging technology issues, including frequency-related effects caused by renewable energy integration, smart grid technology deployment, and new end-use technology.

In March 2011, the NERC Planning Committee tasked the Transmission Issues Subcommittee (TIS, now the System Analysis and Modeling Subcommittee (SAMS)) with determining what criteria should be used to decide the appropriate level of interconnection-wide frequency response needed for reliability. The TIS started with a body of work already underway by the Resources Subcommittee (RS) and the Frequency Working Group (FWG) of the Operating Committee, and the Frequency Responsive Reserve Standard Drafting Team (FRRSDT). The RS produced a position paper on frequency response outlining the method to translate a resource contingency criterion into an Interconnection Frequency Response Obligation (IFRO).

The report on IFRO was approved by the Planning Committee September 2011.[2] Since that time, numerous modifications and improvements have been made to the IFRO determination analysis and calculations. Those changes are reflected in the IFRO section of this report.

This report provides an overview of the work that has been done to date toward gaining understanding of frequency response. It is in support of NERC Standards Project 2007-12 Frequency Response, which is preparing a revised draft standard (BAL-003-1). That standard is intended to codify a Frequency Response Obligation and means for measuring the performance of the Balancing Authorities.

[2] http://www.nerc.com/docs/pc/tis/Agenda_Item_5.d_Draft_TIS_IFRO_Criteria%20Rev_Final.pdf

Executive Summary

Recommendations

1. NERC should embark immediately on the development of a NERC Frequency Response Resource Guideline to define the performance characteristics expected of those resources for supporting reliability. That guideline should address appropriate parameters for the following:

   - Existing conventional generator fleet – In order to retain or regain frequency response capabilities of the existing generator fleet, adopt:
     - deadbands of ±16.67 mHz,
     - droop settings of 3%–5% depending on turbine type,
     - continuous, proportional (non-step) implementation of the response,
     - appropriate operating modes to provide frequency response, and
     - appropriate outer-loop controls modifications to avoid primary frequency response withdrawal at a plant level.

   - Other frequency-responsive resources – Augment existing generation response with fast-acting, electronically coupled frequency responsive resources, particularly for the arresting and rebound periods of a frequency event:
     - contractual high-speed demand-side response,
     - wind and photo-voltaic – particularly for over-frequency response,
     - storage – automatic high-speed energy retrieval and injection, and
     - variable-speed drives – non-critical, short-time load reduction.

2. Instead of using a fixed margin, the calculation of the Interconnection Frequency Response Obligations should use statistical analysis to determine the necessary margin.

3. The starting frequency for the calculation of IFROs should be the frequency 5% of the lower tail of samples from the statistical analysis, representing a 95% confidence that frequencies will be at or above that value at the start of any frequency event, as shown in table A.

Table A: Interconnection Frequency Variation Analysis (Hz)

Value	Eastern	Western	ERCOT	Québec
Starting Frequency (F_{Start})	59.974	59.976	59.963	59.972

4. The recommended UFLS first-step limitations for IFRO calculations are listed in table B.

Table B: Low-frequency Limits (Hz)	
Interconnection	Highest UFLS Trip Frequency
Eastern	59.5[3]
Western	59.5
ERCOT	59.3
Québec	58.5

5. The allowable frequency deviation (starting frequency minus the highest UFLS step) should be reduced to account for differences between the 1-second and sub-second data for Point C (frequency nadir) by a statistically determined adjustment as listed in table C. Sub-second measurements will more accurately detect Point C.

Table C: Analysis of 1-Second and Sub-Second Data for Point C (CC_{ADJ})				
Interconnection	Number of Samples	Mean	Standard Deviation	CC_{ADJ} (95% Quantile)
Eastern	30	0.0006	0.0038	0.0068
Western	17	0.0012	0.0019	0.0044
ERCOT	58	0.0021	0.0061	0.0121
Québec	0	N/A	N/A	N/A

6. The allowable change in frequency from the IFRO Starting Frequency should be adjusted by a statistically determined value to account for the differences between the Value B and the Point C for historical frequency events as listed in table D.

Table D: Analysis of B Value and Point C (CB_R)				
Interconnection	Number of Samples	Mean	Standard Deviation	CB_R (95% Quantile)
Eastern	41	0.964	0.0149	1.0 (0.989)[4]
Western	30	1.570	0.0326	1.625
ERCOT	88	1.322	0.0333	1.377
Québec[5]	N/A	1		1.550

[3] The highest UFLS setpoint in the Eastern Interconnection is 59.7 Hz in FRCC, based on internal stability concerns. The FRCC concluded that the IFRO starting frequency of the prevalent 59.5 Hz for the Eastern Interconnection is acceptable in that it imposes no greater risk of UFLS operation in FRCC for an external resource loss event than for an internal FRCC event.

[4] CB_R value limited to 1.0 because values lower than that indicate the Value B is lower than Point C and does not need to be adjusted. The calculated value is 0.989.

7. An adjustment should be made to the maximum allowable delta frequency to compensate for the predominant withdrawal of primary frequency response exhibited in an interconnection until such withdrawal is no longer exhibited in that interconnection.

8. The determination of the maximum delta frequencies should be calculated in accordance with the methods embodied in Table E – Determination of Maximum Delta Frequencies.

Table E: Determination of Maximum Delta Frequencies

	Eastern	Western	ERCOT	Québec	Units
Starting Frequency	59.974	59.976	59.963	59.972	Hz
Minimum Frequency Limit	59.500	59.500	59.300	58.500	Hz
Base Delta Frequency	0.474	0.476	0.663	1.472	Hz
CC_{ADJ} [6]	0.007	0.004	0.012	N/A	Hz
Delta Frequency (DF_{CC})	0.467	0.472	0.651	1.472	Hz
CB_R [7]	1.000[8]	1.625	1.377	1.550[9]	Hz
Delta Frequency (DF_{CBR})[10]	0.467	0.291	0.473	0.949	Hz
BC'_{ADJ} [11]	.018	N/A	N/A	N/A	Hz
Max. Delta Frequency	0.449	0.291	0.473	0.949	Hz

[5] Based on Québec UFLS design between their 58.5 Hz UFLS with 300 millisecond operating time (responsive to Point C) and 59.0 Hz UFLS step with a 20-second delay (responsive to Value B or beyond) with a 0.05 Hz confidence interval. See the Adjustment for Differences between Value B and Point C section of this report for further details.

[6] Adjustment for the differences between 1-second and sub-second Point C observations for frequency events.

[7] Adjustment for the differences between Point C and Value B.

[8] CB_R value for the Eastern Interconnection limited to 1.0 because values lower than that indicate the Value B is lower than Point C and does not need to be adjusted. The calculated value is 0.989.

[9] Based on Québec UFLS design between their 58.5 Hz UFLS with 300 ms operating time (responsive to Point C)and 59.0 Hz UFLS step with a 20-second delay (responsive to Value B or beyond).

[10] DF_{CC}/CB_R

[11] Adjustment for the event nadir being below the Value B (Eastern Interconnection only) due to primary frequency response withdrawal.

9. The Interconnection Frequency Response Obligations should be calculated as shown in Table F: Recommended IFROs.

Table F: Recommended IFROs					
	Eastern	Western	ERCOT	Québec	Units
Starting Frequency	59.974	59.976	59.963	59.972	Hz
Max. Delta Frequency	0.449	0.291	0.473	0.949	Hz
Resource Contingency Protection Criteria	4,500	2,740	2,750	1,700	MW
Credit for LR	–	300	1,400	–	MW
IFRO[12]	-1,002	-840	-286	-179	MW/0.1Hz
Absolute Value of IFRO	1,002	840	286	179	MW/0.1Hz
% of Current Interconnection Performance[13]	40.6%	71.2%	48.7%	23.9%	
% of Interconnection Load[14]	0.17%	0.56%	0.45%	0.50%	

10. NERC and the Western Interconnection should analyze the FRO allocation implications of the Pacific Northwest RAS generation tripping of 3,200 MW.

11. Trends in frequency response sustainability should be measured and tracked by observing frequency between T+45 seconds and T+180 seconds. A pair of indices for gauging sustainability should be calculated comparing that value to both the Point C and Value B.

12. Frequency response performance by Balancing Authorities should not be judged for compliance on a per-event basis.

13. Linear regression is the method that should be used for calculating Balancing Authority Frequency Response Measure (FRM) for compliance with Standard BAL-003-1 – Frequency Response.

[12] IFRO =

[13] Current Interconnection Frequency Response Performance: EI = -2,467 MW / 0.1Hz, WI = -1,179 MW / 0.1Hz, TI = -586 MW / 0.1Hz, and QI = -750 MW/0.1 Hz.

[14] Interconnection projected Total Internal Demands from the 2010 NERC Long-Term Reliability Assessment: EI = 604,245 MW, WI = 148,895 MW, TI = 63,810 MW, and QI winter load = 36,000 MW.

14. NERC and the Frequency Working Group should annually review the process for detection of frequency events and the method for calculating the A and B Values and Point C. The associated interconnection frequency event database, methods for calculating interconnection metrics on risks to reliability, the associated probabilities, and the calculation of the IFROs using updated data should also undergo review in an effort to improve the process. Throughout this process, NERC should strive to improve the quality and consistency of the data measurements.

15. NERC should address improving the level of understanding of the role of turbine governors through seminars and webinars, with educational materials available to the Generator Owners and Generator Operators on an ongoing basis.

16. When the Eastern Interconnection Reliability Assessment Group Multiregional Modeling Working Group (ERAG MMWG) completes its review of turbine governor modeling, a new light-load case should be developed, and the resource loss criterion for the Eastern Interconnection's IFRO should be re-simulated.

17. Eastern Interconnection inter-area oscillatory behavior should be further investigated by NERC, including the testing of large resource loss analysis for IFRO validation.

Findings

1. Analysis of data submitted by the Balancing Authorities during the field trial indicates that a single-event-based compliance measure is unsuitable for compliance evaluation when based on data that has the large degree of variability demonstrated by the field trial.

2. Analysis of data submitted by the Balancing Authorities during the field trial confirms that the sample size selected (a minimum of 20–25 frequency events) is sufficient to stabilize the result and alleviate the perceived problem associated with outliers in the measurement of Balancing Authority frequency response performance.

3. There is a strong positive correlation between Eastern Interconnection load and frequency response for the 2009–2011 events. On average, when interconnection load changes by 1,000 MW, frequency response changes by 3.5 MW/0.1Hz.

4. Pre-disturbance frequency (Value A) is a statistically significant contributor to the variability of frequency response for the Eastern Interconnection. The expected (mean of the sample) frequency response for events where Value A is greater than 60 Hz is 2,188 MW/0.1 Hz versus 2,513 MW/0.1 Hz for events where Value A is less than or equal to 60 Hz based on data from 2009 through April 2012.

5. There is a statistically significant seasonal (summer/not summer) correlation to the variability of frequency response for the Eastern Interconnection. The expected frequency response for summer (June–August) frequency events is 2,598 MW/0.1 Hz versus 2,271 MW/0.1 Hz for non-summer events based on data from 2009 through April 2012.

6. The difference in average frequency response between on-peak events and off-peak events is not statistically significant for the Eastern Interconnection and could occur by chance.

Frequency Response Overview

To understand the role frequency response plays in system reliability, it is important to understand the different components of frequency control and the individual components of Primary Frequency Control (also known as frequency response). It is also important to understand how those individual components relate to each other.

Frequency Control

Frequency control can be divided into four overlapping windows of time:

Primary Frequency Control (frequency response) – Actions provided by the interconnection to arrest and stabilize frequency in response to frequency deviations. Primary Control comes from automatic generator governor response, load response (typically from motors), and other devices that provide an immediate response based on local (device-level) control systems.

Secondary Frequency Control – Actions provided by an individual Balancing Authority or its Reserve Sharing Group to correct the resource-load unbalance that created the original frequency deviation, which will restore both Scheduled Frequency and Primary frequency response. Secondary Control comes from either manual or automated dispatch from a centralized control system.

Tertiary Frequency Control – Actions provided by Balancing Authorities on a balanced basis that are coordinated so there is a net-zero effect on area control error (ACE). Examples of Tertiary Control include dispatching generation to serve native load, economic dispatch, dispatching generation to affect interchange, and re-dispatching generation. Tertiary Control actions are intended to replace Secondary Control Response by reconfiguring reserves.

Time Control – This includes small offsets to scheduled frequency to keep long-term average frequency at 60 Hz.

Primary Frequency Control – Primary Frequency Response

Primary Frequency Control, also known generally as primary frequency response, is the first stage of frequency control and is the response of resources and load to arrest local changes in frequency. Primary frequency response is automatic, is not driven by any centralized system, and begins within seconds after the frequency changes, rather than minutes. Different resources, loads, and systems provide primary frequency response with different response times, based on current system conditions such as total resource/load mix and characteristics.

The NERC Glossary of Terms defines Frequency Response[15] in two parts:

- **Equipment** – The ability of a system or elements of the system to react or respond to a change in system frequency.

- **System** – The sum of the change in demand, plus the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 hertz (MW/0.1 Hz).

Because the loss of a large generator is much more likely than a sudden loss of an equivalent amount of load, frequency response is typically discussed in the context of a loss of generation.

NOTE: For purposes of this report, the term "frequency response" is considered to be the overall response measured between T+20 and T+52 seconds, as used in the BAL-003-1 draft standard.

Frequency Response Illustration

Many components are included within the defined frequency response. The following simplified example graphically illustrates those components of frequency response and how they react to changes in system frequency. The example is presented as an energy balance problem for the interconnection. It is not intended to be a treatise on governors or other turbine-generator controls or the internal machine dynamics associated with those control actions. For additional information on those topics, see the References on Rotating Machines section in Appendix L.

The example is based on an assumed disturbance event due to the sudden loss of 1,000 MW of generation. Although a large event is used to illustrate the response components, even small events can result in similar reactions or responses. The magnitude of the event only affects the shape of the curves on the graph; it does not obviate the need for frequency response.

The loss of generation is illustrated by the black power deficit line using the MW scale on the left. The interconnection frequency is illustrated in red, using the hertz (Hz) scale on the right. The interconnection frequency is assumed to be 60 Hz when the disturbance occurs.

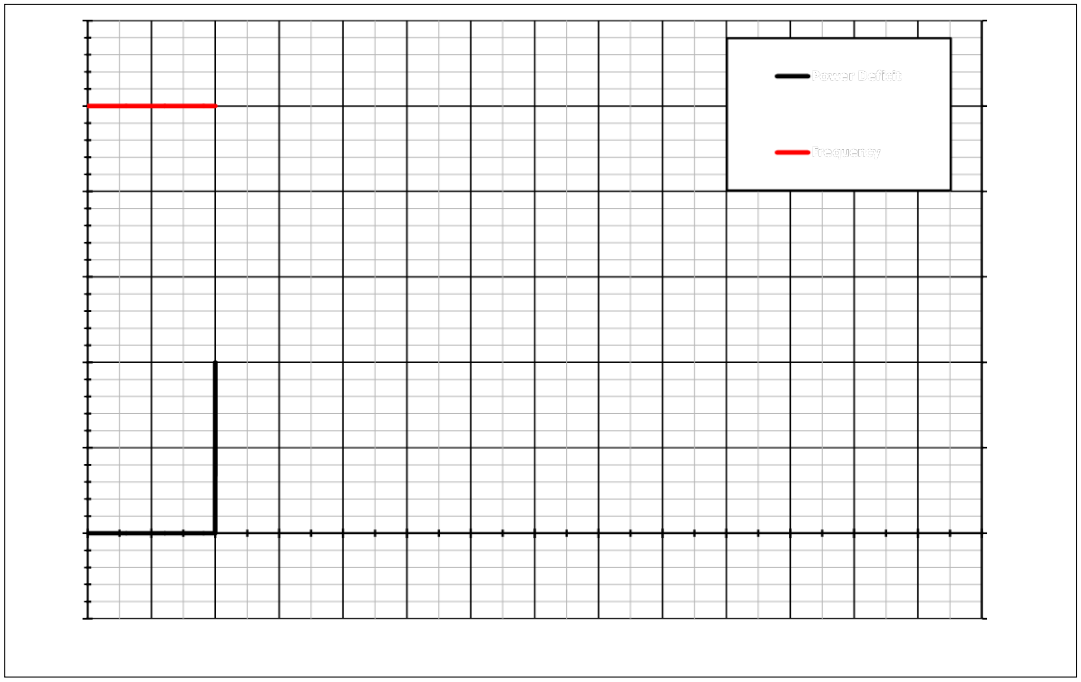
Figure 1 shows the tripping of a 1,000 MW generator. Even though the generation has tripped and power injected by the generator has been removed from the interconnection, the loads across the system continue to use the same amount of power. The Law of Conservation of Energy[16] requires that the 1,000 MW must be supplied to the interconnection if the energy balance is to be conserved. That 1,000 MW of balancing power is provided by extracting it from the kinetic energy stored as inertial energy in the rotating mass of all of the synchronized turbine-generators and motors on the interconnection. It is produced by the slowing of the spinning inertial mass of rotating equipment on the interconnection that both releases the stored kinetic energy and reduces the frequency of the interconnection. The extracted energy

[15] Capitalized as referenced in the NERC Glossary of Terms; lowercased otherwise.

[16] The "Law of Conservation of Energy" is applied here in the form of power. If energy must be conserved, then power—which is the first derivative of energy with respect to time—must also be conserved.

supplies the "balancing inertia"[17] power required to maintain the power and energy balance on the interconnection.

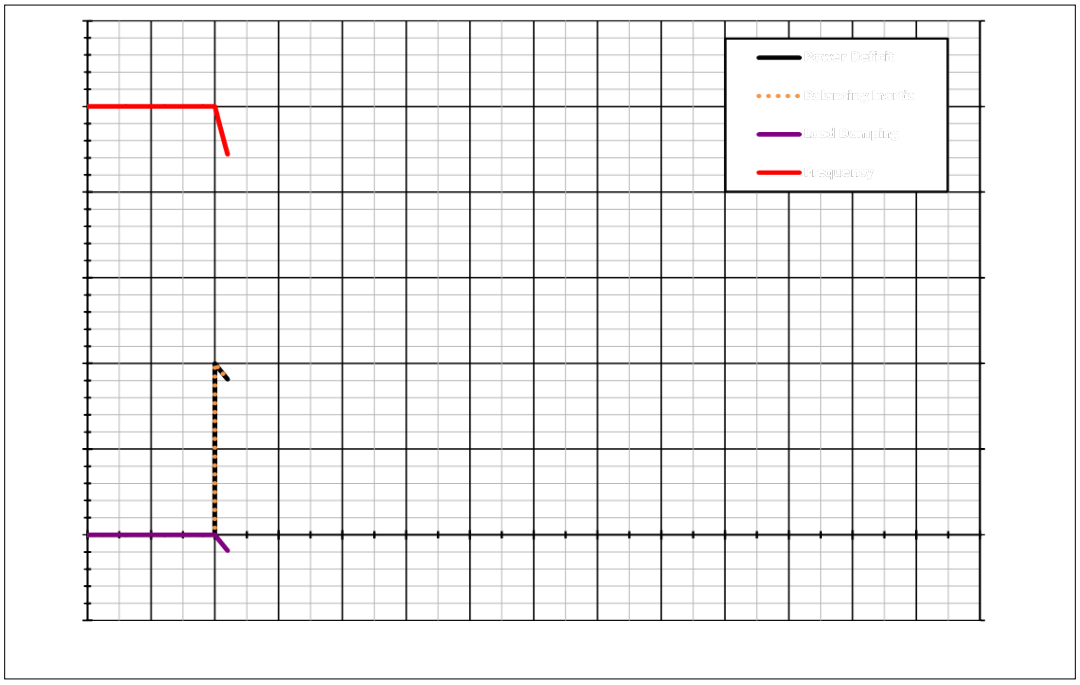
Figure 1: Loss of a 1,000 MW Generator



As this balancing power from inertia is used, the speed of the rotating equipment on the interconnection declines, resulting in a reduction of the interconnection frequency. Synchronously operated motors contribute to load damping; adjustable or variable speed drive motors are effectively decoupled from the interconnection frequency through their electronic controls, and they do not contribute to load damping. In general, any load that does not change with interconnection frequency (such as resistive loads) will not contribute to load damping or frequency response. The balancing inertia is illustrated in figure 2 by the orange dots, which represent the balancing inertia power that exactly overlays and offsets the power deficit. At this point in the example, no other energy injection has occurred through any governor control action.

[17] The term "balancing inertia" is coined here from the terms "inertial frequency response" and "balancing energy." Inertial frequency response is a common term used to describe the power supplied for this portion of the frequency response, and balancing energy is a term used to describe the market energy supposedly purchased to restore energy balance.

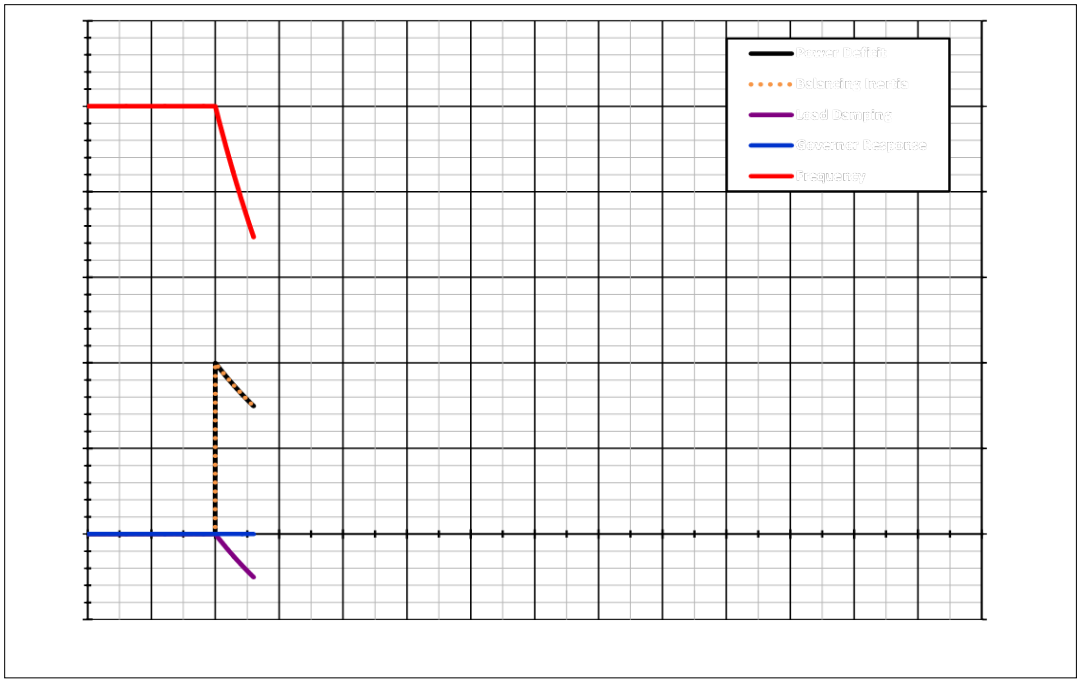
Figure 2: Inertial Energy Extracted from Rotating Mass of Generation and Synchronous Motor Load



As the rotating machines slow down (reflected as a decline of frequency), the generator governors, which are the controls that "govern" the speed of the generator turbines, sense this as a change in turbine speed. In this example, the change in frequency will be used to reflect this control parameter. Governor action then takes physical action, such as injecting more gas into a gas turbine, opening steam valves wider on a steam unit (also injecting more fuel into the boiler), or opening the control gates wider on a hydraulic turbine. This control action results in more combusted gases, steam, or water to impart more mechanical energy to the shaft of the turbine to increase its speed. The turbine shaft is coupled to the generator, where it is converted into additional electric energy. The process of the turbine slowing, the detection of change in speed, and the injection of additional mechanical energy is not instantaneous.

Until the additional mechanical energy can be injected, the frequency continues to decline, due to the ongoing extraction of balancing power from the inertial energy of the rotating turbine-generators and synchronous motors on the interconnection. As frequency continues to decline, the reduction in load also continues as the effect of load damping continues to reduce the load.

Figure 3: Time Delay of Governor Response

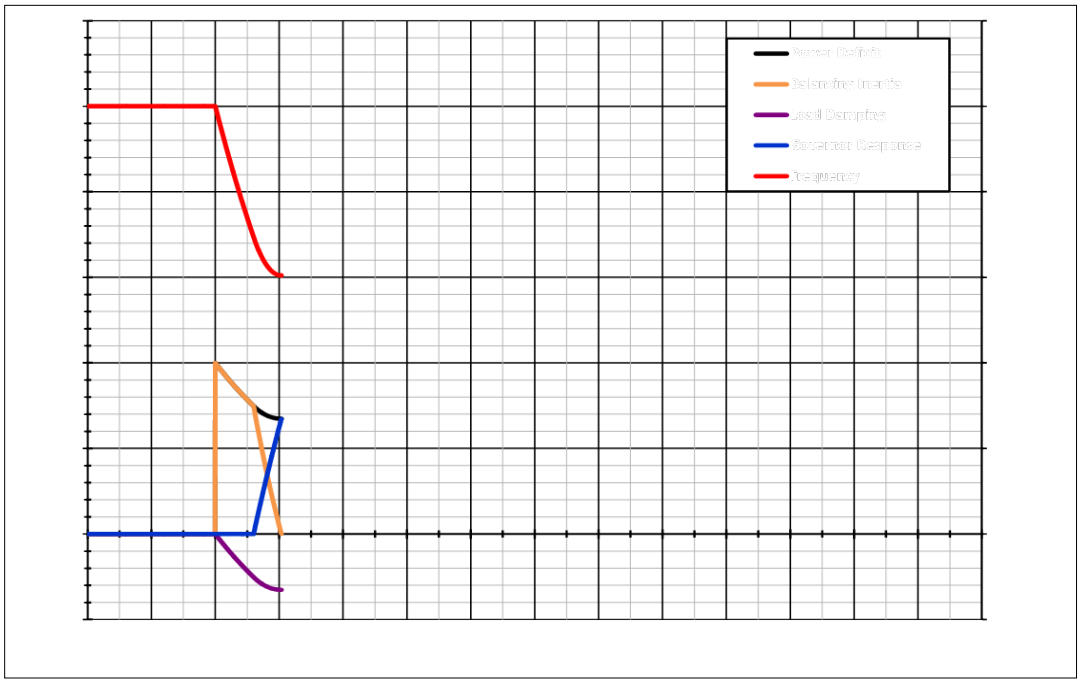


During the initial seconds of the disturbance event, the primary frequency response from the turbine governors has not yet influenced the frequency decline. For this example, primary frequency response from governors that injects additional energy into the system is reflected by the blue line (in MW) on figure 3.

After a short time delay, the governor response begins to increase rapidly in response to the initial decline in frequency, as illustrated in figure 4. In order to arrest the frequency decline, the governor response must offset the power deficit and replace the balancing power that had extracted inertial energy from the rotating machines of the interconnection. At this point in time, the balancing power from inertia is reduced to zero as it is replaced by the governor response. That replacement is shown as the crossing of the orange and blue lines in figure 4. The point at which the frequency decline is arrested is called the nadir, or Point C, and frequency response calculated to that point is "arrested frequency response."

If the time delay associated with the delivery of governor response is reduced, the amount of balancing power from inertia required to limit the change in frequency for the disturbance event can also be reduced. This supports the conclusion that balancing power from inertia is required to manage the time delays associated with the delivery of primary frequency response. Not only is the rapid delivery of primary frequency response important, but so is the shortening of the time delay associated with its delivery.

Figure 4: Governor Response Replaces Balancing Power from Inertia and Arrests Frequency Decline



The above components are related to the length of time before the initial delivery of primary frequency response from governors begins and how much of the response is delivered before the frequency change is arrested.

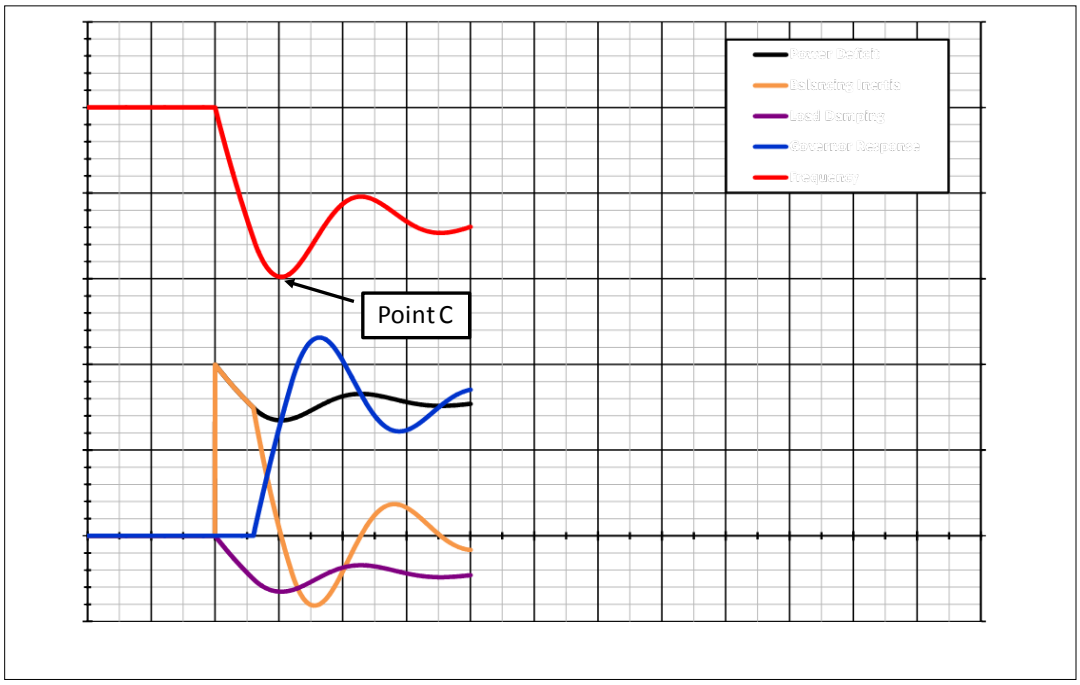
From a system standpoint during this time delay, the amount of inertia on the interconnection, which determines the amount of energy available to be extracted from rotating machines, determines the slope of the frequency decline: the less inertia there is, the steeper the slope. This is important in the relationship between the balancing power from inertia and the time delay associated with the governor response. For a given time delay in primary frequency response from governors, the steeper the slope, the lower frequency will dip before it is arrested. Conversely, for a given balancing power from inertia and slope of frequency decline, the faster governor response can be provided, the sooner the frequency decline is arrested, making the nadir less severe.

Therefore, as traditional rotating generators are replaced by electronically coupled resources, such as wind turbines and solar voltaic resources (which provide less overall system inertia), the speed of delivery of governor response should increase, or other methods should be provided that support fast-acting energy injection to minimize the depth of frequency excursions.

The arrested frequency is normally the minimum (maximum for load loss events) frequency that will be experienced during a disturbance event. This minimum frequency is the frequency that is of concern from a reliability perspective. The goal is to arrest the frequency decline so frequency remains above the under-frequency load shedding (UFLS) relays with the highest settings so that load is not tripped. Frequency response delivered after frequency is arrested at

this minimum provides less reliability value than frequency response delivered before Point C, but greater value than secondary frequency control power and energy that is delivered minutes later.

Figure 5: Post-Disturbance Transient Period (0 to 20 seconds)



Once the frequency decline is arrested, the governors continue to respond because of the time delay associated with the governor action. This results in the frequency partially recovering from the minimum arrested value and results in some oscillating transient that follows the minimum frequency (arrested frequency) until power flows and frequency settle during the transient period, which typically ends around 20 seconds after start of the disturbance event. This post-disturbance transient period is shown in figure 5.

The total disturbance event is illustrated in figure 6. Frequency and power contributions stabilize at the end of the transient period. Frequency response calculated from data measured during this settled period is called the "settled frequency response." The settled frequency response is the measure used as an estimator for determining the Frequency Bias[18] setting used in the automated generator control (AGC) systems of the energy management systems (EMS) in energy control centers.

[18] As defined in the NERC Glossary: "A value, usually expressed in megawatts per 0.1 hertz (MW/0.1 Hz), associated with a Balancing Authority Area that approximates the Balancing Authority Area's response to Interconnection frequency error."

Figure 6: Disturbance Event Frequency Excursion

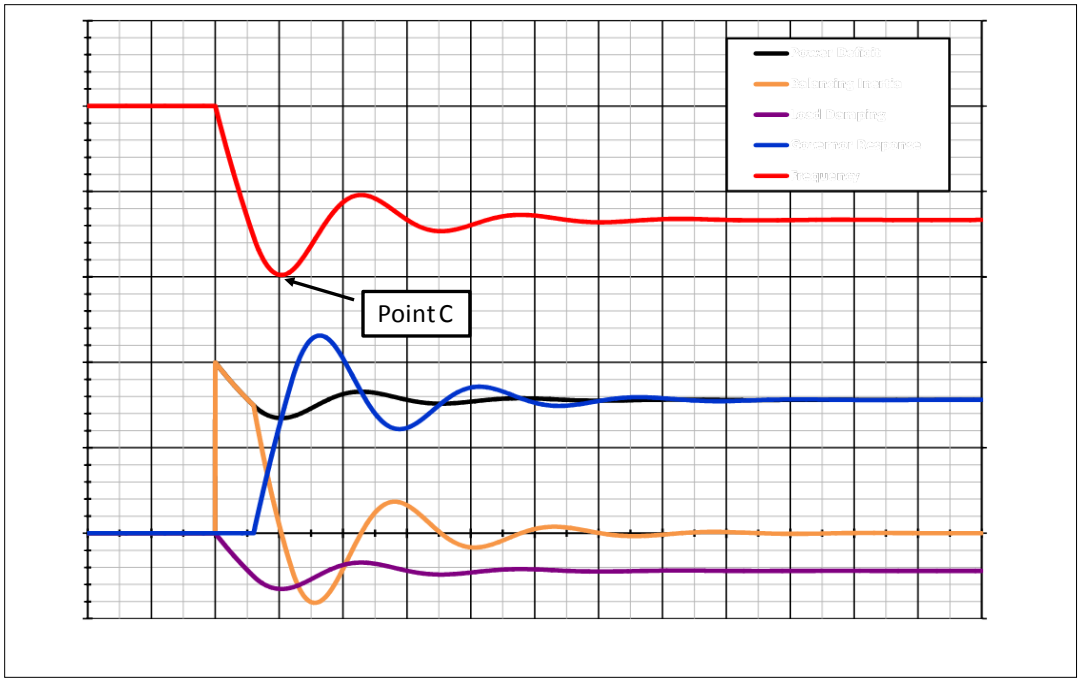


Figure 7: Averaging Periods used for Measuring Frequency Response

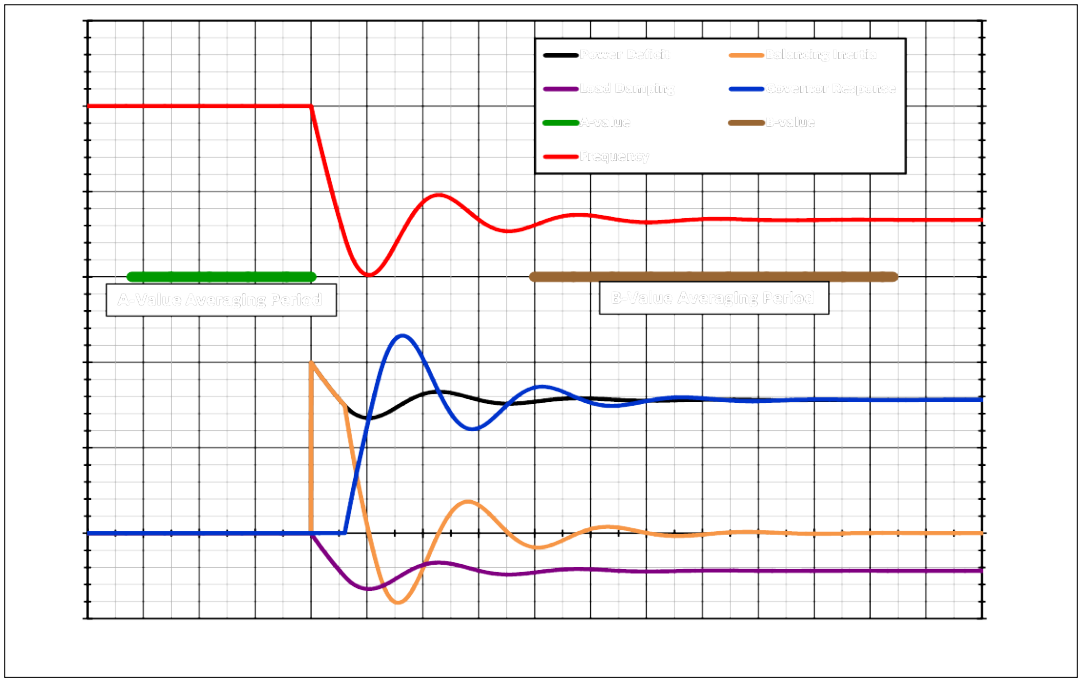


Figure 7 shows the averaging periods used to calculate[19] the pre-disturbance Value A frequency averaging period (T-16 through T+0 seconds) and the post-disturbance Value B frequency averaging period (T+20 through T+52 seconds) used to calculate the settled frequency response. The length of those periods is based on the length of the system control and data acquisition (SCADA) scan rates of the energy management systems (EMS) of the Balancing Authorities.

The calculation of the Value A and Value B frequencies began with the assumption that a 6-second scan rate was the source of the data. Once the averaging periods for a 6-second SCADA scan rate were selected, the averaging periods for the other scan rates were selected to provide as much consistency as possible between Balancing Authorities with different scan rates.

The Value A frequency was initially defined as the average of the two scans immediately prior to the frequency event. All other averaging periods were then selected to be as consistent as possible with this 12-second average scan from the 6-second scan rate method. In addition, the "actual net interchange immediately before Disturbance" was then defined as the average of the same period and same scans as used for Value A averaging.

The Value B frequency was then selected to be an average as long as the average of 6-second scan data as possible, that would not begin until most of the hydro governor response had been delivered, and would end before significant Automatic Generation Control (AGC) recovery response had been initiated as indicated by a consistent frequency restoration slope. The "actual net interchange immediately after Disturbance" was then similarly defined as the average of the same period and same scans as used for the Value B.

Balancing Authority Frequency Response

Disturbances can cause the frequency to either increase from loss of load or decrease from loss of generation; frequency response characteristics of Balancing Authorities should be evaluated for both types of events.

Accurate measurement of frequency response for an interconnection or for individual Balancing Authorities is difficult unless the frequency deviation resulting from a system disturbance is significant. Therefore, it is better to analyze response only when significant frequency deviations occur.

Frequency response considers the following elements of an interconnected transmission system:

1. **Frequency Response Characteristic (FRC)** – For any change in generation/load balance in the interconnection, a frequency change occurs. Each Balancing Authority in the interconnection will respond to this frequency change through:
    - a load change that is proportional to the frequency change due to the load's FRC, and

[19] As proposed in Standard BAL-003-1 – Frequency Response.

- a generation change that is inverse to the frequency change due to turbine governor action. The net effect of these two actions is the Balancing Authority's response to the frequency change; that is, its FRC. The combined response of all Balancing Authorities in the interconnection will cause the interconnection frequency to settle at some value different from the pre-disturbance value. It will not return frequency to the pre-disturbance value because of the turbine governor droop characteristic. Frequency will remain different until the Balancing Authority with the generation/load imbalance (referred to as the "Contingent Balancing Authority") corrects that imbalance, thus returning the interconnection frequency to its pre-disturbance value.

2. **Response to Internal and External Generation/Load Imbalances** – Most of a Balancing Authority's frequency response will be reflected in a change in its actual net interchange. By monitoring the frequency error (the difference between actual and scheduled frequency) and the difference between actual and scheduled interchange, using its response to frequency deviation, a Balancing Authority's automatic generation control (AGC) can determine whether the imbalance in load and generation is internal or external to its system. If internal, the Balancing Authority's AGC should correct the imbalance. If external, the Balancing Authority's AGC should allow its generator governors to continue responding (preserved by its frequency bias contribution in its ACE equation) until the contingent Balancing Authority corrects its imbalance, which should return frequency to its pre-disturbance value.

3. **Frequency Bias versus Frequency Response Characteristic (FRC)** – The Balancing Authority should set its bias setting in its AGC ACE equation to match its FRC. In doing so, the Balancing Authority's bias contribution term would exactly offset the tie line flow error (Ni_A – Ni_S) of the ACE that results from governor action following a frequency deviation on the interconnection. The following sections discuss the effects of bias settings on control action and explain the importance of setting the bias equal to the Balancing Authority's FRC. The discussion explains the control action on all Balancing Authorities external to the contingent Balancing Authority (the Balancing Authority that experienced the sudden generation/load imbalance) and on the contingent Balancing Authority itself.

   While this discussion deals with loss of generation, it applies equally to loss of load, or any sudden contingency resulting in a generation/load mismatch. Each Balancing Authority's frequency response will vary with each disturbance because generation and load characteristics change continuously. This discussion also assumes that the frequency error from 60 Hz was zero (all ACE values were zero) just prior to the sudden generation/load imbalance.

4. **Effects of a Disturbance on all Balancing Authorities External to the Contingent Balancing Authority** – When a loss of generation occurs, an interconnection frequency error will occur as rotating kinetic energy from the generators of the interconnection is expended, slowing the generators throughout the interconnection. All Balancing Authorities' generator governors will respond to the frequency error and increase the

output of their generators (increase speed) accordingly. This will cause a change in the Balancing Authorities' actual net interchange. In other words, the Actual Net Interchange (Ni_A) will be greater than the Scheduled Net Interchange (Ni_S) for all but the contingent Balancing Authority, and the result is a positive flow out of the non-contingent Balancing Authorities. The resulting tie flow error ($Ni_A - Ni_S$) will be counted as Inadvertent Interchange.

If the Balancing Authorities were using only tie line flow error (i.e., flat tie control ignoring the frequency error), this non-zero ACE would cause their AGC to reduce generation until Ni_A was equal to Ni_S, returning their ACE to zero. However, doing this would not help arrest interconnection frequency decline, because the Balancing Authorities would not be helping to temporarily replace some of the generation deficiency in the interconnection. With the tie line bias method, the Balancing Authorities' AGC should allow their governors to continue responding to the frequency deviation until the contingent Balancing Authority replaces the generation it has lost.

In order for the AGC to allow governor action to continue to support frequency, a frequency bias contribution term is added to the ACE equation to counteract the tie flow error. This bias contribution term is equal in magnitude and opposite in direction to the governor action and should ideally be equal to each Balancing Authority's frequency response characteristic measured in MW/0.1 Hz. Then, when multiplied by the frequency error, the bias should exactly counteract the tie flow error portion of the ACE calculation, allowing the continued support of the generator governor action to support system frequency.

In other words, $BiasContributionTerm = 10B(f_A - f_S)$. ACE will be zero, and AGC will not read just generation.

The ACE equation is then:

$$ACE = (Ni_A - Ni_S) - 10B(f_A - f_S) - I_{ME}$$

Where:

- The factor 10 converts the bias setting (B) from MW/0.1 Hz to MW/Hz.
- I_{ME} is meter error correction estimate; this term should normally be very small or zero.

NOTE: Although frequency response and bias are often discussed as positive values (such as "our bias is 50 MW/0.1 Hz"), frequency response and bias are actually negative values.

If the bias setting is greater than the Balancing Authority's actual frequency response characteristic, then its AGC will increase generation beyond the primary frequency response from governors, which further helps arrest the frequency decline, but increases Inadvertent Interchange. Likewise, if the bias contribution term is less than

the actual FRC, its AGC will reduce generation, reducing the Balancing Authority's contribution to arresting the frequency change. In both cases, the resultant control action is unwanted.

5. **Effects of a Disturbance on the Contingent Balancing Authority** – In the contingent Balancing Authority where the generation deficiency occurred, most of the replacement power comes from the interconnection over its tie lines from the frequency response contributions of the other Balancing Authorities in the interconnection. A small portion will be made up internally from the contingent Balancing Authority's own governor response. In this case, the difference between Ni_A and Ni_S for the contingent Balancing Authority is much greater than its frequency bias component. Its ACE will be negative (if the loss is generation), and its AGC will begin to increase generation.

   - Ni_A – drops by the total generation lost less the contingent Balancing Authority's own primary frequency response from governors
   - Ni_S – does not change

   The contingent Balancing Authority must take appropriate steps to reduce its ACE to zero or pre-disturbance ACE if ACE is negative within 15 minutes of the contingency. (Reference: formerly Operating Criterion II.A.) The energy supplied from the interconnection is posted to the contingent Balancing Authority's inadvertent balance.

6. **Effects of a Disturbance on the Contingent Balancing Authority with a Jointly Owned Unit** – In the contingent Balancing Authority where the generation deficiency occurred on a jointly owned unit (with dynamically scheduled shares being exported), the effect on the tie line component ($Ni_A – Ni_S$) of their ACE equation is more complicated. The Ni_A drops by the total amount of the generator lost, while the Ni_S is reduced only by the dynamic reduction in the shares being exported.

   - Ni_A – drops by the total generation lost less the contingent Balancing Authority's own primary frequency response from governors
   - Ni_S – decreases by the reduction in dynamic shares being exported

   The net effect is that the tie line bias component only reflects the contingent Balancing Authority's share of the lost generation. Most of the replacement power comes from the interconnection over its tie lines from the frequency bias contributions of the other Balancing Authorities in the interconnection.

7. **Effects of a Disturbance on the Non-contingent Balancing Authority with a Jointly Owned Unit** – In the non-contingent Balancing Authority where the generation deficiency occurred on a jointly-owned unit in another Balancing Authority (with dynamically scheduled shares being exported), the effect on the tie line component ($Ni_A – Ni_S$) of their ACE equation is also complicated. The Ni_A increases by the Balancing Authority's own primary frequency response from governors, while the Ni_S is reduced only by the dynamic reduction in the shares being imported.

- Ni_A – increases by the Balancing Authority's own primary frequency response from governors
- Ni_S – decreases by withdrawn dynamic shares of the jointly-owned unit

The net effect is that the tie line bias component only reflects the contingent Balancing Authority's share of the lost generation. Most of the replacement power comes from the interconnection over its tie lines from the frequency bias contributions of the other Balancing Authorities in the interconnection.

Historical Frequency Response Analysis

History of Frequency Response and its Decline

Interconnection frequency response has been a subject of industry interest and attention since the first two electric systems became interconnected and the concept of frequency bias was adopted. In 1942, the first test to determine the system's load/frequency characteristic was conducted for use in setting bias control. As interconnected systems grew larger and the characteristics of load and generation changed, it became apparent that guidelines were needed regarding frequency response to avoid one system imposing undue frequency regulation burdens on its interconnected neighbors. During the 1970s and 1980s, NERC's Performance Subcommittee (now the Resources Subcommittee of the Operating Committee), which is charged with monitoring the control performance of the interconnections, observed that generators' governor responses to frequency deviations had been decreasing, especially in the Eastern Interconnection. The result was quite noticeable during large generation losses where the frequency deviation was not arrested as quickly as it once was. The industry did not initially recognize that power systems operations could significantly influence primary frequency response.[20]

In 1991, NERC's Performance Subcommittee approached the Electric Power Research Institute (EPRI) with a request to fund and manage a study of the apparent decline in governor response in the interconnections. EPRI agreed and in turn contracted with EPIC Engineering to perform this study. The conclusions were captured in a joint EPRI/NERC report, "Impacts of Governor Response Changes on the Security of North American Interconnections."[21] These studies indicated that the frequency response of the interconnections was declining at rates greater than would be expected with the growth of demand and generating capacity.[22] Although frequency response was declining, the opinion of experts at the time was that the decline had not reached a point at which reliability was being compromised.

The NERC Resources Subcommittee proposed a frequency response standard for comment in 2001. In response to these comments, the Frequency Task Force of the NERC Resources Subcommittee published a Frequency Response Standard white paper[23] intended to create an understanding of the need for a frequency response standard and the technical and economic drivers motivating its development. The paper documented and discussed the decline observed in frequency response in the Eastern and Western Interconnections.

[20] *See* Illian, H.F. *Frequency Control Performance Measurement and Requirements*, LBNL-4145E (December 2010).

[21] EPRI Report TR-101080, *Impacts of Governor Response Changes on the Security of North American Interconnections*, October 1992.

[22] *See* EPRI Report TR-101080, *Impacts of Governor Response Changes on the Security of North American Interconnections*, October 1992 ("An analysis of the 14 Frequency Response Characteristics Surveys conducted by NERC over the 1971 to 1993 period showed that the Frequency Response in percent MW/O. 1Hz has deteriorated. This value in 1971 was between 2.25 and 3.25% (depending on the area) and by 1993 had dropped to 0.75 and 1.25 %.").

[23] Available here: http://www.nerc.com/docs/oc/rs/Frequency_Response_White_Paper.pdf ("Frequency Response Standard Whitepaper").

Projections of Frequency Response Decline

In August 2011, the Transmission Issues Subcommittee[24] of the NERC Planning Committee completed an analysis titled "Interconnection Criteria for Frequency Response Requirements – Determination of Interconnection Frequency Response Obligations."[25] The analysis included comparisons of various Resource Contingency Protection Criteria for loss of resources, including largest potential loss-of-resource event (N-2), the largest total generating plant with common voltage switchyard, and the largest loss of generation in the interconnection in the last 10 years. Also examined in that analysis were the various other factors that must be considered in an IFRO determination: the highest under-frequency load shedding (UFLS) program setpoint within each interconnection, special consideration of demand-side frequency responsive programs in ERCOT, and a reliability margin to account for the variability of frequency due to items such as time error correction (TEC), variability of load, variability of interchange, variability of frequency over the course of a normal day, and other uncertainties. The proposed margin was analyzed using a probabilistic approach based on 1-minute frequency performance data for each interconnection. The Transmission Issues Subcommittee recommended the following IFROs for the four interconnections: Eastern: -1,875 MW/0.1 Hz; Western: -637 MW/0.1 Hz; Texas: -327 MW/0.1 Hz; and Québec: -113 MW/0.1 Hz. The Transmission Issues Subcommittee IFRO report was approved by the NERC Planning Committee in September 2011 and forwarded to the Standard Drafting Team for their consideration.

A similar report had been prepared by the Resources Subcommittee of the NERC Operating Committee in January 2011 titled "NERC Resources Subcommittee Position Paper on Frequency Response."[26] That report used similar Resource Contingency Protection Criteria but used the prevalent 59.5 Hz highest UFLS setpoint for the Eastern Interconnection and a lower 59.3 Hz UFLS setpoint for ERCOT. The Resources Subcommittee analysis also used a 25% reliability margin for all four interconnections. The Resources Subcommittee recommended the following IFROs for the four interconnections: Eastern: -1,406MW/0.1 Hz; Western: -685 MW/0.1 Hz; Texas: -286 MW/0.1 Hz; and Québec: -141 MW/0.1 Hz. The Resources Subcommittee position paper was approved by the Operating Committee in March 2011 and was considered by the Frequency Response Standard Drafting Team. NERC has been tracking the decline of frequency response in the Eastern Interconnection for several years.

[24] The Transmission Issues Subcommittee is now the System Analysis and Modeling Subcommittee (SAMS).

[25] Available here: http://www.nerc.com/docs/pc/tis/Agenda_Item_5.d_Draft_TIS_IFRO_Criteria%20Rev_Final.pdf.

[26] Available here: http://www.nerc.com/docs/oc/rs/NERC%20RS%20Position%20Paper%20on%20Frequency%20Response%20Final%20(May%2027%202011).pdf.

Figure 8: Eastern Interconnection Mean Primary Frequency Response[27] (March 30, 2012)

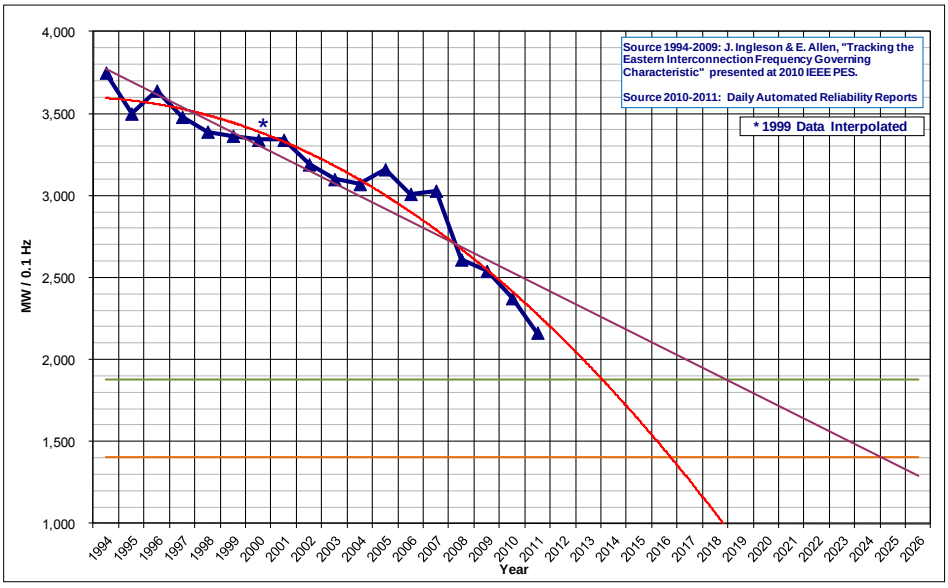


Figure 8 shows how frequency response has declined since 1994, as filed in NERC's "Motion for an Extension of Time of the North American Electric Reliability Corporation" (for the development of Standard BAL-003-1 – Frequency Response).[28] That request for extension of time was granted by FERC in its Order on Motion for an Extension of Time and Setting Compliance Schedule (Issued May 4, 2012).[29]

Comparing the proposed IFROs from those two studies, the Eastern Interconnection IFROs range from about 1,400 MW/0.1 Hz to about 1,900 MW/0.1 Hz, and the linear projection of the frequency response decline intercepts those target IFROs between 2019 and 2024. Even the more pessimistic polynomial projection of the decline intercepts the proposed IFROs between 2014 and 2016. This shows that there was still some time as of that filing for revising BAL-003-1 and responding to the decline in frequency response.

Figure 8 was revised shortly after the March 2012 filing in conjunction with revised frequency response calculation methods used in NERC's 2012 State of Reliability report (May 2012). Figure 9 reflects the revised frequency response calculations for 2009 through 2011.

[27] The Frequency Response data from 1994 through 2009 displayed in figure 2 is from a report by J. Ingleson & E. Allen, Tracking the Eastern Interconnection Frequency Governing Characteristic that was presented at the 2010 IEEE.

[28] Filing available at: http://www.nerc.com/files/MotionExtTime_RM06-16_03302012.pdf

[29] Order available at: http://www.nerc.com/files/Order_Motion_Extension_Time_Compliance_Sched_2012.5.4.pdf

Figure 9: Updated Eastern Interconnection Mean Primary Frequency Response (May 2012)

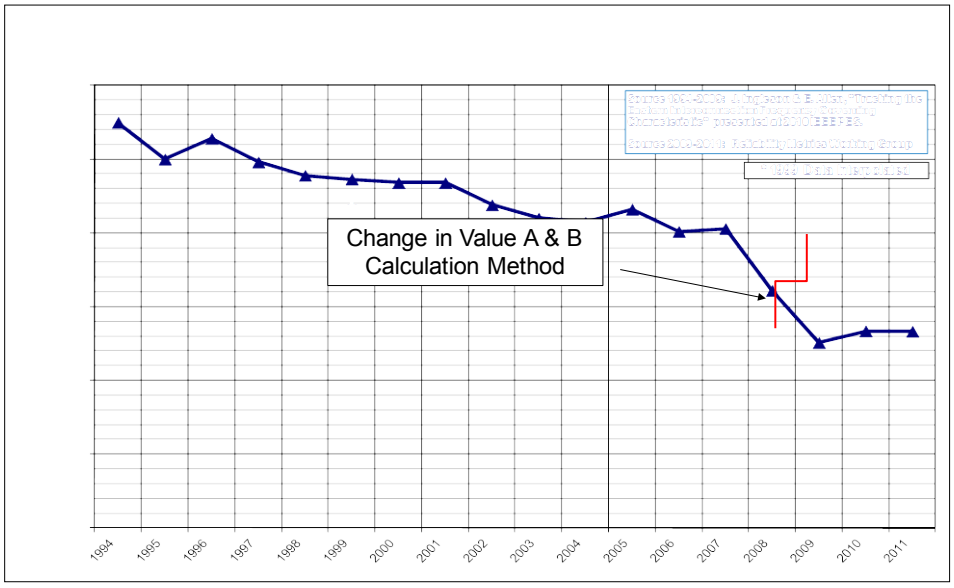


Figure 9 shows an improvement in frequency response in 2009 through 2011 due to alignment of the methods for calculation Values A and B. That method is consistent with the method being proposed in NERC Standard BAL-003-1. The method has since been further refined, as reflected in the Statistical Analysis of Frequency Response section of this report.

Figures 10–13 show the statistical analysis of the frequency response for 2009–2011 for the Eastern, Western, and ERCOT Interconnections from the 2012 State of Reliability report in box plot format (only 2011 data was available for the Québec Interconnection).

Figure 10: Eastern Interconnection Frequency Response Analysis for 2009–2011

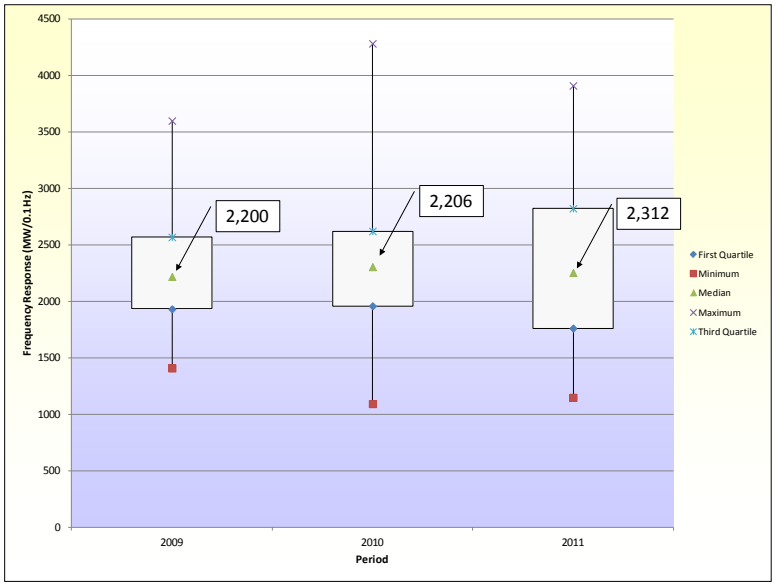


Figure 11: Western Interconnection Frequency Response Analysis for 2009–2011

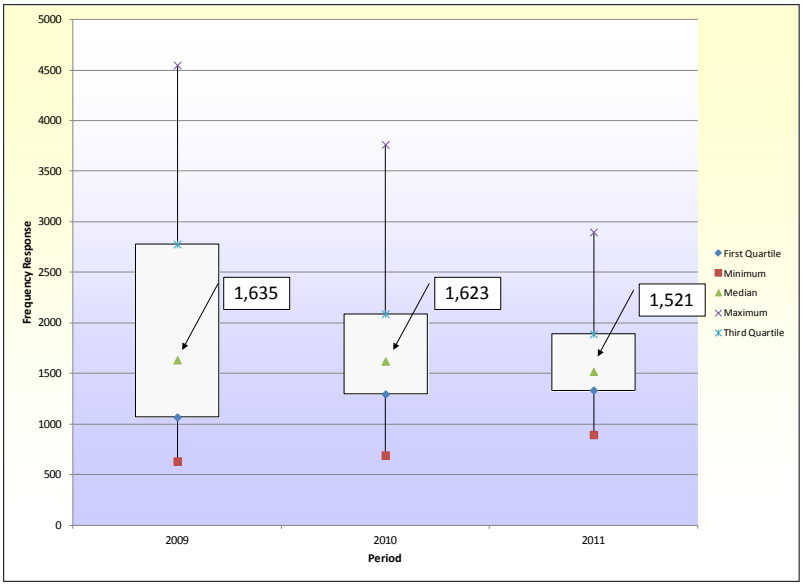
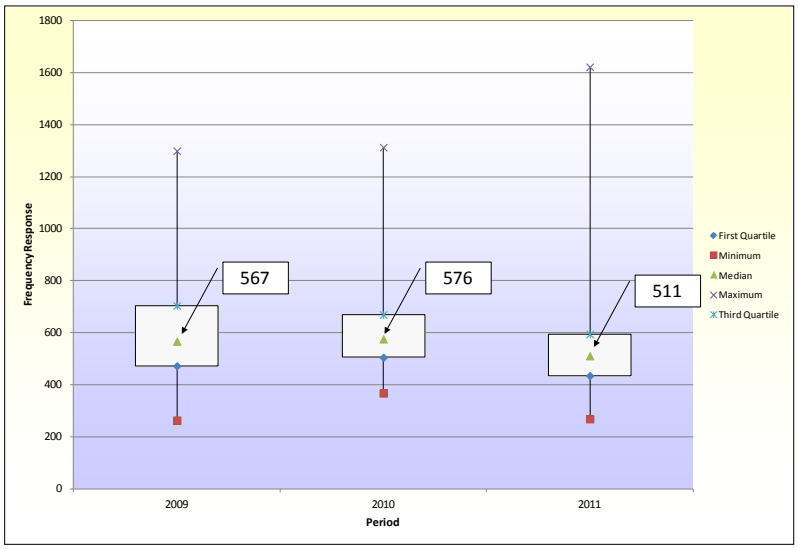
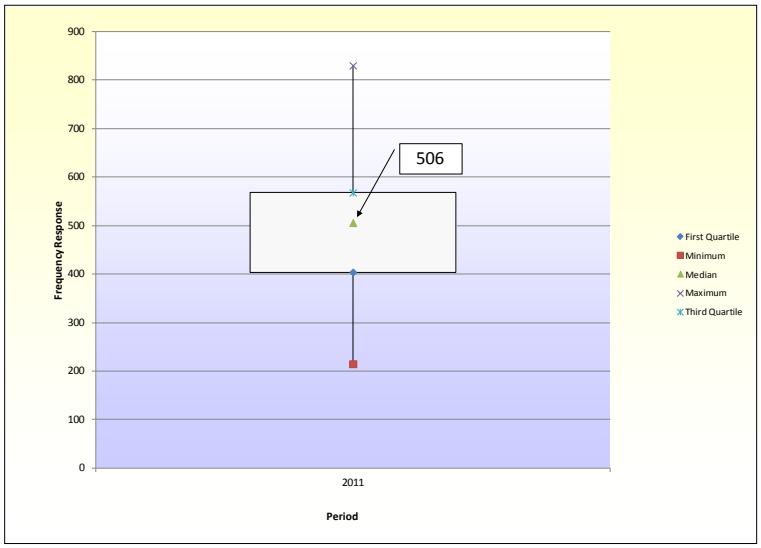


Figure 12: ERCOT Interconnection Frequency Response Analysis for 2009–2011



It is important to note the range of variability of the frequency response for each year. Additional events and modifications to the calculation methods for the A, B, and C values have been made since these values were calculated for the May 2012 report. The new values are reflected in the Statistical Analysis section of this report.

Figure 13: Québec Interconnection Frequency Response Analysis for 2011



Statistical Analysis of Frequency Response (Eastern Interconnection)

In July 2012, a statistical analysis of the frequency response of the Eastern Interconnection was performed for the calendar years 2009–2011 and the first three months of 2012. The size of the dataset was 163 (with 44 observations for 2009, 49 for 2010, 65 for 2011, and 5 for 2012).

Table 1: Statistical Analysis Dataset

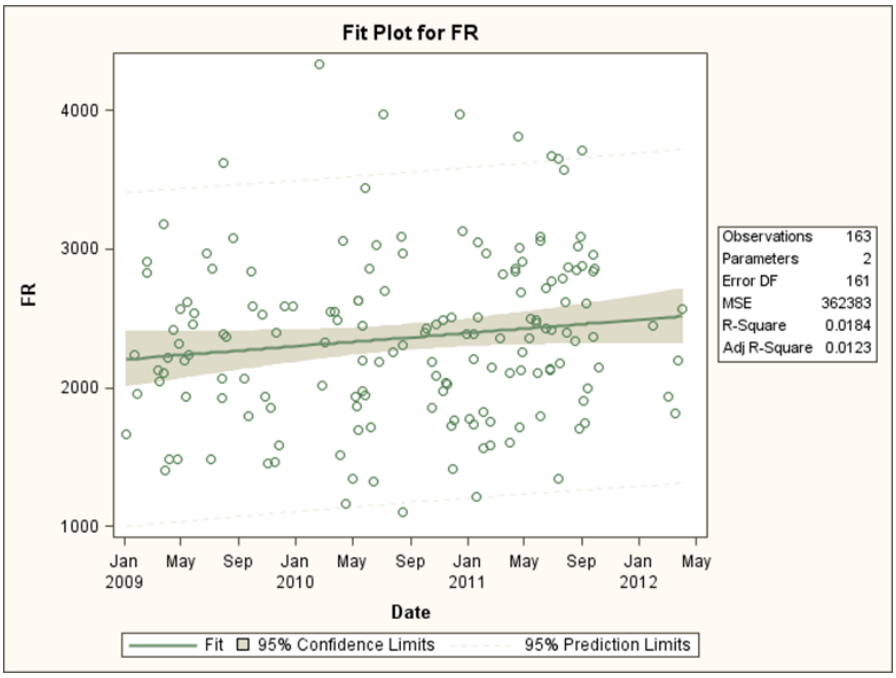
Sample Parameter	2009	2010	2011
Sample Size	44	49	65
Sample Mean	2,258.4	2,335.7	2,467.8
Sample Standard Deviation	522.5	697.6	593.7

The report on that analysis was updated in August and September 2012 and is contained in Appendix G. Its results are paraphrased here for brevity. For the analysis, frequency response pertains to the absolute value of frequency response.

Key Statistical Findings

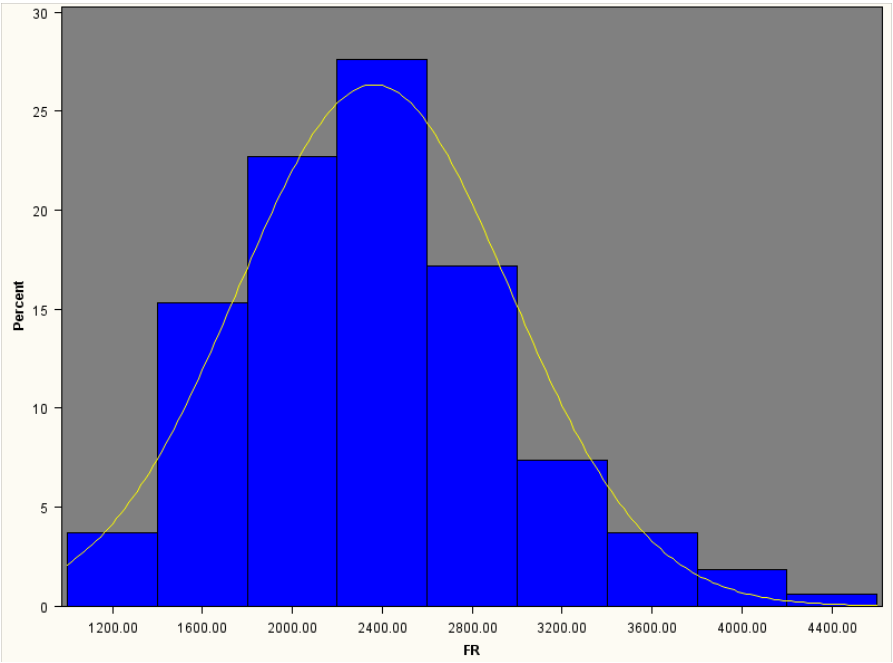
1. A linear regression equation with the parameters defined in Appendix G is an adequate statistical model to describe the relationship between time (predictor) and frequency response (responsive variable). The graph of the linear regression line and frequency response scatter plot is given in figure 14.

Figure 14: Linear Regression Fit Plot for Eastern Interconnection Frequency Response



2. The probability distribution of the whole frequency response dataset is approximately normal, with an expected frequency response of 2,363 MW/0.1 Hz and a standard deviation of 605.7 MW/0.1 Hz as shown in figure 15.

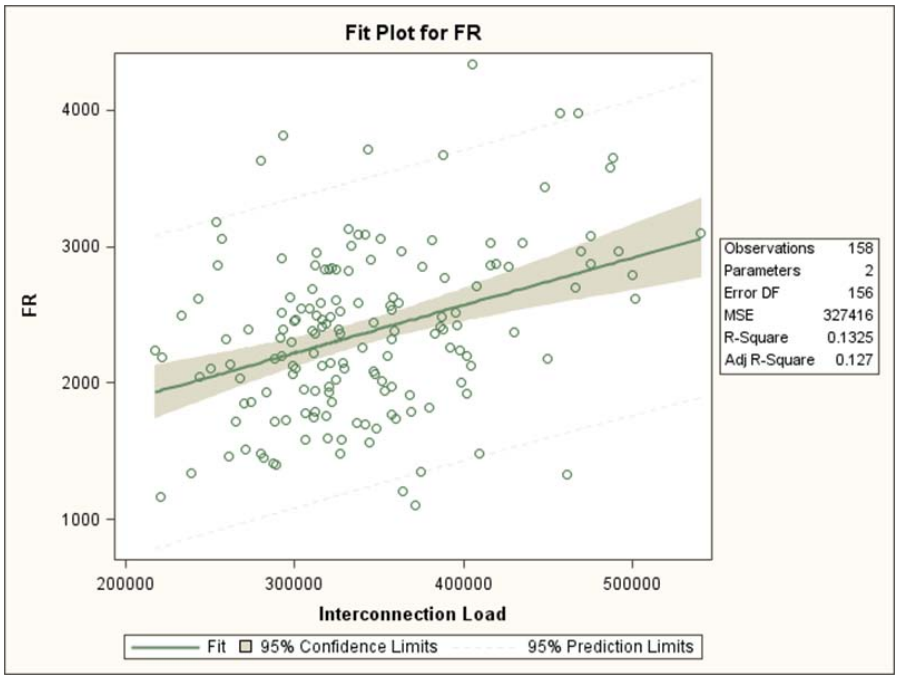
Figure 15: Probability Distribution Eastern Interconnection Frequency Response January 2009–April 2012



3. There is a statistically significant seasonal (summer/not summer) correlation to the variability of frequency response for the Eastern Interconnection. The expected frequency response (mean of the samples) for summer (June–August) frequency events is 2,598 MW/0.1 Hz versus 2,271 MW/0.1 Hz for non-summer events. This is attributable to at least two factors: higher load contribution to frequency response and increased generation dispatch of units with higher frequency response characteristics.

4. Pre-disturbance (average) frequency (Value A) is another statistically significant contributor to the variability of frequency response. The expected frequency response (mean of the samples) for events where Value A is greater than 60 Hz is 2,188 MW/0.1 Hz versus 2,513 MW/0.1 Hz for events where Value A is less than or equal to 60 Hz.

Figure 16: Linear Regression for Frequency Response and Interconnection Load



5. The difference in average frequency response between on-peak events and off-peak events is not statistically significant and could occur by chance. According to the NERC definition, Eastern Interconnection on-peak hours are designated as follows: Monday to Saturday from 07:00 to 22:00 hours (Central Time) excluding six holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day. Analysis showed that the on-peak/off-peak variable is not a statistically significant contributor to the variability of frequency response. There is a positive correlation of 0.06 between the indicator function of on-peak hours and frequency response; however, difference in average frequency response between on-peak events and off-peak events is not statistically significant and could occur by chance (P-value—the probability of obtaining a result at least as extreme—is 0.49).

6. There is a strong positive correlation of 0.364 between interconnection load and frequency response for the 2009–2011 events. On average, when interconnection load changes by 1,000 MW, frequency response changes by 3.5 MW/0.1 Hz.

   This correlation indicates a statistically significant linear relationship between interconnection load (predictor) and frequency response (response variable). Figure 16 shows the linear regression line and frequency response scatter plot. For the dataset, the regression line has a positive slope estimate of 0.00349; thus, the frequency response variable increases when interconnection load grows.

7. For the 2009–2011 dataset, five variables (time, summer, high pre-disturbance frequency, on-peak/off peak hour, and interconnection load) were involved in the statistical analysis of frequency response. Four of these—time, summer, on-peak hours, and interconnection load—have a positive correlation with frequency response (0.16, 0.24, 0.06, and 0.36, respectively), and the high pre-disturbance frequency has a negative correlation with frequency response (-0.26). The corresponding coefficients of determination R^2 (the square of correlation) indicate that about 2.6% in variability of frequency response can be explained by the changes in time, about 5.8% is seasonal, 0.4% is due to on-peak/off-peak changes, 13.3% is the effect of interconnection load variability, and about 6.9% can be accounted for by a high pre-disturbance frequency. However, the correlation between frequency response and on-peak hours is not statistically significant, with the probability of about 0.44 having occurred by mere chance (the same holds true for the corresponding R^2).

Table 2: Explanatory Variables for Eastern Interconnection Frequency Response

Variable X	Sample Correlation (X, FR)	P-Value	Linear Regression Statistically Significant	Coefficient of Determination R^2 (Single Regression)
Interconnection Load	0.36	<0.0001	Yes	13.3%
Value A > 60 Hz	-0.26	0.0008	Yes	6.9%
Summer/Not Summer	0.24	0.0023	Yes	5.8%
Date	0.16	0.044	Yes	2.6%
On-Peak Hours	0.06	0.438	No	N/A

Therefore, out of the five parameters, interconnection load has the biggest impact on frequency response followed by the indicator of high pre-disturbance frequency. A multivariate regression with interconnection load and starting frequency (Value A) greater

than 60 Hz as the explanatory variables for frequency response yields a linear model with the best fit (it has the smallest mean square error among the linear models with any other set of explanatory variables selected from the five studied). Together these two factors can account for about 20% of the variability in frequency response.

Frequency response is, therefore, affected by other parameters that have low correlation with those studied and account for the remaining share of frequency response variability, minimizing the random error variance.

Note that interconnection load is positively correlated with summer (0.55), on-peak hours (0.45), and time (0.20), but is uncorrelated with starting frequency greater than 60 Hz (P-value of the test on zero correlation is 0.90).

Frequency Response Withdrawal

Withdrawal of primary frequency response is an undesirable characteristic associated most often with digital turbine-generator control systems using setpoint output targets for generator output. These are typically outer-loop control systems that defeat the primary frequency response of the governors after a short time to return the unit to operating at a requested MW output.

Figure 17: Primary Response Sustainability

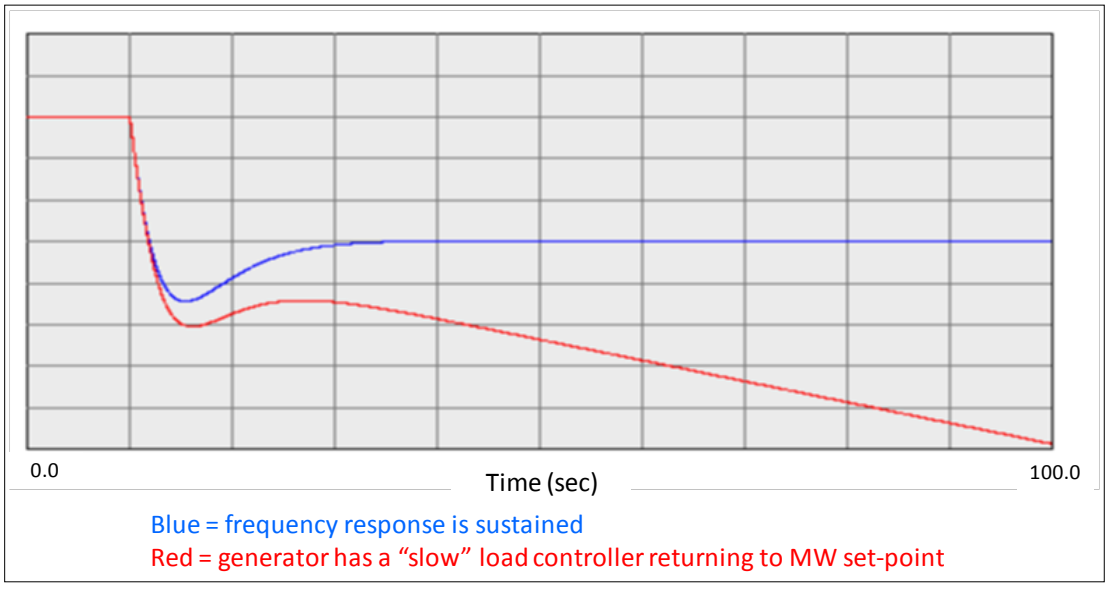


Figure 17 shows how the outer-loop control on a single machine would influence its ability to provide primary frequency response.

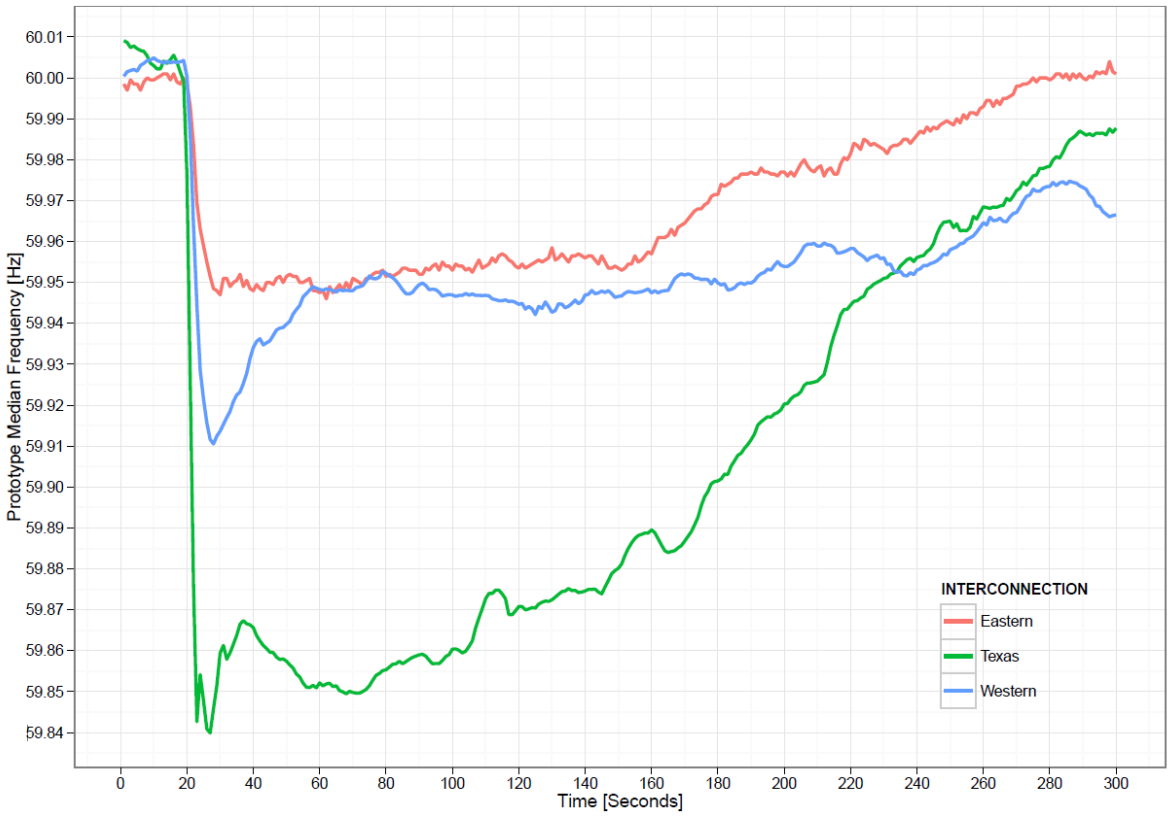
Some of the typical causes of the withdrawal are:

- Plant outer-loop control systems – driving the units to MW setpoints
- Unit characteristics

  - Plant incapable of sustaining primary frequency response
  - Governor controls overridden by other turbine/steam cycle controls
- Operating philosophies – operating characteristic choices made by plant operators
  - Desire to maintain highest efficiencies for the plant

The phenomenon is most prevalent in the Eastern Interconnection and can easily be seen in the comparison of the typical frequency response performance of the three interconnections (figure 18).

Figure 18: Typical Interconnection Responses for 2011[30]



Sustainability of primary frequency response becomes more important during light load conditions (nighttime) when there are generally fewer frequency-responsive generators on-line.

A number of the governor survey questions addressed the operational status and parameters of the governor fleet. The results of the survey show:

- About 90% of the generators were reported to have governors.

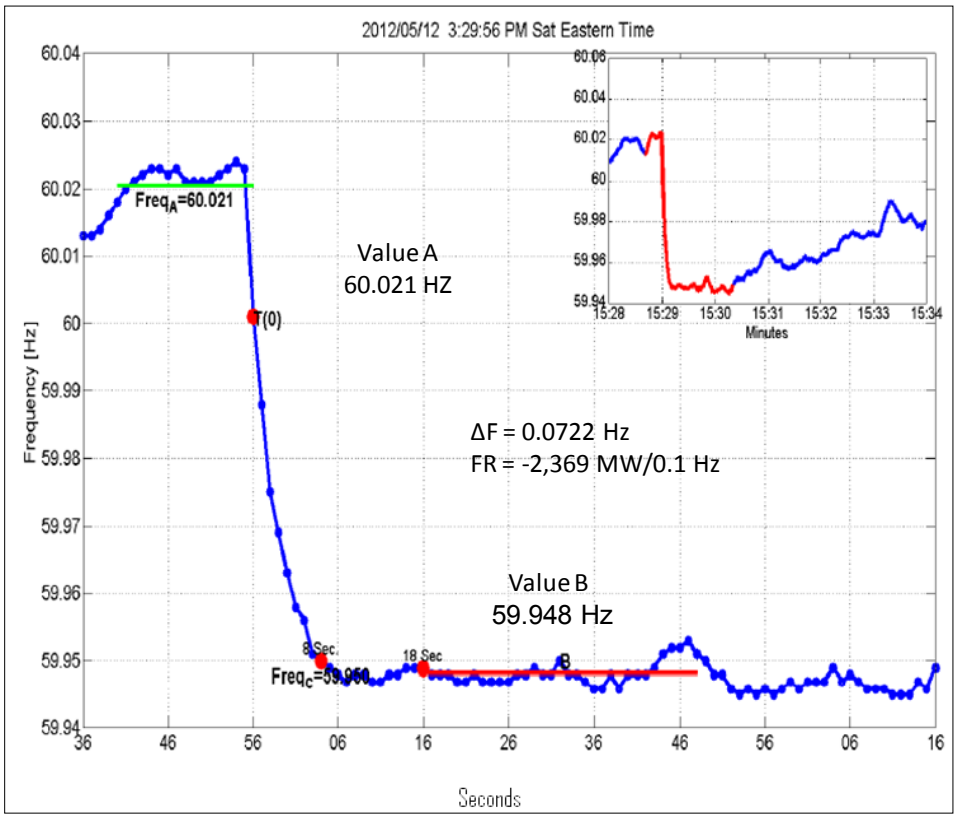
[30] NERC interconnections 2011 typical event frequency patterns using the median of the same second of each RS–FWG selected event – Revised: 09/26/12 provided by Advanced Systems Researchers.

- Virtually all (95–99% by interconnection) of the GOs and GOPs reported that their governors are operational.
- 80–85% (by interconnection) of the governors were reported to be capable of sustaining primary frequency response for longer than 1 minute if the frequency remained outside of their deadband.
- Roughly 50% of the governors reported that they had unit-level or plant-level control systems that override or limit governor performance.

Despite the fact that the majority of generators reported they have operational turbine governors, half of them have unit- or plant-level control systems that override governor responses. These control systems allow the units to return to scheduled output (MW setpoint) or an optimized operating point for economic reasons. These factors heavily influence the sustainability of primary frequency response, contributing to the withdrawal symptom often observed. This is often evident during light load periods in the middle of the night when high-efficiency, low-cost units that operate on MW setpoints are the majority of the generators dispatched to serve load.

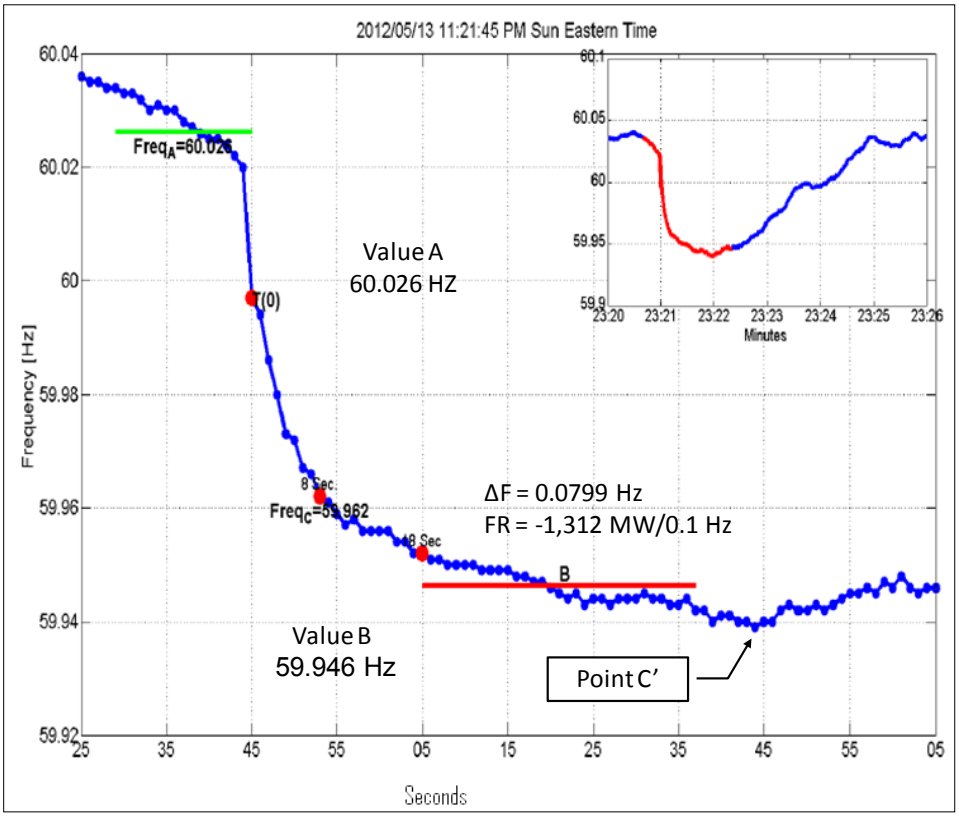
This was exhibited by two events involving generator trips in the spring of 2012 in one weekend. During the first event (figure 19), 1,711 MW of generation was tripped with a typical -2,369 MW/0.1 Hz frequency response.

Figure 19: 3:30 pm Saturday Afternoon 1,711 MW Resource Loss



The second event (figure 20) occurred late Sunday night when load in the Eastern Interconnection was much lighter, and the generators dispatched—probably the most efficient units—were of a different character. Despite the resource loss being almost 700 MW less, the frequency response of the interconnection was significantly reduced and exhibited the "lazy L" of primary frequency response withdrawal. Point C defined to occur during the first 8 seconds (at that time) was 59.962 Hz, while a lower point of about 59.939 Hz occurred about 1 minute after the event.

Figure 20: 11:21 pm Sunday Night 1,049 MW Resource Loss



These two events point to the composition of the dispatch and the characteristics of the units on-line as primary elements in the frequency response strength, as well as the key elements in creating withdrawal. Therefore, when calculating an Interconnection Frequency Response Obligation (IFRO), it is important for operational planners and operators to recognize the potential for that withdrawal and the frequency consequentially being lower one to two minutes after the beginning of the event.

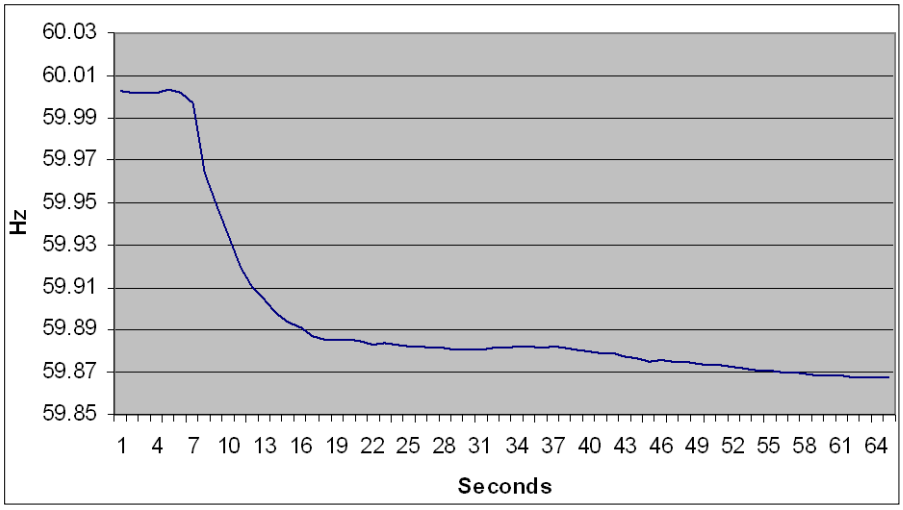
A similar withdrawal was experienced during the major frequency excursion of August 4, 2007 (figure 21). During that event some 4,500 MW of generation was lost.

The lowest frequency in the event was 59.868 Hz at about one minute after the start. Recovery to pre-event frequency was about 8 minutes, but the measurement of Value B (20 to 52 seconds) would not capture the lowest frequency. That frequency point is the true frequency

event nadir, hereafter referred to as Point C' ("Point C Prime"), and is normally equal to Point C for events that don't exhibit the so-called "lazy L" effect.

It is important that the phenomenon be recorded and trended to determine if it is improving or deteriorating.

Figure 21: Interconnection Frequency – August 4, 2007 EI Frequency Excursion



Recommendation – Measure and track frequency response sustainability trends by observing frequency between T+45 seconds and T+180 seconds. A pair of indices for gauging sustainability should be calculated comparing that value to both Point C and Value B.

Modeling of Frequency Response in the Eastern Interconnection

Modeling of frequency response characteristics has been a known problem since at least 2008, when forensic modeling of the Eastern Interconnection required a "de-tuning" of the existing MMWG dynamics governor to 20% of modeled (80% error) to approach the measured frequency response values from the event.

Figure 22 shows the response comparison for that event analysis. Although the event was an over-frequency problem at that point, it is indicative of the larger problem of governor modeling in the Eastern Interconnection. The problem was further highlighted in the 2010 "Use of Frequency Response Metrics to Assess the Planning and Operating Requirements for Reliable Integration of Variable Renewable Generation," by Ernest Orlando Lawrence Berkeley National Laboratory (LBNL). In that analysis, an attempt was made to simulate a 4,500 MW loss event that occurred on August 4, 2007. Figure 23 shows a comparison of the simulation to the measured frequency from the event.

Figure 22: 2007 Event Frequency Response Forensic Analysis

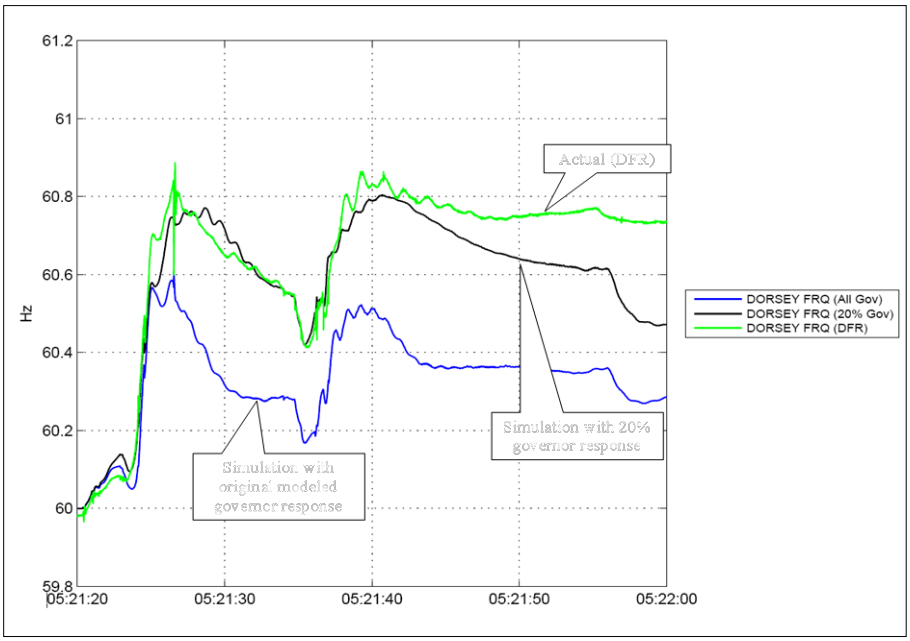
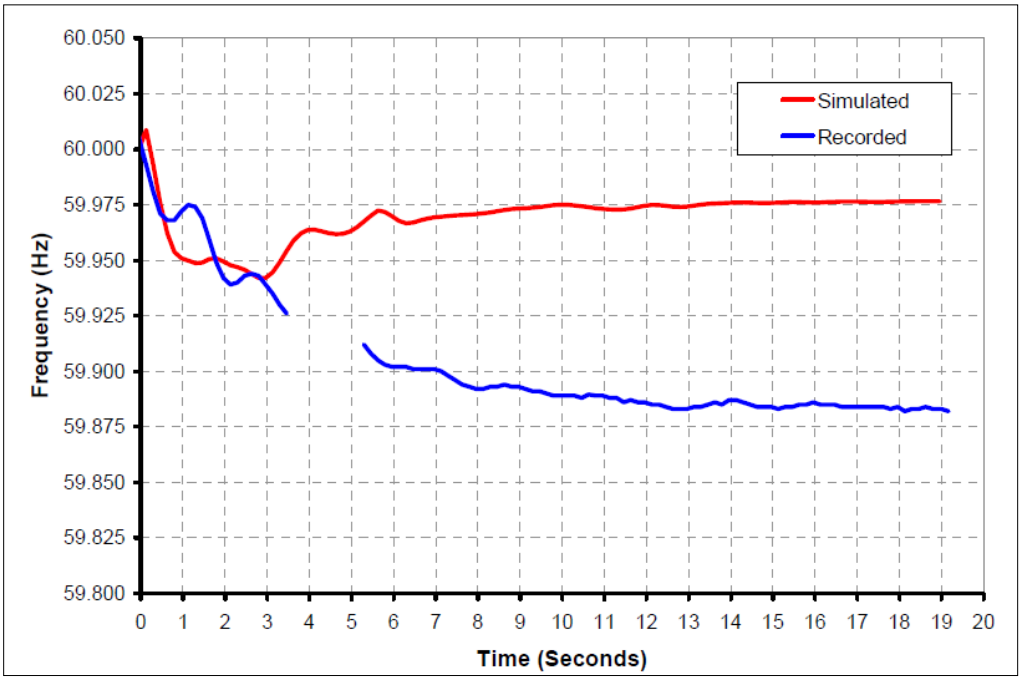


Figure 23: Eastern Interconnection Frequency Response – August 4, 2007 Initial 20 Seconds



As part of the NERC Frequency Response Initiative and the Modeling Improvements Initiative, NERC collaborated with the Eastern Interconnection Reliability Assessment Group (ERAG) Multiregional Modeling Working Group (MMWG) to perform an analysis of the modeling of overall frequency response in the Eastern Interconnection. That review was a prelude to a plan

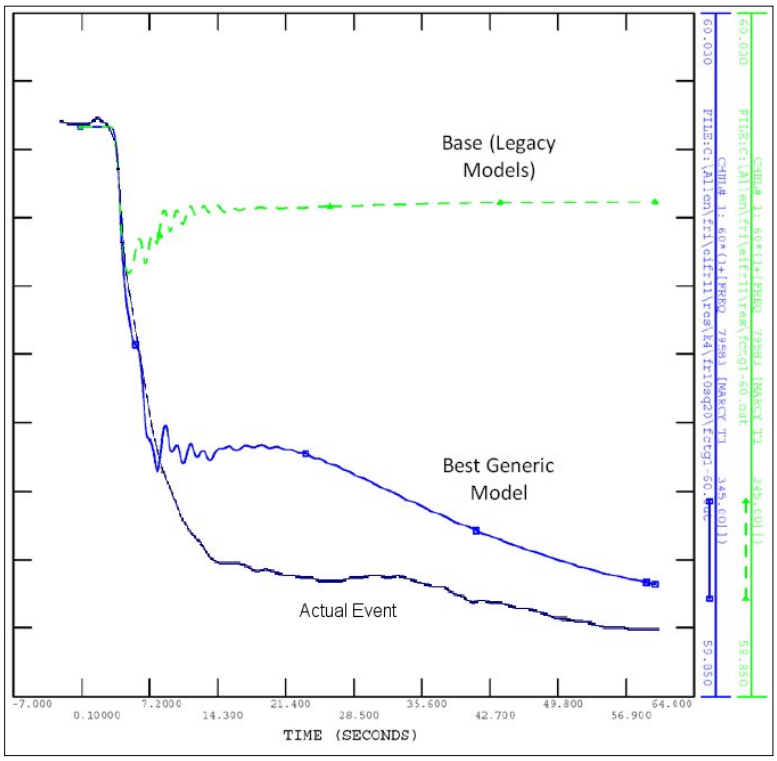
for thorough examination of the governor models in the Eastern Interconnection dynamics study cases that are assembled by the MMWG. That report stated, "The turbine-governor modeling currently reflected in the MMWG dynamics simulation database is not a valid representation of the frequency control behavior of the Eastern Interconnection."

That project created a "generic case" dynamics model, replacing the turbine governor models in the case with a generic governor model in order to ascertain the basic characteristics of the frequency response of the Eastern Interconnection. Figure 24 shows a comparison of the actual event data and the simulations using the original governor data and the generic case.

The characteristics found in that study were:

- Only 30% of the units on-line provide primary frequency response.
- Two-thirds of the units that did respond exhibit withdrawal of primary frequency response.
- Only 10% of units on-line sustain primary frequency response.

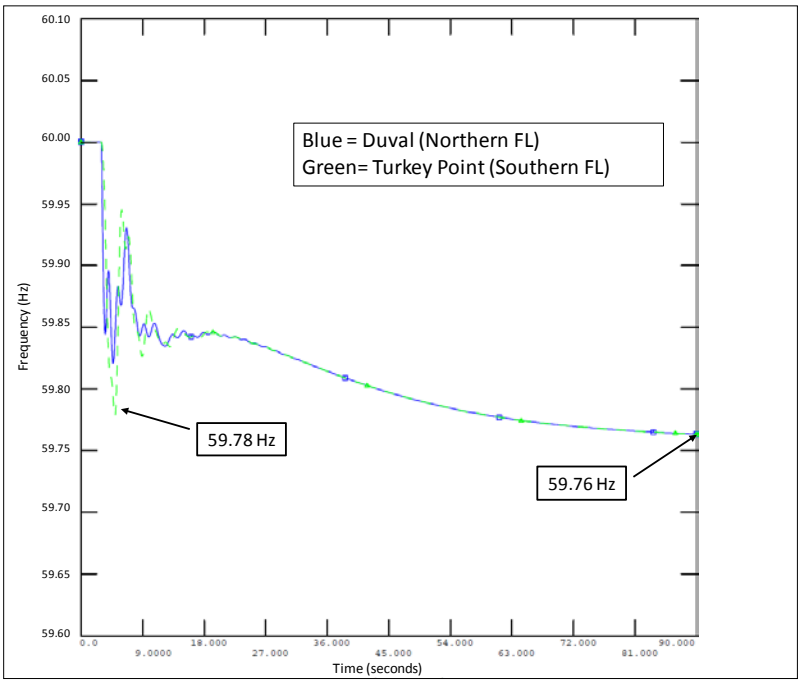
Figure 24: Comparison of Legacy and Generic Simulations to August 4 Event



Following that study, a follow-on analysis was performed by NERC staff to determine the general order of magnitude of a frequency event that could be sustained by the Eastern Interconnection without violating the 59.7 Hz first step UFLS in FRCC. A simulation was run that tripped about 8,500 MW of generation in the southeast United States (north of Florida). Figure 25 shows the result of that testing.

The simulation showed that the lowest frequency would be about 59.76 Hz in southern Florida. The initial nadir of 59.78 Hz in southern Florida is lower than the nadir in northern Florida due to the wave properties of the disturbance.

Figure 25: 8,500 MW Resource Loss Simulation



Although the simulations using the generic governor models are not exact, that analysis is indicative of the Eastern Interconnection's ability to sustain a resource loss event significantly higher than the Resource Contingency Protection Criteria proposed in this report.

Concerns for Future of Frequency Response

There is a growing concern about the future of frequency response in light of a number of factors:

- **Electronically coupled resources** – The incorporation of renewable resources such as wind and solar and the increasing penetration of variable speed motor drives presents a continuing erosion of system inertia; all are electronically coupled to the system. As such, those resources, unless specifically designed to mimic inertial response, do not have inertial response.

- **Electronically coupled loads** – As synchronous motors are replaced by variable speed drives, the load response of the motors is eliminated by the power electronics of the motor controller. This reduces the load damping factor for the interconnection.

- **Displacement of traditional turbine-generators in the dispatch** – Traditional turbine-generators are being displaced in the dispatch, particularly during off-peak hours when wind generation is at its highest and the loads and generation levels are at their lowest.

Such displacement of frequency responsive resources increasingly depletes the inertia of the interconnection at those times.

Role of Inertia in Frequency Response

Inertia plays a crucial role in determining the slope of a frequency decline during a resource loss event.

The slope of frequency excursion is determined by the inertia of the system and a factor to account for the load damping characteristics of the interconnection.

$$\frac{\quad}{\quad}$$

Where:

D = Load Damping Factor

The load damping factor ranges from 0 to 2, where 2 would represent a load of all motors.

H = Inertia Constant of the interconnection

The inertia constant ranges from 2.5 to 6.5

Figure 26 shows the sensitivity of frequency response to changes to system inertia. The lower green curve represents an inertia constant of 2.5, and the lower red curve represents an inertia constant of 5.0.

Figure 26: Frequency Response Sensitivity to System Inertia

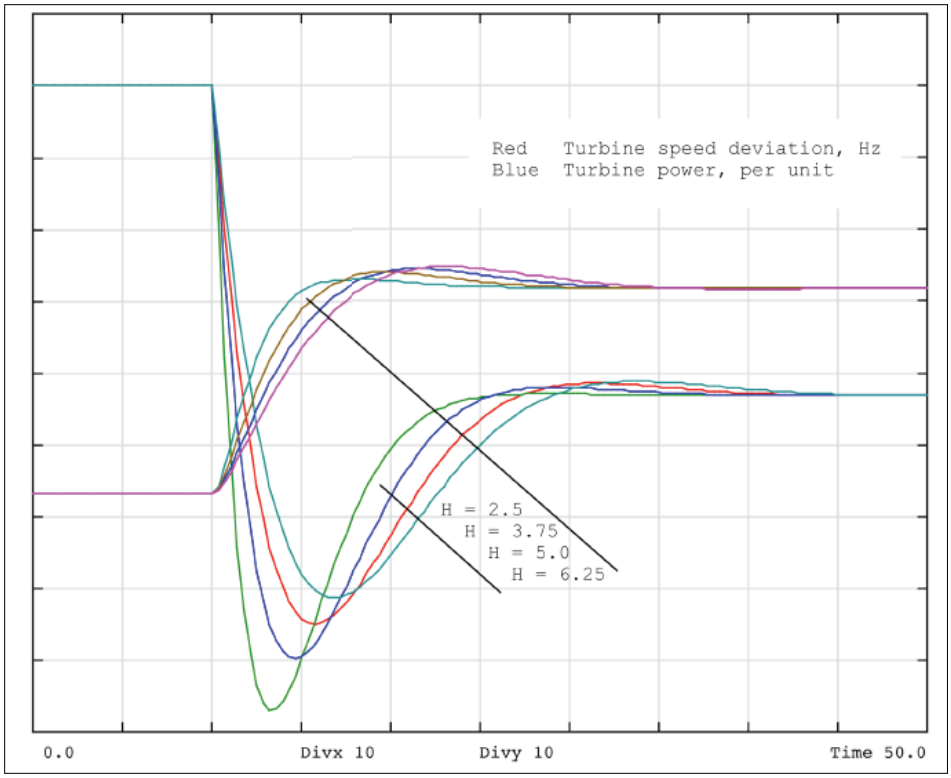
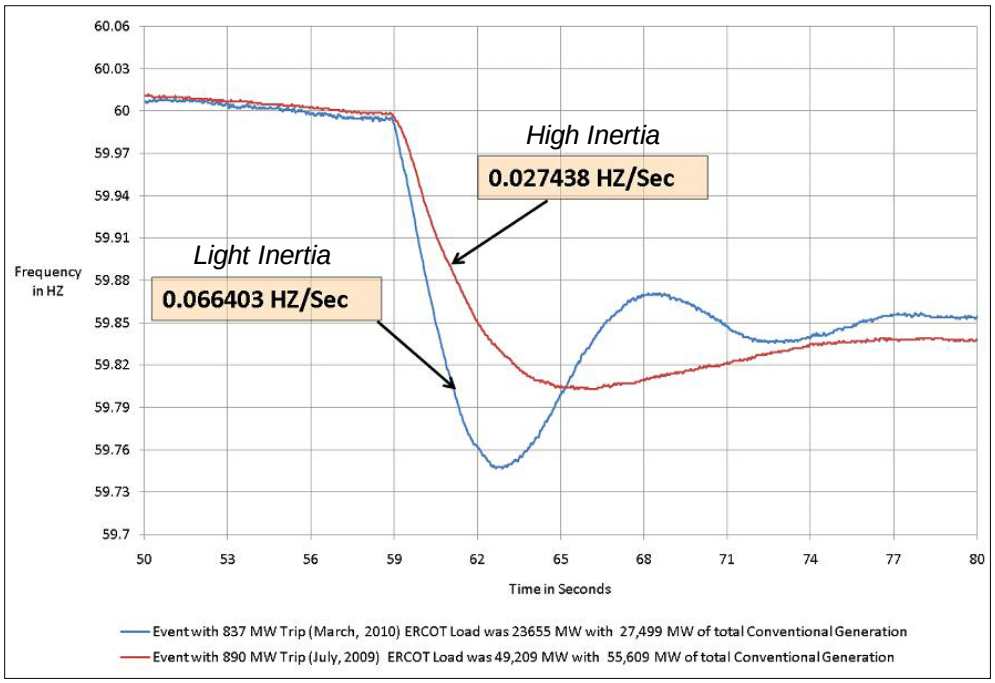


Figure 27 shows an actual example from ERCOT of how frequency response is changed for similarly sized resource loses with differences in inertia. It is clear that when the inertia on the system is lower, a similar resource MW loss creates a much steeper and deeper frequency excursion. This is a good example of the displacement of traditional resources with electronically coupled resources during light load periods.

Figure 27: Inertial Response Sensitivity



Need for Higher Speed Primary Frequency Response

The reduction of inertia drives a need for higher speed response to frequency excursions. If the slope of the frequency decline is steeper, it is necessary for high-speed injection of energy to arrest the decline in order to prevent the excursion from being too deep. Such energy injection can come from a number of sources, such as energy storage devices and wind turbines with modified inverters.

Preservation or Improvement of Existing Generation Primary Frequency Response

Additionally, to further ensure strong overall frequency response, it is important to preserve or improve the primary frequency response of the existing generation fleet. The Role of Governors section of this report discusses the results of the 2010 survey on generator governors. The survey results show that there is a significant portion of the existing generator fleet that has operational governors. However, the reported deadband ranges make those governors ineffective for all but catastrophic losses of resources. Figure 28 shows the reported deadband ranges.

If the existing generator fleet primary frequency response performance can be improved through adjustments in deadbands and implementation of no-step droop responses, a significant improvement in interconnection frequency response could be realized. Further, if all of the existing generators were made capable of response, any generators that are on-line during light load periods would be more able to provide response.

Figure 28: Reported Governor Deadband Settings

The Role of Governors section of this report recommends immediate development of a NERC turbine-generator governor guideline calling for deadbands of ±16.67 mHz with droop settings of 4%–5% depending on turbine type in order to retain or regain frequency response capabilities of the existing generator fleet.

Withdrawal of Primary Frequency Response

Withdrawal of primary frequency response caused by outer-loop control systems must be addressed. As shown in the Frequency Response Withdrawal section of this report, frequency response during light load periods can be highly influenced by the mix of dispatched resources. Economics of the dispatch dictates that the most efficient, cost-effective generation will remain on-line during those periods. Such generation employs setpoint controls that return generation to AGC-prescribed or efficiency-prescribed generation levels regardless of system frequency. This results in "squelching" of any primary frequency response that the governors may have provided during a frequency event. This withdrawal of primary response before secondary frequency response from AGC becomes effective starting at about T+45 to T+60 seconds, creating the "lazy L" event response prevalent in the Eastern Interconnection.

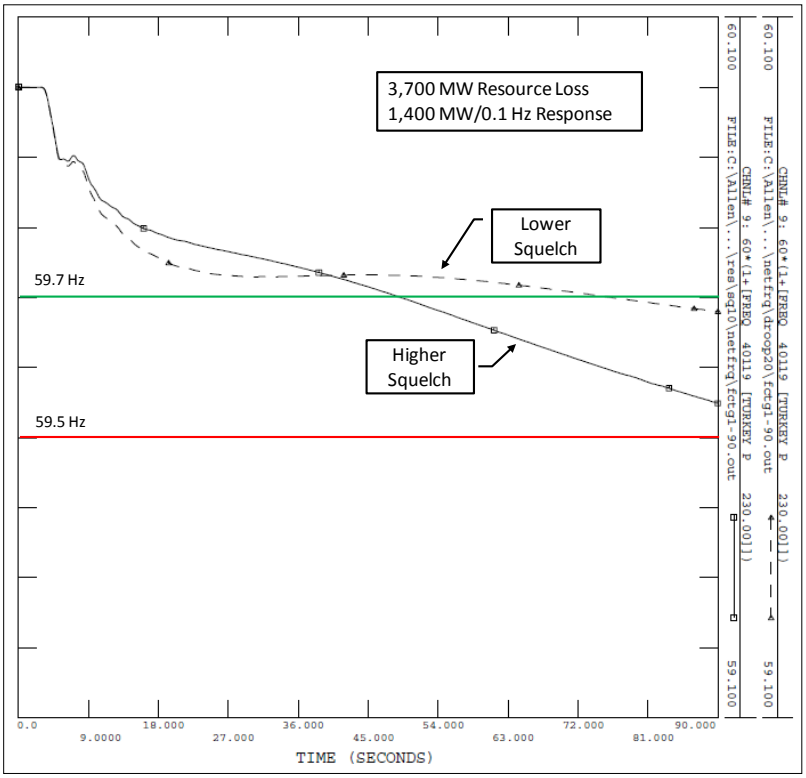
To illustrate this effect, a dynamic simulation of a 3,700 MW resource loss frequency event was performed for the Eastern Interconnection using the generic dynamics case described in the Modeling of Frequency Response in the Eastern Interconnection section of this report. Two simulation runs were performed to mimic about 1,400 MW/0.1 Hz frequency response

(between 20 and 52 seconds), with different combinations of generator dispatch and differing amounts of response "squelch." Figure 29 shows that the effects on frequency response sustainability can be highly influenced by the composition of the resource dispatch, even with the same measured frequency response.

There are potential ways of alleviating this withdrawal symptom, including introduction of a frequency bias into the outer-loop controls systems that would prevent withdrawal of primary frequency response, similar to the frequency bias settings in an automatic generation control (AGC) system.

Recommendation – NERC should include guidance on methods to reduce or eliminate the effects of primary frequency response withdrawal by outer-loop unit or plant control systems.

Figure 29: Simulations of Varying Levels of Primary Frequency Response Withdrawal Eastern Interconnection



Note that these simulation runs were done for illustrative purposes only; the simulations are not yet accurate enough to confidently predict system performance, and AGC secondary frequency response was NOT simulated. Secondary frequency response from AGC becomes effective starting at about T+45 to T+60 seconds.

Interconnection Frequency Response Obligation (IFRO)

Tenets of IFRO

The IFRO is intended to be the minimum amount of frequency response that must be maintained by an interconnection. Each Balancing Authority in the interconnection should be allocated a portion of the IFRO that represents its minimum responsibility. In order to be sustainable, Balancing Authorities that may be susceptible to islanding may need to carry additional frequency responsive reserves to coordinate with their under-frequency load shedding (UFLS) plans for islanded operation.

A number of methods to assign the frequency response targets for each interconnection can be considered. Initially, the following tenets should be applied:

1. A frequency event should not trip the first stage of regionally approved UFLS systems within the interconnection.
2. Local tripping of first-stage UFLS systems for severe frequency excursions, particularly those associated with protracted faults or on systems on the edge of an interconnection, may be unavoidable.
3. Other frequency-sensitive loads or electronically coupled resources may trip during such frequency events (as is the case for photovoltaic inverters in the Western Interconnection).
4. Other susceptible frequency sensitivities may have to be considered in the future (e.g., electronically coupled load common-mode sensitivities).

UFLS is intended to be a safety net to prevent against system collapse from severe contingencies. Conceptually, that safety net should not be violated for frequency events that happen on a relatively regular basis. As such, the resource criteria are selected to avoid violating UFLS settings approved by the Regional Entities.

The Frequency Responsive Reserve Standard Drafting Team (FRRSDT) is proposing an administered value approach for the BAL-003-1 field trial. Eventually, an agreed-upon method of determining the interconnection FRO will be included in a reliability standard, or in the NERC Rules of Procedure.[31]

[31] http://www.nerc.com/files/NERC_Rules_of_Procedure_EFFECTIVE_20110412.pdf

Statistical Analyses

Frequency Variation Statistical Analysis

A statistical analysis of the variability of frequency for each of the four interconnections was performed using 1-second measured frequency for the Eastern, Western, and ERCOT Interconnections for 2007–2011 (five years). Data for the Québec Interconnection was only available for 2010 and 2011. Analysis of data showed the Western Interconnection frequency deviations (Epsilon) to be more volatile since the Balancing Authority ACE Limit (BAAL) field trial began there in March of 2010. Therefore, it was decided to limit the analysis to the years 2009–2011 to more accurately portray the current frequency characteristics.

This variability accounts for items such as time error correction; variability of load, interchange, and frequency over the course of a normal day; and other uncertainties, including time error corrections and all frequency events—no large events were excluded. The results of the analysis are shown in table 3.

Table 3: Interconnection Frequency Variation Analysis (Hz)

Value	Eastern	Western	ERCOT	Québec
Timeframe	2009–2011	2009–2011	2009–2011	2010–2011
Number[32] of Samples	91,283,555	90,446,802	85,924,929	34,494,049
Expected Value	60.0000367	59.9999522	59.9999847	60.00002303
Maximum Value	60.3090	60.3575	62.1669	60.8776
Minimum Value	59.0015	59.7364	58.0000	59.1879
Variance of Frequency (σ^2)	0.00024092 Hz^2	0.00022266 Hz^2	0.00060749 Hz^2	0.00035315 Hz^2
σ	0.01552147	0.01492184	0.02464722	0.01879236
2σ	0.03104295	0.02984369	0.04929445	0.03758472
3σ	0.04656442	0.04476553	0.07394167	0.05637708
Starting Frequency (F_{Start}) 5% of lower tail samples	59.974	59.976	59.963	59.972

[32] Numbers of samples vary due to exclusion of data drop-outs and other obvious observation anomalies.

For each interconnection, the distribution of the interconnection frequency fails the normality test (both the chi-square goodness-of-fit and the Kolmogorov-Smirnov goodness-of-fit) at any standard significance level. The combined datasets for the interconnection frequency consist of very large numbers of observations. For such large samples, the empirical distribution can be considered as a very good approximation of the actual distribution of the frequency, and was judged a better predictor than use of standards deviation for predicting the interconnection starting frequencies for an event. The rate of convergence in the Glivenko-Cantelli theorem is $n^{(-1/2)}$, where n is the sample size. Therefore, quantiles of the empirical distribution function can be used directly to calculate intervals where values of frequency belong with any pre-determined probability.

Only resource losses (frequency drops) are examined for IFRO calculations, so the focus is on the one-sided lower tail of the distribution for frequencies that fall outside the upper 95% interval of the overall distribution. Therefore, the starting frequency that should be used for the calculation of the IFROs is the 10% quantile frequency value, which represents a 95% confidence in the prediction for that single tail.

Those starting frequencies encompass all variations in frequency, including changes to the target frequency during time error correction. That eliminates the need to expressly evaluate TEC as a variable in the IFRO calculation.

Recommendation – The starting frequency for the calculation of IFROs should be frequency of the 5% of lower tail of samples from the statistical analysis, representing a 95% confidence that frequencies will be at or above that value at the start of any frequency event.

Figures 30–33 show the interconnection histograms broken into 1-mHz "bins." A complete set of graphs for the four interconnections is located in Appendix D of this report.

Figure 30: Eastern Interconnection 2009–2011 Frequency Histogram

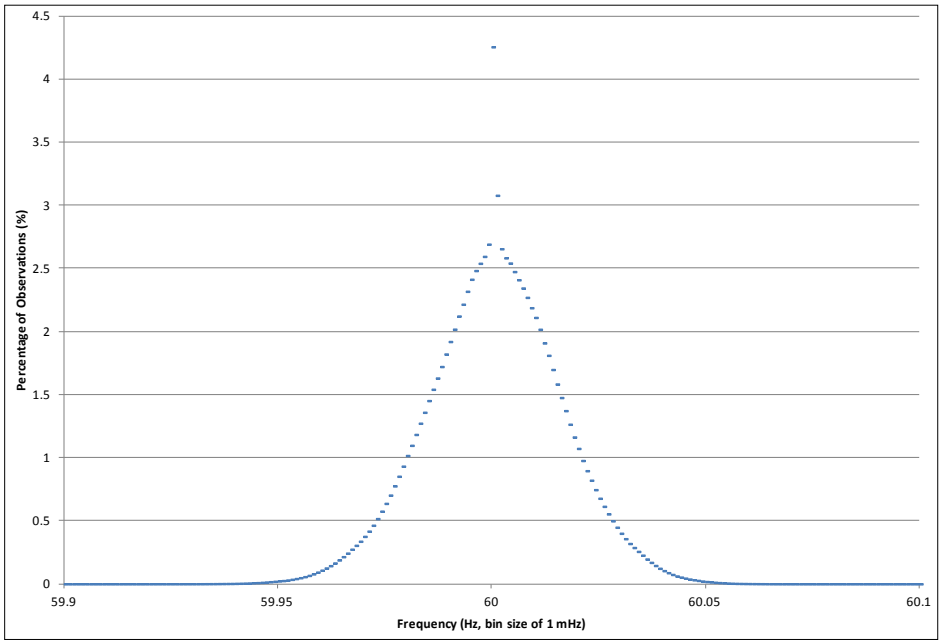


Figure 31: Western Interconnection 2009–2011 Frequency Histogram

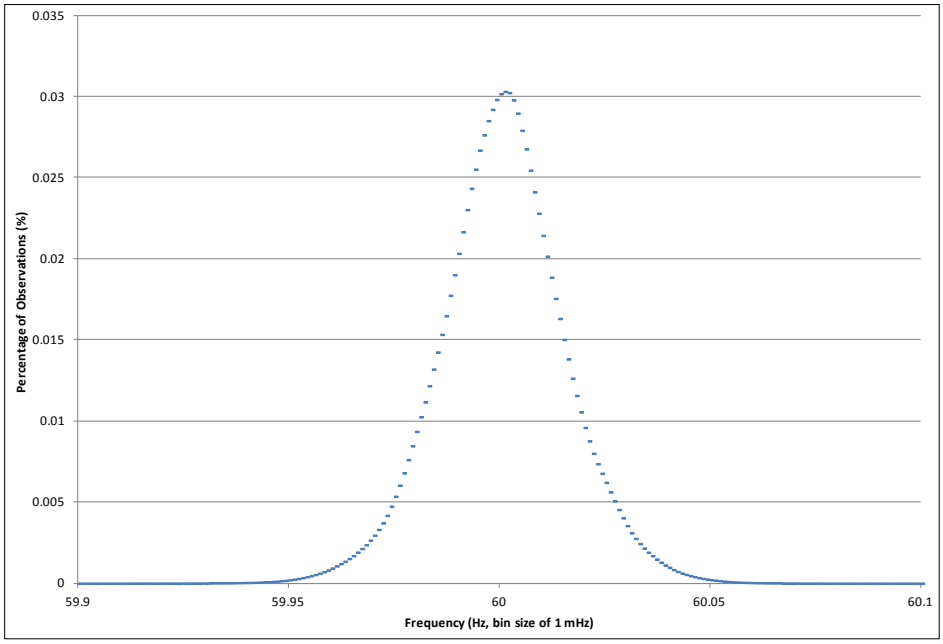
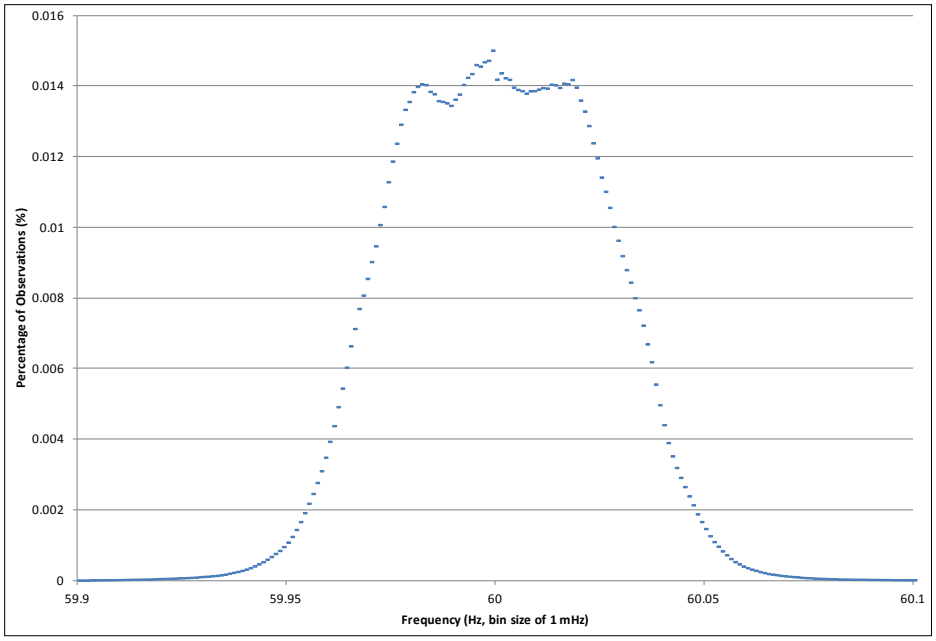
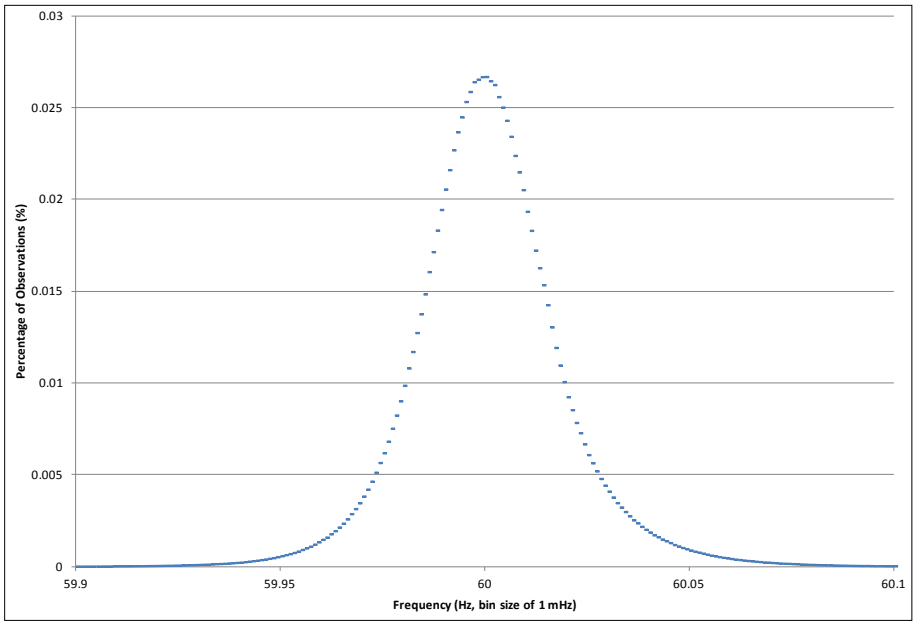


Figure 32: ERCOT Interconnection 2009–2011 Frequency Histogram



Note that the ERCOT frequency histogram displays the influence of the "flat-top" f profile that was common to that interconnection prior to 2008. That phenomenon was caused by a standardized ±36 mHz deadband with a step-function implementation. Additional discussion on that topic is in the ERCOT Experience section of this report.

Figure 33: Québec Interconnection 2010–2011 Frequency Histogram



Point C Analysis – One-second versus Sub-second Data

Additional statistical analysis was performed for the differences between Point C and Value B calculated as a ratio of Point C to Value B using 1-second data for events from December 2010 through May 2012. Although the 1-second data sample is robust, it does not necessarily ensure the nadir of the event was accurately captured. To do so requires sub-second measurements that can only be provided by PMUs or FDRs. Therefore, a "CC" adjustment component (CC_{ADJ}) for the IFRO calculation was designed to account for the differences observed between the 1-second Point C and high-speed Point C measurements.

Table 4: Analysis of One-second and Sub-second Data for Point C (CC_{ADJ})

Interconnection	Number of Samples	Mean	Standard Deviation	CC_{ADJ} (95% Quantile)
Eastern	30	0.0006	0.0038	0.0068
Western	17	0.0012	0.0019	0.0044
ERCOT	58	0.0021	0.0061	0.0121
Québec[33]	0	N/A	N/A	N/A

This adjustment should be made to the allowable frequency deviation value before it is adjusted for the ratio of Point C to Value B. Note: No sub-second data was available for the Québec Interconnection.

Recommendation – The allowable frequency deviation (starting frequency minus the highest UFLS step) should be reduced by the CC_{ADJ} to account for differences between the 1-second and sub-second data for Point C as listed in table B-C9.

Adjustment for Differences between Value B and Point C

All of the calculations of the IFRO are based on protecting from instantaneous or time-delayed tripping of the highest step of UFLS, either for the initial nadir (Point C), or for any lower frequency that might occur during the frequency event. The frequency variance analysis in the previous section of this report is based on 1-second data from 2007 through 2011 (except Québec 2010 and 2011 only).

As a practical matter, the ability to measure the tie line and loads for the Balancing Authorities is limited to system control and data acquisition (SCADA) scan-rate data of 1–6 seconds. Therefore, the ability to measure frequency response of the Balancing Authorities is still limited by the SCADA scan rates available to calculate Point B.

[33] Sub-second data from Québec was not available.

Candidate events from the ALR1-12 Interconnection Frequency Response selection process (Appendix E) for frequency response analysis were used to analyze the relationship between Value B and Point C for the significant frequency disturbances from December 2010 through May 2012. This sample set was selected because data was available for the analysis on a consistent basis. This resulted in the number of events shown in table 5.

Analysis Method

When evaluating some physical systems, the nature of the system and the data resulting from measurements derived from that system do not fit the standard linear regression methods that allow for both a slope and an intercept for the regression line. In those cases, it is better to use a linear regression technique that represents the system correctly.

The Interconnection Frequency Response Obligation is a minimum performance level that must be met by the Balancing Authorities in an interconnection. Such response is expected to come from the frequency response in MWs of the Balancing Authorities to a change in frequency. As such, if there is no change in frequency there should be no change in MWs resulting from frequency response.

This response is also related to the function of the frequency bias setting in the ACE equation of the Balancing Authorities for longer term. The ACE equation looks at the difference between scheduled frequency and actual frequency times the frequency bias setting to estimate the amount of MWs that are being provided by load and generation within the Balancing Authority. If the actual frequency is equal to the scheduled frequency, the frequency bias component of ACE must be zero.

Since the IFRO is ultimately a projection of how the interconnection is expected to respond to changes in frequency related to a change in MW (resource loss or load loss), there should be no expectation of frequency response without an attendant change in MW. It is this relationship that indicates the appropriateness of the use of regression with a forced fit through zero.

Evaluation of data to determine C-to-B ratio:

The evaluation of data to determine C-to-B ratio to account for the differences between arrested frequency response (to the nadir, Point C) and settled frequency response (Value B) is also based on a physical representation of the electrical system. Evaluation of this system requires investigation of the meaning of an intercept. The C-to-B ratio is defined as the difference between the pre-disturbance frequency and the frequency at the maximum deviation in post-disturbance frequency, divided by the difference between the pre-disturbance frequency and the settled post-disturbance frequency.

A stable physical system requires the ratio to be positive; a negative ratio indicates frequency instability or recovery of frequency greater than the initial deviation.

Table 5: Analysis of Value B and Point C (CBR)				
Interconnection	Number of Samples	Mean	Standard Deviation	CB_R (95% Quantile)
Eastern	41	0.964	0.0149	1.0 (0.989)[34]
Western	30	1.570	0.0326	1.625
ERCOT	88	1.322	0.0333	1.377
Québec[35]				1.550

This statistical analysis was completed using 1-second averaged data that does not accurately capture Point C and is better measured by high-speed metering (PMUs or FDRs). Therefore, a separate correction must be used to account for the differences between the Point C in the 1-second data and the Point C values measured with sub-second measurements from the FNet FDRs.

The CB_R value for the Eastern Interconnection indicates that the Value B is generally below the Point C value. Therefore, there is no adjustment necessary for that interconnection.

The Québec Interconnection's resources are predominantly hydraulic and are operated to optimize efficiency, typically at about 85% of rated output. Consequently, most generators have about 15% headroom to supply primary frequency response. This results in a robust response to most frequency events, exhibited by high rebound rates between Point C and the calculated B Value. For the 26 frequency events in their event sample, Québec's CB_R value would be 3.613, or two to three times as high as the CB_R value of other interconnections. Using the same calculation method for CB_R would effectively penalize Québec for their outstanding rebound performance and make their IFRO artificially high. Therefore, the method for calculating the Québec CB_R was modified.

Québec operates with an operating mandate for frequency responsive reserves to protect from tripping their 58.5 Hz (300 ms trip time) first step UFLS for their largest hazard at all times, effectively protecting against tripping for Point C frequency excursions. They also protect against tripping a UFLS step set at 59.0 Hz that has a 20-second time delay, which protects them for Value B low frequency and any withdrawals. This results in a Point C to Value B ratio of 1.5. To account for the confidence interval, 0.05 is then added, making the CB_R = 1.550.

Adjustment for Primary Frequency Response Withdrawal

At times, the nadir for a frequency event occurs after Point C—defined in BAL-003-1 as occurring in the T+0 to T+12 second period, during the Value B averaging period (T+20 through T+52 seconds), or later. For purposes of this report, that later occurring nadir is termed Point

[34] CB_R value limited to 1.0 because values lower than that indicate the Value B is lower than Point C and does not need to be adjusted. The calculated value is 0.989.

[35] Based on Québec UFLS design between their 58.5 Hz UFLS with 300 millisecond operating time (responsive to Point C)and 59.0 Hz UFLS step with a 20 second delay (responsive to Value B or beyond).

C'. This lower nadir is symptomatic of primary frequency response withdrawal, or squelching, by unit or plant-level outer-loop control systems. Withdrawal is most prevalent in the Eastern Interconnection, as described earlier.

As described in the Withdrawal of Primary Frequency Response section of this report, frequency response withdrawal can become important depending on the type and characteristics of the generators in the resource dispatch, especially during light load periods. Therefore, an additional adjustment to the maximum allowable delta frequency for calculating the IFROs was statistically developed. This adjustment should be used whenever withdrawal is a prevalent feature of frequency events. Initially, it is only being applied to the Eastern Interconnection.

Table 6 shows the statistical results of the analysis based on the 34 frequency response events in the Eastern Interconnection. Note that the expected timeframe for the C' nadir to occur is about 82 seconds after the start of the event.

Table 6: Statistical Analysis of the Adjustment for C' Nadir (BC'_{ADJ})

Value	Number of Samples	Mean	Standard Deviation	BC'_{ADJ} (95% Quantile)
Delta Frequency from Value B to Point C' Nadir	34	4.0 mHz	8.2 mHz	17.5 mHz
Seconds from T+0 to C' Nadir	34	38.9 s	26.3 s	82.1 s

This BC'_{ADJ} should be applied to the allowable delta frequency after the differences from Value B to Point C are adjusted. The values driving this adjustment should also be carefully monitored and the adjustment recalculated during the annual review of IFRO calculations.

Variables in Determination of Interconnection Frequency Response Obligation from Criteria

To make a determination of the appropriate Resource Contingency Protection Criteria to protect for a certain kind of event, the MW target value needs to be translated into an Interconnection Frequency Response Obligation (IFRO) for an appropriate comparison. A number of other variables must be taken into consideration.

Low Frequency Limit

The low frequency limit to be used for the IFRO calculations should be the highest setpoint in the interconnection for regionally approved UFLS systems.

Recommendation – Based on the tenet that UFLS should not trip for a frequency event throughout the interconnection, the recommended UFLS first-step limitations for IFRO calculations listed in table 7 should be used.

Table 7: Low-Frequency Limits (Hz)	
Interconnection	Highest UFLS Trip Frequency
Eastern	59.5[36]
Western	59.5
ERCOT	59.3
Québec	58.5

The highest UFLS setpoint in the Eastern Interconnection is 59.7 Hz in FRCC, while the prevalent highest setpoint in the rest of that interconnection is 59.5 Hz. The FRCC 59.7 Hz first UFLS step is based on internal stability concerns and preventing the Florida peninsula from separation from the rest of the interconnection. The FRCC concluded that the IFRO starting point of 59.5 Hz for the Eastern Interconnection is acceptable in that it imposes no greater risk of UFLS operation for an interconnection resource loss event than for an internal FRCC event.

Protection against tripping the highest step of UFLS does not ensure that generation that has frequency-sensitive protection or turbine control systems will not trip. Severe system conditions might drive the frequency to levels that may present protection and control systems with a combination of conditions that may cause the generation to trip, such as severe rate of change in voltage or frequency, which might actuate volts per hertz relays. Similarly, some combustion turbines may not be able to sustain operation at frequencies below 59.5 Hz. Recent laboratory testing by Southern California Edison of inverters used on residential and commercial scale photovoltaic (PV) systems revealed a propensity to trip at about 59.4 Hz, which is 200 mHz above the expected 59.2 Hz prescribed in IEEE Standard 1547 for distribution-connected PV rating ≤ 30 kW (57.0 Hz for larger installations). This could become problematic in areas of high penetration of photovoltaic resources.

Credit for Load Resources (CLR)

The ERCOT Interconnection depends on contractually interruptible demand that automatically trips at 59.7 Hz to help arrest frequency declines. A 1,400 MW Load Resource (formerly Load acting as a Resource – LaaR) credit is included against the Resource Contingency for the ERCOT Interconnection. Similarly, there is a remedial action scheme (RAS) in WECC that trips 300 MW of load for the loss of two Palo Verde generating units.

For the Western Interconnection, if the larger 3,200 MW resource loss activates the RAS and trips the Pacific DC Intertie (PDCI), the 300 MW credit for Load Resources associated with the loss of the two Palo Verde units does not apply.

[36] The highest UFLS setpoint in the Eastern Interconnection is 59.7 Hz in FRCC, based on internal stability concerns. The FRCC concluded that the IFRO starting frequency of the prevalent 59.5 Hz for the Eastern Interconnection is acceptable in that it imposes no greater risk of UFLS operation in FRCC for an external resource loss event than for an internal FRCC event.

For both interconnections, credit for load resources is handled in the calculation of the IFRO as a reduction to the loss of resources, when appropriate.

Interconnection Resource Contingency Protection Criteria

Selection of discrete event protection criteria for each interconnection must be done before the IFRO can be calculated. The protection criteria selected should ensure that Point C would not encroach on the first step UFLS. However, the criteria may need to be different from one interconnection to the other due to the differences in size and design characteristics.

The following potential interconnection event criteria were considered:

- largest N-2 loss-of-resource event,
- largest total generating plant with common voltage switchyard, and
- largest loss-of-resource event in the interconnection in the last 10 years.

Largest N-2 Event

For this approach, each interconnection will have a target Resource Contingency Protection Criteria based on the largest N-2 loss-of-resource event. This should not be confused with a Category C, N-2 event prescribed in the NERC TPL standards; it is intended to reflect a simultaneous loss of the resources without time for system adjustments. As such, these events would be considered Category D events in the current standards.

Table 8: Largest N-2 Event

Interconnection	Basis	MW
Eastern	Nelson DC Bi-poles 1 & 2	3,854[37]
Western	Two Palo Verde Units	2,740[38]
ERCOT	Two South Texas Project Units	2,750[39]

For both the ERCOT and Western Interconnections, that would be the loss of the two largest generating units in the interconnection. However, for the Eastern Interconnection, the largest N-2 loss-of-resource event would be the loss of the two Nelson dc bi-pole converters.

[37] Nelson Bi-poles 1 and 2 are rated 1,854 MW and 2,000 MW, respectively.

[38] Net winter ratings per Form EIA-860 reporting.

[39] Net rating from ERCOT Resource Asset Registration Form (RARF).

Largest Total Plant with Common Voltage Switchyard

Another approach is to examine the largest complete generating plant outage in each of the interconnections, limiting this classification to those generators with a common voltage switchyard. The reasoning for considering such a protection criteria is that despite popular belief, complete plant outages can and do happen on a regular basis; 15 complete plant outages occurred in North America in the 12 months from July 1, 2010 through June 30, 2011.

Table 9: Largest Total Plant with Common Voltage Switchyard		
Interconnection	Basis	MW
Eastern	Darlington Units 1-4	3,524[40]
Western	3 Palo Verde Units	3,575[41]
ERCOT	2 South Texas Project Units	2,750[42]

Note that in the Western Interconnection, multi-plant generation tripping by the operation of the Pacific Northwest remedial action scheme (RAS) results in resource loss of 3,200 MW. That issue is further discussed in the Special IFRO Considerations section of this report.

Largest Resource Event in Last 10 Years

A third approach is to examine the largest complete resource loss event in the interconnection over the last 10 years. Although this method yields a reasonable value for the Eastern Interconnection, the values for the other two interconnections would likely not be sustainable without activating some UFLS. It also results in a larger resource contingency for the Western Interconnection than for the Eastern Interconnection. These single events were not approached in magnitude by any other events in the 10-year period.

Table 10: Largest Resource Contingency Event in Last 10 Years		
Interconnection	Basis	MW
Eastern	August 4, 2007 Disturbance[43]	4,500
Western	June 14, 2004 Disturbance[44]	5,000
ERCOT	May 15, 2003 Disturbance[45]	3,400

[40] Net winter ratings from the NERC Electricity Supply and Demand.

[41] Net winter ratings per Form EIA-860 reporting.

[42] Net rating from ERCOT Resource Asset Registration Form (RARF).

[43] The August 4, 2007 frequency excursion was a complex, multi-faceted event involving nine generators across three states. Of those nine generators, seven tripped because of turbine control actions, and the others tripped on instability. This was not an N-1 event.

[44] The June 14, 2004 disturbance was a complex series of events thattripped ten generators across the western Interconnection as the result of a protracted fault. This was not an N-1 event.

Recommended Resource Contingency Protection Criteria

Because the philosophy is for the criteria to protect against the largest frequency excursion the interconnection can withstand, the contingency criteria may vary significantly between the interconnections. For example, because of its sheer size and generating capacity, the Eastern Interconnection can withstand a greater loss of resources.

Therefore, a blending of Resource Contingency Protection Criteria is recommended (table 4) for the determination of IFROs.

Table 11: Recommended Resource Contingency Protection Criteria

Interconnection	Resource Contingency	Basis	MW
Eastern	Largest Resource Event in Last 10 Years	August 4, 2007 Disturbance	4,500
Western	Largest N-2 Event	2 Palo Verde Units	2,740[46]
ERCOT	Largest N-2 Event	2 South Texas Project Units	2,750[47]

Although the size of a resource contingency that can be sustained by an interconnection should be tested through dynamic simulations, that test can currently be done only for the Western and ERCOT Interconnections.

Recommendation – Dynamic simulation testing of the Western and ERCOT Resource Contingency Protection Criteria should be conducted as soon as possible.

Recommendation – Dynamic simulation testing of the Eastern Interconnection Resource Contingency Protection Criteria should be conducted when the dynamic simulation models of the interconnection are capable of performing the analysis.

[45] The May 15, 2003 disturbance was a complex series of events that tripped six generators due to a protracted fault. This was not an N-1 event.

[46] Net winter ratings per Form EIA-860 reporting.

[47] Net rating from ERCOT Resource Asset Registration Form (RARF).

Comparison of Alternative IFRO Calculations

Each of the proposed resource loss criteria alternatives were compared through development of the corresponding IFROs. The following tables show the calculation of an IFRO for each alternative for the Eastern, Western, and ERCOT Interconnections. The criterion for the Québec Interconnection was kept constant throughout.

IFRO Formulae

The following are the formulae that comprise the calculation of the IFROs.

Where:

- DF_{Base} is the base delta frequency.
- F_{Start} is the starting frequency determined by the statistical analysis.
- UFLS is the highest UFLS trip setpoint for the interconnection.
- CC_{ADJ} is the adjustment for the differences between 1-second and sub-second Point C observations for frequency events. A positive value indicates that the sub-second C data is lower than the 1-second data.
- DF_{CC} is the delta frequency adjusted for the differences between 1-second and sub-second Point C observations for frequency events.
- CB_R is the statistically determined ratio of the Point C to Value B.
- DF_{CBR} is the delta frequency adjusted for the ratio of the Point C to Value B.
- BC'_{ADJ} is the statistically determined adjustment for the event nadir occurring below the Value B (Eastern Interconnection only) during primary frequency response withdrawal.
- MDF is the maximum allowable delta frequency.
- RLPC is the resource loss protection criteria.
- CLR is the credit for load resources.

- ARLPC is the adjusted resource loss protection criteria adjusted for the credit for load resources.
- IFRO is the interconnection frequency response obligation.

Determination of Maximum Delta Frequencies

Because of the limitation of measurement of the Balancing Authority-level frequency response performance using Value B, the Interconnection Frequency Obligations must be calculated in "Value B space." Protection from tripping UFLS for the interconnections based on Point C (the nadir defined as occurring between T=0 and T+12 seconds in BAL-003-1), Value B (defined as occurring from T+20 seconds to T+52 seconds), or any nadir occurring after point C, within Value B, or after T+52 seconds must be reflected in the maximum allowable delta frequency for IFRO calculations expressed as a Value B.

Table 12: Determination of Maximum Delta Frequencies

	Eastern	Western	ERCOT	Québec	Units
Starting Frequency	59.974	59.976	59.963	59.972	Hz
Minimum Frequency Limit	59.500[48]	59.500	59.300	58.500	Hz
Base Delta Frequency	0.474	0.476	0.663	1.472	Hz
CC_{ADJ}	0.007	0.004	0.012	N/A	Hz
Delta Frequency (DF_{CC})	0.467	0.472	0.651	1.472	Hz
CB_R	1.000[49]	1.625	1.377	1.550[50]	Hz
Delta Frequency (DF_{CBR})[51]	0.467	0.291	0.473	0.949	Hz
BC'_{ADJ}	.018	N/A	N/A	N/A	Hz
Max. Delta Frequency	0.449	0.291	0.473	0.949	Hz

Table 12 shows the calculation of the maximum allowable delta frequencies for each of the interconnections. All adjustments to the maximum allowable change in frequency are made to include:

- adjustments for the differences between 1-second and sub-second Point C observations for frequency events,
- adjustments for the differences between Point C and Value B, and

[48] The highest UFLS setpoint in the Eastern Interconnection is 59.7 Hz in FRCC, based on internal stability concerns. The FRCC concluded that the IFRO starting frequency of the prevalent 59.5 Hz for the Eastern Interconnection is acceptable in that it imposes no greater risk of UFLS operation in FRCC for an external resource loss event than for an internal FRCC event.

[49] CB_R value for the Eastern Interconnection limited to 1.0 because values lower than that indicate the Value B is lower than Point C and does not need to be adjusted. The calculated value is 0.989.

[50] Based on Québec UFLS design between their 58.5 Hz UFLS with 300 ms operating time (responsive to Point C) and 59.0 Hz UFLS step with a 20-second delay (responsive to Value B or beyond).

[51] DF_{CC}/CB_R

- adjustments for the event nadir being below the Value B (Eastern Interconnection only) due to primary frequency response withdrawal.

Recommendation – The determination for the Maximum Delta Frequencies should be calculated in accordance with the methods embodied in Table 12 – Determination of Maximum Delta Frequencies.

Largest N-2 Event

Table 13 shows the determination of IFROs based on a resource loss equivalent to the largest N-2 event in each interconnection. This calculation has been adjusted to include the recommended adjustment for the differences between Value B and Point C, and for the differences in measurement of Point C using 1-second and sub-second data.

Table 13: Largest N-2 Event

	Eastern	Western	ERCOT	Québec	Units
Starting Frequency	59.974	59.976	59.963	59.972	Hz
Max. Delta Frequency	0.449	0.291	0.473	0.949	Hz
Resource Contingency Protection Criteria	3,854	2,740	2,750	1,700	MW
Credit for LR		300	1,400		MW
IFRO[52]	-858	-840	-286	-179	MW/0.1Hz
Absolute Value of IFRO	858	840	286	179	MW/0.1Hz
% of Current Interconnection Performance[53]	34.8%	71.2%	48.7%	23.9%	
% of Interconnection Load[54]	0.14%	0.56%	0.45%	0.50%	

[52] IFRO = ——————————

[53] Current Interconnection Frequency Response Performance: EI = -2,467 MW / 0.1Hz, WI = -1,179 MW / 0.1Hz, TI = -586 MW / 0.1Hz, and QI = -750 MW/0.1 Hz.

[54] Interconnection projected Total Internal Demands from the 2010 NERC Long-Term Reliability Assessment: EI = 604,245 MW, WI = 148,895 MW, TI = 63,810 MW, and QI winter load = 36,000 MW.

Largest Total Plant with Common Voltage Switchyard

Table 14 shows the determination of IFROs based on a resource loss equivalent to the largest total plant with common voltage switchyard in each interconnection. This calculation has been adjusted to include the recommended adjustment for the differences between Value B and Point C, and for the differences in measurement of Point C using 1-second and sub-second data.

Table 14: Largest Total Plant with Common Voltage Switchyard

	Eastern	Western	ERCOT	Québec	Units
Starting Frequency	59.974	59.976	59.963	59.972	Hz
Max. Delta Frequency	0.449	0.291	0.473	0.949	Hz
Resource Contingency Protection Criteria	3,524	3,575	2,750	1,700	MW
Credit for LR		300	1,400		MW
IFRO[55]	-785	-1,127	-286	-179	MW/0.1Hz
Absolute Value of IFRO	785	1,127	286	23.9%	MW/0.1Hz
% of Current Interconnection Performance[56]	31.8%	95.6%	48.7%	23.9%	
% of Interconnection Load[57]	0.13%	0.76%	0.45%	0.50%	

[55] IFRO = ——————————

[56] Current Interconnection Frequency Response Performance: EI = -2,467 MW / 0.1Hz, WI = -1,179 MW / 0.1Hz, TI = -586 MW / 0.1Hz, and QI = -750 MW/0.1 Hz.

[57] Interconnection projected Total Internal Demands from the 2010 NERC Long-Term Reliability Assessment: EI = 604,245 MW, WI = 148,895 MW, TI = 63,810 MW, and QI winter load = 36,000 MW.

Largest Resource Event in Last 10 Years

Table 15 shows the determination of IFROs based on a resource loss equivalent to the largest resource event in the last 10 years in each interconnection. This calculation has been adjusted to include the recommended adjustment for the differences between Value B and Point C, and for the differences in measurement of Point C using 1-second and sub-second data.

Table 15: Largest Resource Event in Last 10 Years

	Eastern	Western	ERCOT	Québec	Units
Starting Frequency	59.974	59.976	59.963	59.972	Hz
Max. Delta Frequency	0.449	0.291	0.473	0.949	Hz
Resource Contingency Protection Criteria	4,500	5,000	3,400	1,700	MW
Credit for LR		300	1,400		MW
IFRO[58]	-1,002	-1,721	-423	-179	MW/0.1Hz
Absolute Value of IFRO	1,002	1,721	423	179	MW/0.1Hz
% of Current Interconnection Performance[59]	40.6%	146.0%	72.2%	23.9%	
% of Interconnection Load[60]	0.17 %	1.16%	0.66%	0.50%	

[58] IFRO = ——————————

[59] Current Interconnection Frequency Response Performance: EI = -2,467 MW / 0.1Hz, WI = -1,179 MW / 0.1Hz, TI = -586 MW / 0.1Hz, and QI = -750 MW/0.1 Hz.

[60] Interconnection projected Total Internal Demands from the 2010 NERC Long-Term Reliability Assessment: EI = 604,245 MW, WI = 148,895 MW, TI = 63,810 MW, and QI winter load = 36,000 MW.

Recommended IFROs

Table 16 shows the determination of IFROs based on a resource loss equivalent to the recommended criteria in each interconnection. This calculation has been adjusted to include the recommended adjustment for the differences between Value B and Point C, and for the differences in measurement of Point C using 1-second and sub-second data.

Recommendation – The Interconnection Frequency Response Obligations should be calculated as shown in Table 16 – Recommended IFROs.

Table 16: Recommended IFROs

	Eastern	Western	ERCOT	Québec	Units
Starting Frequency	59.974	59.976	59.963	59.972	Hz
Max. Delta Frequency	0.449	0.291	0.473	0.949	Hz
Resource Contingency Protection Criteria	4,500	2,740	2,750	1,700	MW
Credit for LR		300	1,400		MW
IFRO[61]	-1,002	-840	-286	-179	MW/0.1Hz
Absolute Value of IFRO	1,002	840	286	179	MW/0.1Hz
% of Current Interconnection Performance[62]	40.6%	71.2%	48.7%	23.9%	
% of Interconnection Load[63]	0.17%	0.56%	0.45%	0.50%	

Special IFRO Considerations

The IFRO calculation scenarios for the Western Interconnection do not take into account intentional tripping of generation during the operation of remedial action schemes (RAS). A key example is the Pacific Northwest RAS for loss of the Pacific DC Intertie (PDCI), which trips up to 3,200 MW of generation in the Pacific Northwest when the PDCI trips, depending on the loading of the PDCI. The RAS is intended to avoid system instability, tripping generation, inserting the Chief Joseph braking resistor (for up to 30 cycles), and other reactive configuration

[61] IFRO = ———————————

[62] Current Interconnection Frequency Response Performance: EI = -2,467 MW / 0.1Hz, WI = -1,179 MW / 0.1Hz, TI = -586 MW / 0.1Hz, and QI = -750 MW/0.1 Hz.

[63] Interconnection projected Total Internal Demands from the 2010 NERC Long-Term Reliability Assessment: EI = 604,245 MW, WI = 148,895 MW, TI = 63,810 MW, and QI winter load = 36,000 MW.

changes. However, because the generation in the Pacific Norwest is some of the most responsive to frequency deviations in the Western Interconnection, the RAS also blocks frequency response by a number of generators and Balancing Authorities to avoid overloading the Pacific AC ties (such as the California–Oregon Interface (COI)).

Frequency events caused by the 3,200 MW generation trips from that RAS have not been considered historically as candidate events for the Western Interconnection calculation of frequency bias settings by the Balancing Authorities because of the response blocking. However, from an interconnection perspective, the frequency of the interconnection still must be maintained as a whole, regardless of which Balancing Authorities are responding to the event. This creates a dilemma when calculating an IFRO for the interconnection—the resultant resource loss is larger than the design loss criteria of two Palo Verde units (2,440 MW). Table 17 shows a comparison of the two resource losses in calculating the IFRO for the Western Interconnection.

Table 17: Western Interconnection IFRO Comparison

	2-PV	PNW RAS	Units
Starting Frequency	59.976	59.976	Hz
Max. Delta Frequency	0.291	0.291	Hz
Resource Contingency Protection Criteria	2,740	3,200	MW
Credit for LR	300		MW
IFRO[64]	-840	-1,101	MW/0.1Hz
Absolute Value of IFRO	840	1,101	MW/0.1Hz
% of Current Interconnection Performance[65]	71.2 %	93.4 %	
% of Interconnection Load[66]	0.56 %	0.74 %	

Using a 3,200 MW resource loss criterion in the IFRO calculation increases the obligation by 260 MW but is further complicated when that obligation is allocated to the Balancing Authorities in the interconnection; allocation of FRO to Balancing Authorities whose response is blocked by the RAS is inappropriate. Therefore, a different FRO allocation would be necessary for that IFRO.

Recommendation – NERC and the Western Interconnection should analyze the FRO allocation implications of the Pacific Northwest RAS generation tripping of 3,200 MW.

[64] IFRO = ——————————

[65] Current Interconnection Frequency Response Performance: WI = -1,179 MW / 0.1Hz.

[66] Interconnection projected Total Internal Demands from the 2010 NERC Long-Term Reliability Assessment: WI = 148,895 MW.

Comparison of IFRO Calculations

Table 18 shows a comparison of the four criteria analyzed by the TIS, as well as the criteria recommended by the NERC Resources Subcommittee (RS) in their white paper on frequency response. The table also compares the IFROs to current levels of frequency response performance[67] for each of the interconnections. A comparison is also made to IFROs adjusted to include the recommended adjustment for the differences between Value B and Point C.

Table 18: IFRO Calculation Comparison

	Eastern	Western	ERCOT	Québec	Units
Current Interconnection Frequency Response Performance	-2,467	-1,179	-586	N/A	MW/0.1Hz
Largest N-2 Event					
Resource Loss Criteria	3,854	2,740	2,750	1,700	MW
IFRO	-858	-840	-286	-179	MW/0.1Hz
IFRO as % of Current Performance	34.8%	71.2%	48.7%	23.9%	
IFRO as % of Load[68]	0.14%	0.56%	0.45%	0.50%	
Largest Total Plant with Common Voltage Switchyard					
Resource Loss Criteria	3,524	3,575	2,750	1,700	MW
IFRO	-785	-1,127	-286	-179	MW/0.1Hz
IFRO as % of Current Performance	31.8%	95.6%	48.7%	23.9%	
IFRO as % of Load	0.13%	0.76%	0.45%	0.50%	
Largest Resource Event in Last 10 Years					
Resource Loss Criteria	4,500	5,000	3,400	1,700	MW
IFRO	-1,002	-1,716	-423	-179	MW/0.1Hz
IFRO as % of Current Performance	40.6%	146.0%	72.2%	23.9%	
IFRO as % of Load	0.17%	1.16%	0.66%	0.50%	

[67] Based on the frequency response performance calculated in the daily CERTS-EPG Automated Reliability Reports for 2011 through August 16, 2011.

[68] Interconnection projected Total Internal Demands from the 2010 NERC Long-Term Reliability Assessment: EI = 604,245 MW, WI = 148,895 MW, TI = 63,810 MW, and QI = 20,599 MW.

Table 19 compares the recommended IFROs with those recommended by the Resources Subcommittee.

Table 19: IFRO Calculation Comparison

	Eastern	Western	ERCOT	Québec	Units
Current Interconnection Frequency Response Performance	-2,467	-1,179	-586	N/A	MW/0.1Hz
Recommended IFROs					
Resource Loss Criteria	4,500	2,740	2,750	1,700	MW
IFRO	-1,692	-838	-286	-417	MW/0.1Hz
IFRO as % of Load	0.28 %	0.56 %	0.45 %	2.03 %	
RS Recommendation					
Resource Loss Criteria	4,500	2,740	2,750	1,700	MW
Base IFRO	-1,125	-548	-229	-113	MW/0.1Hz
25 % Margin	-281	-137	-57	-28	MW/0.1Hz
IFRO	-1,406	-685	-286	-141	MW/0.1Hz
IFRO as % of Load	0.23 %	0.46 %	0.45 %	0.68 %	

Allocation of IFRO to Balancing Authorities

The allocation of the IFRO to individual Balancing Authorities in a multi-Balancing Authority interconnection will be done in accordance with the "Attachment A – BAL-003-1 Frequency Response and Frequency Bias Setting Supporting Document," which can be found at:

http://www.nerc.com/docs/standards/sar/Att_A_Freq_Response_Standard_Support_Document_100611.pdf)

The process is paraphrased here for brevity.

Once the IFROs have been calculated by the ERO, the FRO for each Balancing Authority in a multi-Balancing Authority interconnection is allocated based on the Balancing Authority's annual load and annual generation to each Balancing Authority by the following formula:

$$FRO_{BA} = FRO_{Int} X \frac{AnnualGen_{BA} + AnnualLoad_{BA}}{AnnualGen_{Int} + AnnualLoad_{Int}}$$

Where:

- Annual Gen_{BA} is the total annual "Output of Generating Plants" within the Balancing Authority Area (BAA), on FERC Form 714, column C of Part II – Schedule 3.
- Annual $Load_{BA}$ is total annual load within the BAA, on FERC Form 714, column E of Part II – Schedule 3.
- Annual Gen_{Int} is the sum of all Annual Gen_{BA} values reported in that interconnection.
- Annual $Load_{Int}$ is the sum of all Annual $Load_{BA}$ values reported in that interconnection.

The data used for this calculation is from the most recently filed Form 714. As an example, a report to NERC in January 2013 would use the Form 714 data filed in 2012, which used data from 2011. Balancing Authorities that are not FERC-jurisdictional will use the Form 714 instructions to assemble and submit equivalent data to the ERO for use in the FRO allocation process.

Balancing Authorities that elect to form a Frequency Response Sharing Group (FRSG) will calculate an FRSG FRO by summing the individual Balancing Authority FROs. Balancing Authorities that elect to form an FRSG as a means to jointly meet the FRO will calculate their FRM performance for the FRS Form 1 as follows:

- calculate a group NI_A and measure the group response to all events in the reporting year on a single FRS Form 1, or
- jointly submit each Balancing Authority's Form 1 with a summary spreadsheet that sums each participant's individual event performance.

Balancing Authorities that merge or transfer load or generation are encouraged to notify the ERO of the change in footprint and corresponding changes in allocation such that the net obligation to the interconnection remains the same and so that Control Performance Standard (CPS) limits can be adjusted.

Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), frequency bias setting and frequency bias type (fixed or variable) to the ERO each year to allow the ERO to validate the revised frequency bias settings on FRS Form 1. If the ERO posts the official list of events after the date specified in the timeline below, Balancing Authorities will be given 30 days from the date the ERO posts the official list of events to submit FRS Form 1.

Once the ERO reviews the data submitted in FRS Form 1 and FRS Form 2 for all Balancing Authorities, the ERO will use FRS Form 1 data to post the following information for each Balancing Authority for the upcoming year:

- frequency bias setting
- Frequency Response Obligation (FRO)

A Balancing Authority providing Overlap Regulation will report the historic peak demand and generation of its combined Balancing Authorities' areas on FRS Form 1 as described in Requirement R4 of the BAL-003-1 standard.

Frequency Response Performance Measurement

Interconnection Process

The process for detection of candidate interconnection frequency events for use in frequency response metrics is described in the ALR1-12 Metric Event Selection Process contained in Appendix W. It is paraphrased here for brevity.

Frequency Event Detection, Analysis, and Trending (for Metrics and Analysis)

Interconnection frequency events are detected through a number of systems, including:

- FNet (Frequency monitoring Network) – FNet is a wide-area power system frequency measurement system that uses a type of phasor measurement unit (PMU) known as a Frequency Disturbance Recorder (FDR). FNet is able to measure the power system frequency, voltage, and angle very accurately at a rate of 10 samplers per second. The FNet system is currently operated by the Power Information Technology Laboratory at Virginia Tech and the University of Tennessee, Knoxville. FNet alarms are received by the NERC Situational Awareness staff and contain an estimate of the size of the resource or load loss and general location description based on triangulation between FDRs.
- CERTS–EPG Resource Adequacy Tool Intelligent Alarms – The Electric Power Group (EPG) operates the Resource Adequacy (RA) tool developed under the auspices of the Consortium for Electric Reliability Technology Solutions (CERTS). The RA tool uses 1-minute frequency and area control error (ACE) SCADA data transmitted to a NERC central database. The RA tool constantly monitors frequency and produces many Smart Alarms for a number of frequency change conditions, but most useful for frequency event detection is the short-term frequency deviation alarm, which indicates when there has been a significant change in frequency over the last few minutes, typically indicating a resource loss.
- CERTS–EPG Frequency Monitoring and Analysis (FMA) Tool – EPG also developed and operates the FMA tool that allows rapid analysis of frequency events, calculating the A, B, and C values for a frequency event in accordance with parameters set by the Frequency Working Group (FWG). Event selection criteria are further discussed in Appendix E of this report.

Those three systems are used in combination by NERC staff to detect and collect data about frequency excursions in the four North American interconnections. The size of resource losses is verified with the Regional Entities for events where FNet estimates of resource loss meet the following criteria:

- Eastern: >1,000 MW (60 mHz excursion)
- Western: >700 MW (80 mHz excursion)
- ERCOT: >450 MW (100 mHz excursion)

Events that are detected and meet the ALR1-12 metric criteria are then considered to be "candidate events" and are used by NERC to calculate interconnection frequency response metrics and trends. Those candidate events are also presented to the Frequency Working Group for consideration to be used as events for calculation of Balancing Authority frequency response and bias setting calculations in accordance with NERC Standard BAL-003-1.

Ongoing Evaluation

The process for detection of frequency events and the calculation of Values A, B, and C and the associated interconnection level metrics will undergo constant review in an effort to improve the process. NERC staff and the Frequency Working Group will perform that review at least annually.

Recommendation –NERC staff and the Frequency Working Group should annually review the process for detection of frequency events and the method for calculating A and B Values and Point C. The associated interconnection frequency event database, methods for calculating interconnection metrics on risks to reliability, the associated probabilities, and the calculation of the IFROs using updated data should also undergo review in an effort to improve the process. Throughout this process, NERC should strive to improve the quality and consistency of the data measurements.

Balancing Authority Level Measurements

A statistical analysis and evaluation was performed on field trial data with similar sample sizes to those specified in the draft Standard BAL-003-1 Frequency Response and Frequency Bias Setting. Field trial data was provided on FRS Form 1 for 2011 for 60 Balancing Authorities on the Eastern and Western Interconnections; the analysis was not performed for either of the single Balancing Authority interconnections, (i.e., ERCOT or Québec). Of the 60 Balancing Authorities that provided data, only 50 provided data of sufficient quality to be used in the analysis. Balancing Authorities that were excluded provided frequency data that was either obviously incorrect (i.e., frequency data in hertz instead of change in hertz) or frequency data that was uncorrelated to the frequency measured in an interconnection.

To protect the confidential nature of the data, the Form 1 data was normalized by dividing the change in actual net interchange by the Frequency Response Obligation (FRO) for each Balancing Authority, based on Interconnection Frequency Response Obligations (IFROs) of -1,215 MW/0.1 Hz and -836 MW/0.1 Hz for the Eastern and Western Interconnections, respectively.[69] This normalization method converts all of the data from the actual frequency response of the Balancing Authority to a per-unit frequency response value where 1.0 indicates that the frequency response is exactly equal to the Balancing Authority's FRO. The process also required the development of the some of the data that would appear on the equivalent of the CPS2 Bounds Report under this revised standard. The required data was extracted from FERC Form 714 reports for the year 2009 and was estimated for those Balancing Authorities that did

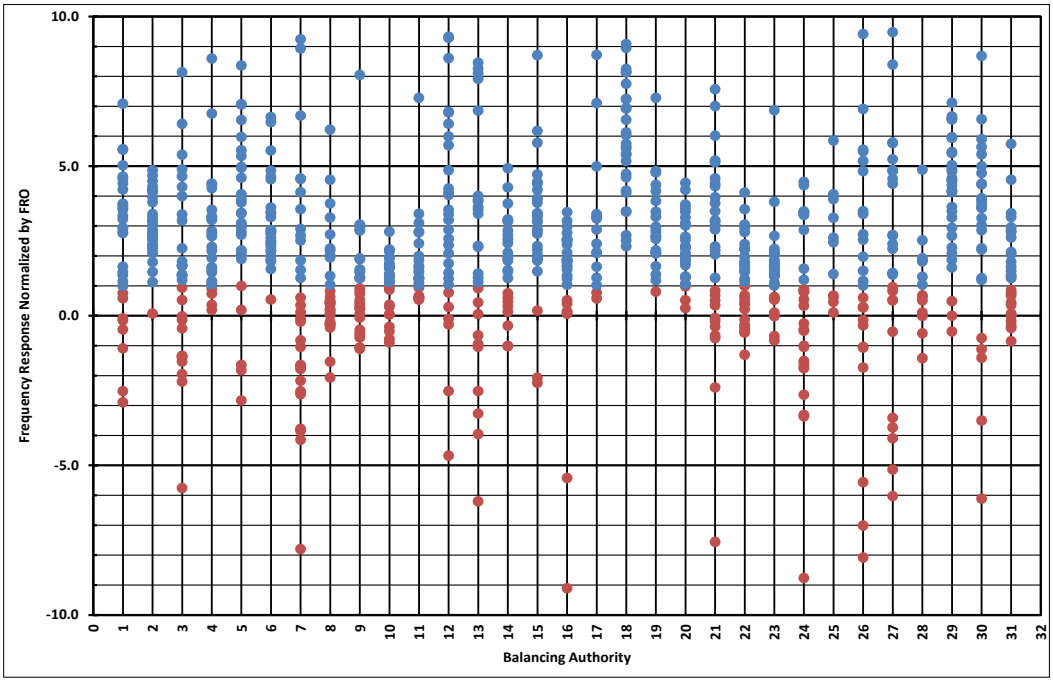
[69] As recommended by the Project 2007-12 Frequency Response Standards Drafting Team during the May 2012 Frequency Response Technical Conferences.

not submit 714 reports from equivalent data based on other sources. The validity of this analysis is not dependent upon the accuracy of the FRO estimates. It is only necessary for these estimates to be close to the actual values for firm conclusions to be drawn from the results and put the results in the proper context. Once the FROs were estimated for all of the Balancing Authorities on the Eastern and Western Interconnections, they were transcribed onto the FRS Form 1 for each Balancing Authority included in the analysis.

Single-Event Compliance

The question was posed whether or not a Balancing Authority's compliance with the proposed BAL-003-1 standard should be measured on each event, through use of the mean, median, or a regression analysis for a 12-month period. The variability of the measurement of frequency response for an individual Balancing Authority for an individual disturbance event was evaluated to determine its suitability for use as a compliance measure. The individual Balancing Authorities' performance disturbance events were normalized and plotted for each Balancing Authority on the Eastern and Western Interconnections.

Figure 34: 2011 Normalized Frequency Response Events by BA Eastern Interconnection

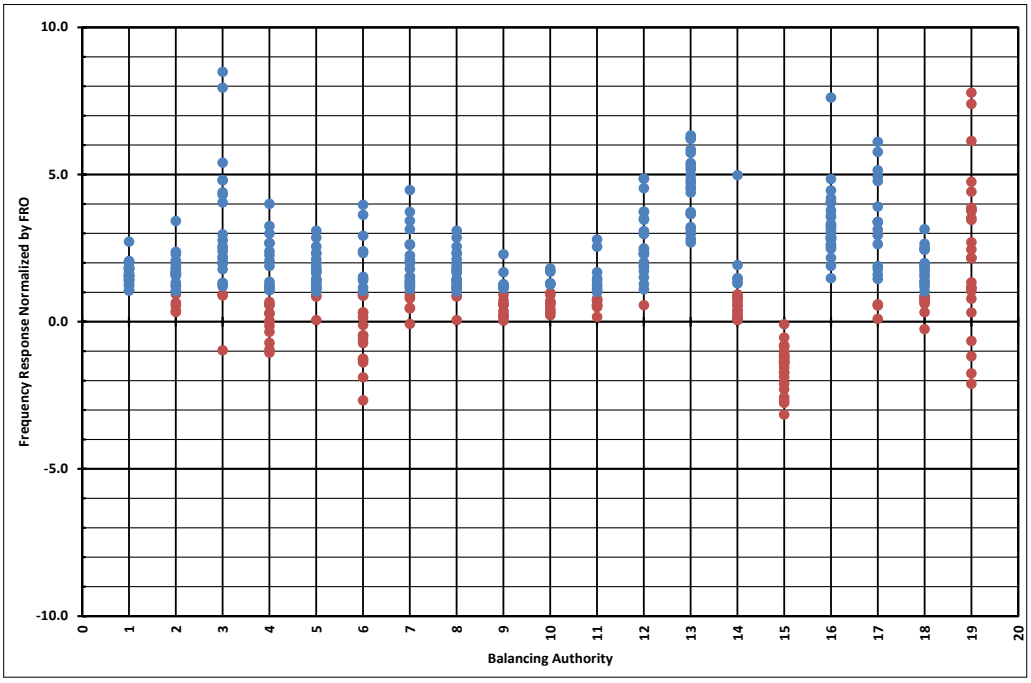


On Figures 34 and 35, events that had a measured Balancing Authority's frequency response above its FRO were shown as blue dots, and events that had a measured frequency response below its FRO were shown as red dots.

Analysis of this data indicates that a single-event-based compliance measure is unsuitable for compliance evaluation when the data has the large degree of variability shown in the charts in Appendix 1. Based on the field trial data provided, only three out of 19 Balancing Authorities in the sample (16%) would be compliant for all events with a standard based on a single event

measure on the Western Interconnection. Only one out of 31 Balancing Authorities in the sample (3%) would be compliant for all events with a standard based on a single-event measure on the Eastern Interconnection.

Figure 35: 2011 Normalized Frequency Response Events by BA Western Interconnection



Finding – Analysis of the field trial data indicates that a single-event-based compliance measure is unsuitable for compliance evaluation when the data has a large degree of variability.

Recommendation – Balancing Authority compliance with BAL-003-1 should not be judged on a per-event basis. Doing so would cause almost 90% of the Balancing Authorities to be out of compliance.

Balancing Authority Frequency Response Performance Measurement Analysis

Data provided by the Balancing Authorities from the field trial were also analyzed to determine: 1) if the sample size minimum of 20–25 frequency events, as specified for FRM calculation of the draft BAL-003-1 standard, is sufficient to provide stable measurements results; and 2) which of the three candidate FRM measurement methods is most appropriate. These analyses were carried out using the normalized data provided by a number of Balancing Authorities during the field trial.

Event Sample Size

Previous studies have recommended a sample size sufficient to provide a stable measure of frequency response of 20–25 events. These previous studies were performed on limited data and a limited number of Balancing Authorities. The field trial data set is sufficiently large to allow conclusions to be drawn with respect to that sample size recommendation specified for FRM calculation in the draft standard.

Review of the full set of graphs (Appendix H) indicates that the outlier problem, as previously described, did not present itself. There were no Balancing Authorities that had a small degree of variability in the measured single-event frequency response for most of the events that contained a few outliers.

The variability appeared similar for all events for each Balancing Authority, which indicates that the sample size of 20–25 events was sufficient to stabilize the result and eliminate any undue influence from potential outliers. In those Balancing Authorities with large variations in measured single-event response, the sample size was large enough that no single outliers unduly influenced the result. Balancing Authorities with large measurement variation still had enough samples to mitigate the risk associated with outliers. This demonstrates that the sample size chosen was sufficient to stabilize all three methods of measuring FRM. Therefore, it can be concluded that none of the methods are unduly influenced by outliers and the selection of the measurement method should be based on other factors.

Finding – Analysis of data submitted by the Balancing Authorities during the field trial confirms that the sample size selected (a minimum of 20–25 frequency events) is sufficient to stabilize the result and alleviate the perceived problem associated with outliers in the measurement of Balancing Authority frequency response performance.

Measurement Methods – Median, Mean, or Regression Results

All of the normalized data were analyzed using all three candidate methods for measuring FRM.

median – Median is the numerical value separating the higher half of a one-dimensional sample, a one-dimensional population, or a one-dimensional probability distribution from the lower half. The median of a finite list of numbers is found by arranging all the observations from lowest value to highest value and picking the middle one. When the number of observations is even, there is no single middle value; the median is arbitrarily defined as the mean of the two middle values.

In a sample of data, or a finite population, there may be no member of the sample whose value is identical to the median (in the case of an even sample size), and, if there is such a member, there may be more than one so that the median may not uniquely identify a sample member. Nonetheless, the value of the median is uniquely determined with the usual definition. A median is also a central point that minimizes the arithmetic mean of the absolute deviations. However, a median need not be

uniquely defined. Where exactly one median exists, statisticians speak of "the median" correctly; even when no unique median exists, some statisticians speak of "the median" informally.

The median can be used as a measure of location when a distribution is skewed, when end values are not known, or when one requires reduced importance to be attached to outliers; e.g., because they may be measurement errors. A median-unbiased estimator minimizes the risk with respect to the absolute-deviation loss function, as observed by Laplace.[70] For continuous probability distributions, the difference between the median and the mean is never more than one standard deviation. Calculation of medians is a popular technique in summary statistics and summarizing statistical data, since it is simple to understand and easy to calculate. It also gives a measure that is more robust in the presence of outlier values than the mean.

mean – Mean is the numerical average of a one-dimensional sample, a one-dimensional population, or a one-dimensional probability distribution. A mean-unbiased estimator minimizes the risk (expected loss or estimate error) with respect to the squared-error loss function, as observed by Gauss.[71] The mean is more sensitive to outliers for the very reason that it is a better estimator; it minimizes the squared-error loss function.

linear regression – Linear regression is the linear average of a multi-dimensional sample, or a multi-dimensional population. A linear regression unbiased estimator minimizes the risk (expected loss or estimate error) with respect to the squared-error loss function in multiple dimensions, as observed by Gauss.[72] The linear regression is also sensitive to outliers for the very reason that it is a better estimator; it minimizes the squared-error loss function.

Important Considerations

The following issues are important to consider with respect to the selection of the best method for measuring frequency response.

two-dimensional measurement – Two-dimensional measurement of frequency response provides the best representation of the change in MWs divided by the change in frequency and is used to estimate the frequency bias setting, which indicates the frequency response in MWs provided at actual frequency as compared to scheduled frequency.

non-linear attribute of frequency response – The non-linear attribute of frequency response has been demonstrated on all of the North American interconnections and is an important consideration in the representation of frequency response.

[70] An absolute-deviation loss function is used to minimize the risk of estimate error when dealing with uniform distributions. Appendix 3 provides a description of Uniform Distributions and a derivation of the median.

[71] A squared-error loss function is used to minimize the risk when dealing with normal (Gaussian) distributions. Appendix 4 provides a description of normal (Gaussian) distributions and a derivation of the mean.

[72] Appendix H provides a derivation of the linear regression.

single best estimator – A single best estimator of frequency response is a necessary result for use in compliance evaluation.

linear system – A linear system[73] is assumed in the development of the individual Frequency Response Obligation for each Balancing Authority on a multiple Balancing Authority interconnection and is used to distribute the Interconnection Frequency Response Obligation among the Balancing Authorities on that interconnection. If the system is non-linear,[74] then it cannot be assumed that the total required Interconnection Frequency Response Obligation will be achieved when all Balancing Authorities provide their individual Frequency Response Obligations.

bi-modal distributions – Bi-modal distributions occur whenever a reconfiguration of Balancing Authorities occurs within a compliance year. Unless the method chosen can correctly represent bi-modal distributions, reconfigured Balancing Authorities cannot be effectively measured for compliance.

quality statistics – Quality statistics should be available for use in compliance evaluation. Frequency response is used to determine compliance with minimum provision of the Balancing Authority's obligation for providing its share of frequency response for the interconnection. When using a measure for compliance, one must ensure that the measure fairly represents the Balancing Authority's performance. There is still a presumption that an indication of non-compliance should not occur due to pure chance.

reducing influence of noise – Reducing influence of noise in the data is considered an important attribute in the measurement method. All measurements of frequency response will be affected by noise in the measurement process.

reducing influence of outliers – Reducing influence of outliers in the data is considered the most important attribute in the measurement method. All measurements of frequency response will be affected by true outliers. The risk associated with the reduction in the influence of outliers is that valid information about the measure is also lost when an outlier reduction method is used.

ease of calculation and familiar indicators – Ease of calculation and familiar indicators are important considerations for communication and to promote ease of understanding by the industry.

Appendix H presents the series of graphs indicating results for each Balancing Authority. Each graph shows all of the individual data points use to determine the median, mean, and regression lines.

[73] A linear system is a system in which the sum of the parts is equal to the whole.

[74] A non-linear system is a system in which the sum of the parts is not equal to the whole.

The median line is green, the mean line is blue, and the regression line is red. The value of the normalized frequency response (vertical axis) where the line intercepts the value of frequency (horizontal axis) at a value of 0.1 Hz indicates compliance. Values above 1.0 indicate an FRM above the FRO, and values below 1.0 indicate an FRM below the FRO.

Figure 36 shows an example of a Balancing Authority with a small degree of variability in the measured frequency response for each individual event.

Figure 36: BA with Small Degree of Variability in Measured Frequency Response

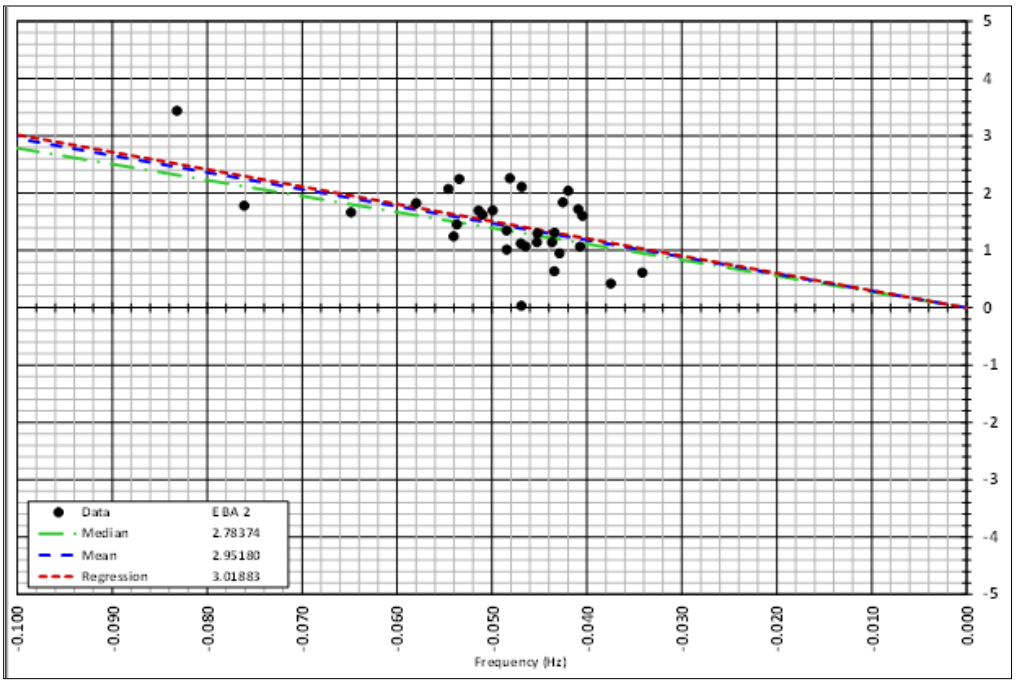
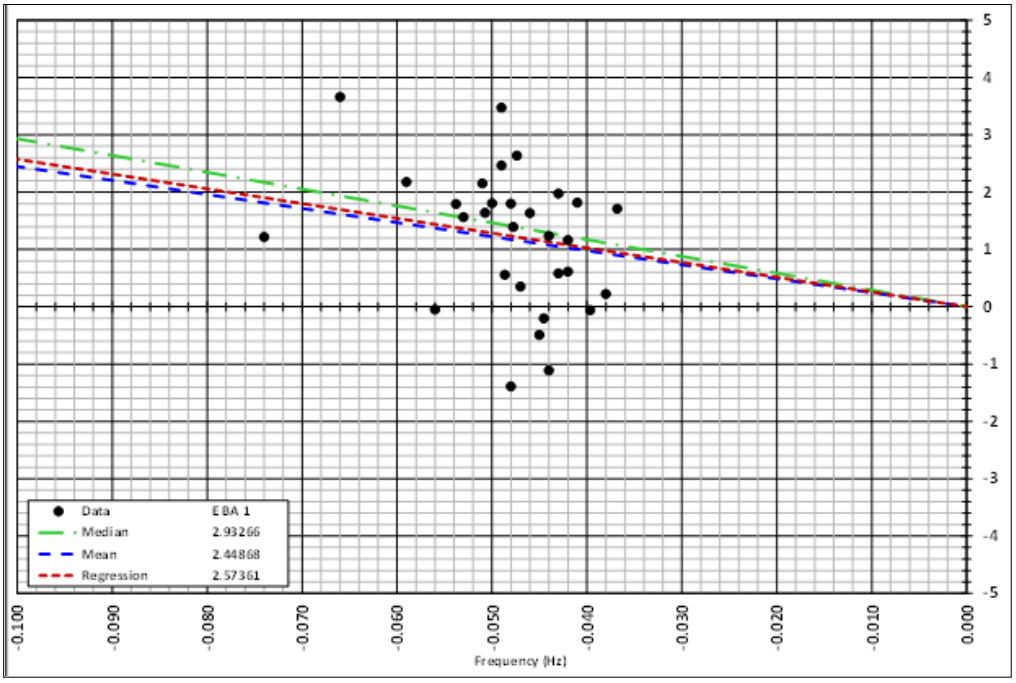


Figure 37 shows an example of a Balancing Authority with a large degree of variability in the measured frequency response for each individual event.

During the analysis, the graphs appeared to show that the regression provided a higher estimate of FRM than the median. Consequently, a comparison was made between the FRM as measured by the median and the FRM as measured by the regression. The results of the regression analysis demonstrate a performance for all samples that is 0.087% of their FRO higher than the median's performance on the Eastern Interconnection and 0.117% of their FRO higher than the median's performance on the Western Interconnection. In an unbiased analysis, one would expect the median and regression to yield the same result. This indicates there is an unknown statistical bias affecting the results of the analysis.

Figure 37: BA with Large Degree of Variability in Measured Frequency Response

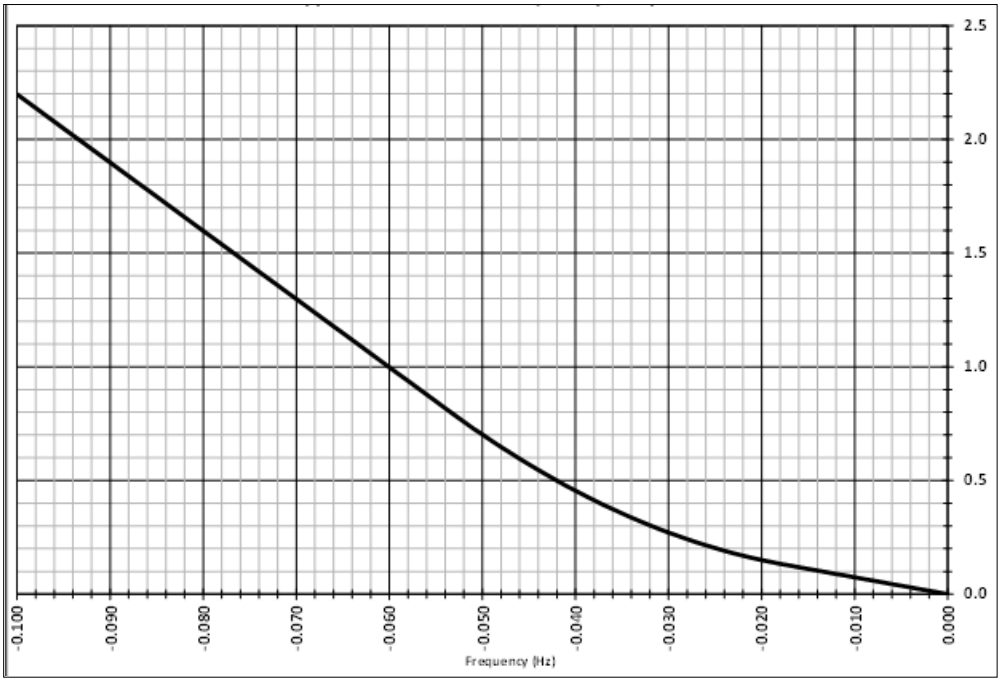


The bias causing the difference between the median and regression results can be explained by an attribute of frequency response. As the frequency deviation increases for larger disturbance events, the frequency response increases, but it does so disproportionately, shown in figure 38. This attribute of frequency response has been demonstrated in technical papers.[75] It has also been implemented in the variable frequency bias settings used by ERCOT, BPA and BC Hydro. In simple terms, the regression includes the effect of this non-linear attribute and the median does not.

The regression accommodates the disproportion on the slope of the regression line. In this case the effect tends to be upward—ever bigger MWs per increment in size of larger frequency error. The median is biased against any disproportionate increase in response per increase in size of frequency error as part of the median's blindness to outliers. The median will give no credit for the ever-growing amount of MWs deployed per added increment in size of frequency error. All the median does is count the number of MW responses regardless of size and, to represent all the MW responses, choose the one that occurred half-way in the sequence of decreasingly negative and increasingly positive frequency errors. Therefore, the median underestimates the FRM because it cannot evaluate the non-linear attribute correctly. It does not see or notice that attribute at all through its blinders regardless of numerical order or placement in a sequence. Regression is the only measurement method that captures the non-linear frequency response correctly.

[75] Hoffman, Stephen P., Frequency Response Characteristic Study for ComEd and the Eastern Interconnection, Proceedings of the American Power Conference, 1997. Kennedy, T., Hoyt, S. M., Abell, C. F., Variable, Non-linear Tie Line Frequency Bias for Interconnected Systems Control, IEEE Transactions on Power Systems, Vol. 3, No. 3, August 1988.

Figure 38: Typical Non-Linear Frequency Response



The advantages of each method of measurement are presented in Table 20 – Median, Mean and Regression Comparison. The alphabetic key is below.

Table 20: Median, Mean, and Regression Comparison

Attribute	Median	Mean	Regression
Provides two-dimensional measurement	A	A	Yes
Represents non-linear attributes	B	B	Yes
Provides a single best estimator (single value)	C	Yes	Yes
Is part of a linear system		Yes	Yes
Represents bi-modal distributions	D	Yes	Yes
Quality statistics available	E	Yes	Yes
Reducing influence of noise	Yes (F)		Partial (G)
Reducing influence of outliers	Yes		Partial (H)
Easy to calculate	Yes	Yes	I
Familiar indicator	Yes	Yes (J)	No
Currently used as the measure in BAL-003-1	No	Yes	No

A. Neither median nor mean can evaluate the two-dimensional nature of frequency response.

B. Neither median nor mean can capture the non-linear attribute of frequency response. Both underestimate the typical non-linear frequency response.

C. Median is arbitrarily defined as the average of the two central values when there is an even number of values in the data set. The decision to further constrain this central range of values to a single value that is the average of the ends of that range is unsupported by any mathematical construct. It is only the desire of those looking for simplicity in the result that supports this singular definition of median.

D. The median fails to provide a valid estimate of frequency response when the distribution of frequency event responses is bi-modal due to Balancing Authority reconfiguration or changes in responsibility for control such as partial-period overlap of supplemental control.

E. The median fails to provide any methods to determine the quality, significance, or confidence associated with the measure.

F. The median reduces the influence of noise in the data, but that noise reduction comes with the cost of eliminating the availability of any quality statistics.

G. Linear regression provides a result that weights the data according to the change in frequency. Since the noise in the data is independent of change in frequency, linear regression provides a method superior to the mean for reducing the influence of noise in the resulting estimate of frequency response.

H. Linear regression is less sensitive to outliers and large data errors than the mean.

I. Linear regression is more complex and requires more effort to calculate, but that additional effort is small when the evaluation process has been automated.

J. Mean is currently used as the measure in the proposed draft BAL-003-1 standard.

After consideration of the mitigating effects of the sample size with respect to outliers, the linear regression method is the preferred method for calculating the frequency response Measure (FRM) for Balancing Authorities for compliance with proposed NERC Standard BAL-003-1 – Frequency Response.

Recommendation – Linear regression is the method that should be used for calculating Balancing Authority Frequency Response Measure (FRM) for compliance with Standard BAL-003-1 – Frequency Response.

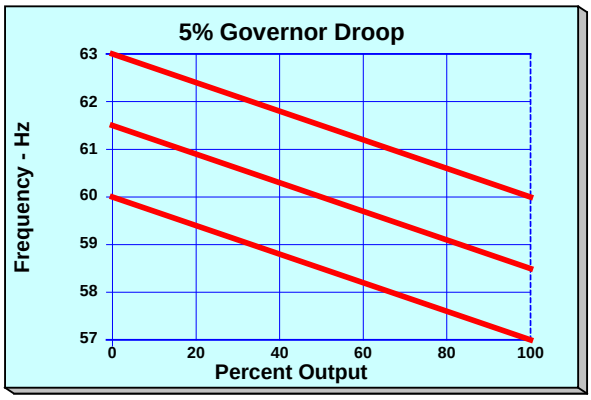
Role of Governors

Deadband and Droop

Turbine-generator units use turbine speed control systems, called governors, to control shaft speed by sensing turbine shaft speed deviations and initiating adjustments to the mechanical input power to the turbine. This control action results in a shaft speed change (increase or decrease). Since turbine-generators rotate at a variety of speeds, outside the power plant it is more appropriate to generally relate shaft speed to system frequency and throttle valve position to generator output power (MW).

The expected response of a turbine-generator's governor to frequency deviations is often plotted on what is known as a governor droop characteristic curve or a droop curve. The curve shows the relationship between the generator output and system frequency. The curve droops from left to right. Simply stated, as the frequency decreases, the generator's output will increase in accordance with its size.

Figure 39: Sample Droop Characteristic Curve



Droop settings on governors are necessary to enable multiple generators to operate in parallel while on governor control while not competing with each other for load changes. Droop is expressed as a percentage of the frequency change required for a governor to move a unit from no-load to full-load or from full-load to no-load. Prior to 2004, NERC Operating Policy 1, Generation Control and Performance, recommended generators with governor control (typically 10 MW and larger) to have a droop setting of 5% for steam turbine (and 4% for combustion turbines, although not explicitly stated in the policy). This means that a 3 Hz (5% of 60.00 Hz) change in system frequency is required to move a generator across its full range. Normally governors respond only to substantial frequency deviations.

Guidelines of the 2004 NERC Operating Policy 1, Generation Control and Performance, section C, stated:

1. Governor installation – Generating units with nameplate ratings of 10 MW or greater should be equipped with governors operational for frequency response unless restricted by regulatory mandates.
2. Governors free to respond – Governors should be allowed to respond to system frequency deviation unless there is a temporary operating problem.
3. Governor droop – All turbine-generators equipped with governors should be capable of providing immediate and sustained response to abnormal frequency excursions. Governors should provide a 5% droop characteristic. Governors should, at a minimum, be fully responsive to frequency deviations exceeding ±0.036 Hz (±36 mHz).
4. Governor limits – Turbine control systems that provide adjustable limits to governor valve movement (valve position limit or equivalent) should not restrict travel more than necessary to coordinate boiler and turbine response characteristics.

Within the Frequency Response Initiative, NERC is considering modifications to those parameters based on the recent advances in frequency response performance in ERCOT and revised governor control parameters.

In 2010, NERC conducted a survey of governor status and settings through Generator Owners and Generators Operators. The results of that survey are summarized in the Generator Governor Survey section of this report. A complete set of the summary graphics of the survey is contained in Appendix K.

ERCOT Experience

The general decline in primary frequency response in all interconnections has prompted regulatory entities to address the issue. Electric grids such as the one in Texas are especially sensitive to frequency regulation and response due to their relatively small overall interconnected capacity compared to the other interconnections. The Texas Regional Entity (TRE) is actively working on a regional standard for frequency regulation.

Frequency Regulation

Electric grid frequency regulation is attained by the response of the turbine governors to deviations from nominal synchronous speed, the operation of the boilers-turbine controls in response to the frequency change, and the actions of the dispatching system.

Frequency regulation success for any given boiler-turbine plant depends on many factors, primarily:

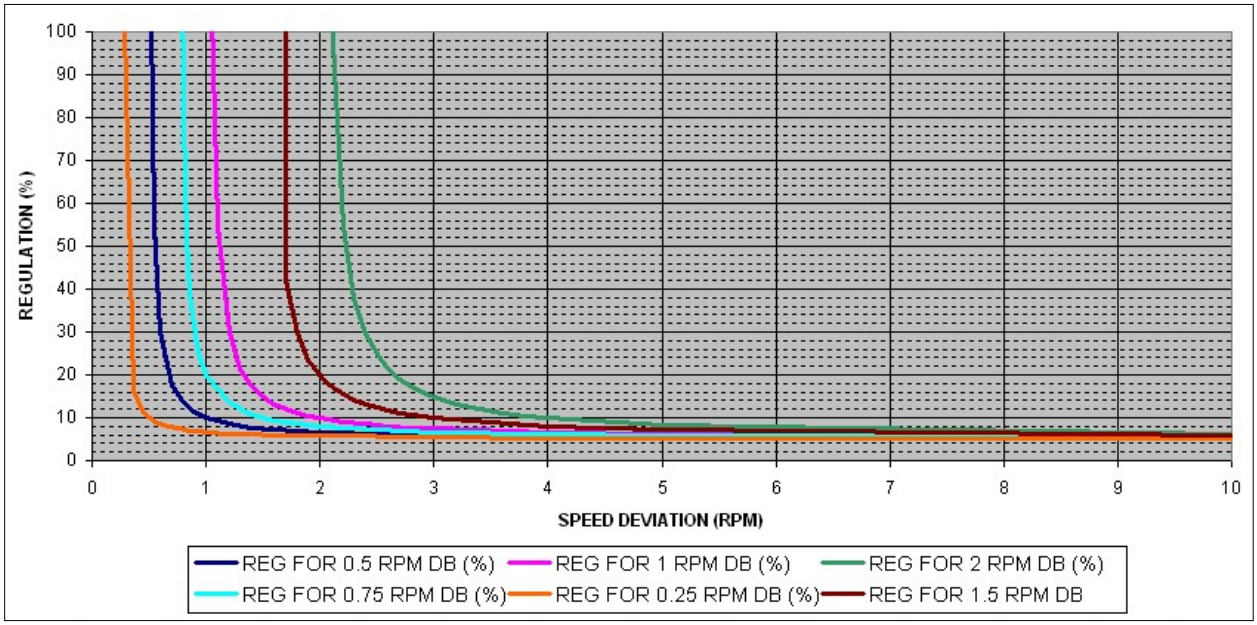
- steady state and dynamic stability of the unit
- load following capability
- linearization of turbine governor valves' steam flow characteristics
- proper calibration and coordination of the boiler and turbine frequency regulation parameters

- proper high and low limiting of the boiler and turbine frequency regulation based on unit conditions
- proper dispatching actions to restore the frequency to its normal operating value

Another factor that influences a unit's capability for frequency regulation is the available boiler energy storage. The larger the storage, the less the initial pressure drop caused by the quick opening of the governor valves, and the better the initial unit frequency regulation.

The standard speed regulation setting for the turbine governors of the boiler-turbine generating units is 5%. This is a ±5% change from rated speed (0.05*3,600 = 180 RPM), which causes the turbine governor to change its valves' position demand ±100 percent. It is also generalized industry practice to add a small deadband (DB) to the calibration of the governor speed error bias in order to minimize the movement for very small speed deviations. The selection of the DB affects the fidelity of the regulation, as shown in figure 40.

Figure 40: Regulation versus RPM Deadbands



The regulation curves of figure 40 are for the noted speed regulation at constant pressure. They are calculated by developing the equation ΔGVD= f (ΔRPM) for each DB, where ΔGVD is the change in the turbine Governor Valve Demand as a function of the change in RPM.

Knowing the ΔGVD for any given ΔRPM enables the regulation calculation via the equation:

$$REG\ (\%) = (100 * \Delta RPM/\Delta GVD)*(100/3{,}600)$$

ERCOT Nodal Operating Guides Section 2 has specific requirements for governor deadband settings. The maximum allowable deadband is ±0.036 Hz, which has been the industry standard for mechanical "fly-ball" governors on steam turbines for many years. With the development

of energy markets in the early 2000s, generators with electronic or digital governors began implementing this same deadband in their primary frequency response implementation. Unfortunately, the Guides were not clear on how to implement the droop curve at the deadband. Since the Guides required 5% droop performance, many generators introduced a "step function" or modified "step" once the deadband was reached in order to achieve near 5% droop performance outside the deadband.

As can be seen in figure 40, a 2 rpm deadband on a 3,600 rpm turbine is equivalent to +/-0.033 Hz. Based on the corresponding droop (regulation percent) for this deadband, a generator's performance to typical frequency deviations during disturbances would be much greater than 5% without some "step" function. These governor settings resulted in an abnormal frequency profile for the interconnection.

Figure 41: Frequency Profile for March and September 2008 (in 5 mHz bins)

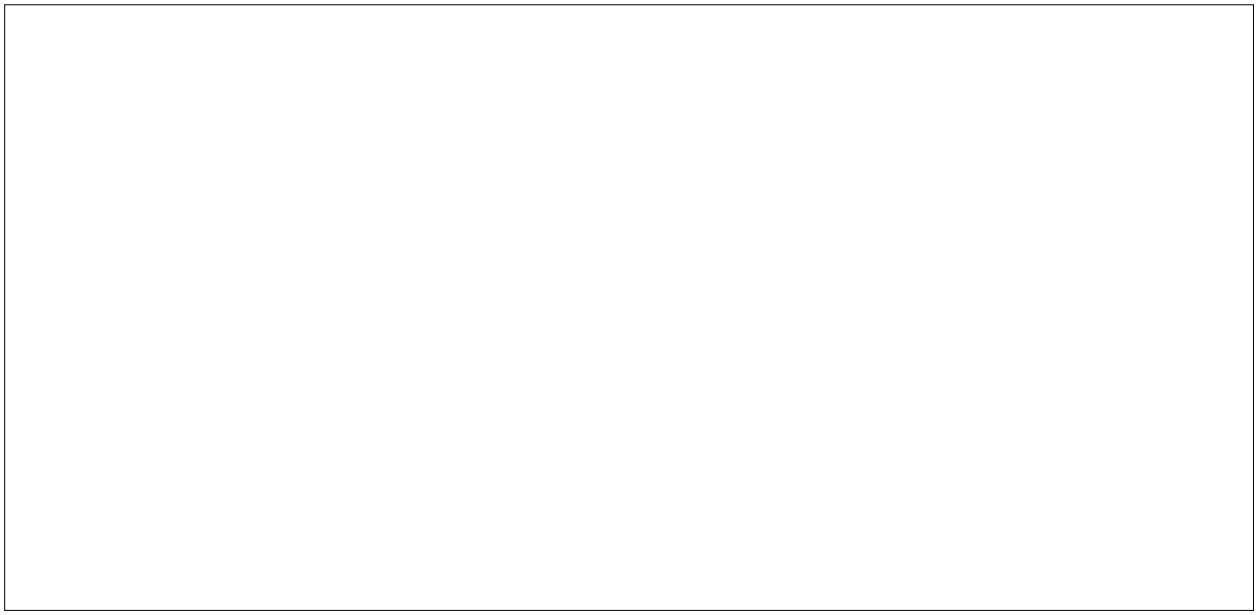
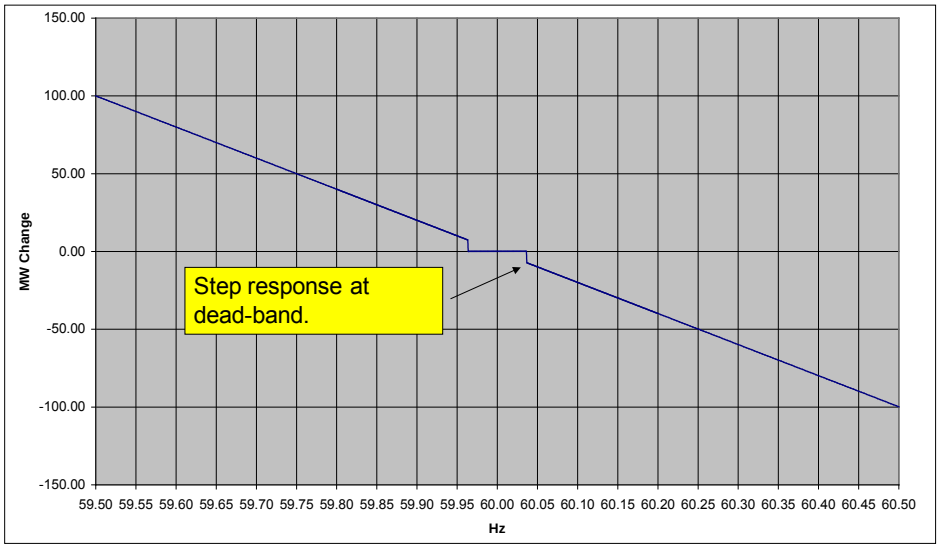


Figure 41 is the ERCOT frequency profile for March and September of 2008. It is clear that the "flat top" of the profile is centered on the ±0.036 Hz deadband. This flat frequency profile created significant problems because frequency spent as much time at the governor deadband points as it did at any point in between. This made it difficult to employ Frequency Regulation to correct frequency to 60 Hz, and for ERCOT to meet the NERC BAL-001-0 — Real Power Balancing Control Performance Requirement 1 (aka, CPS1), since ERCOT had an epsilon-1 limit of 0.030 Hz. The frequency profile also contributed to generator instability at the deadbands with the implementation of the various "step" functions in the governors.

If generators that had implemented governor step functions were to be electrically separated from the grid during an islanding event, they would experience extreme instability. This would be caused by the governor providing excessive frequency response to the island to small generation load imbalances, resulting in large frequency swings and unit instability.

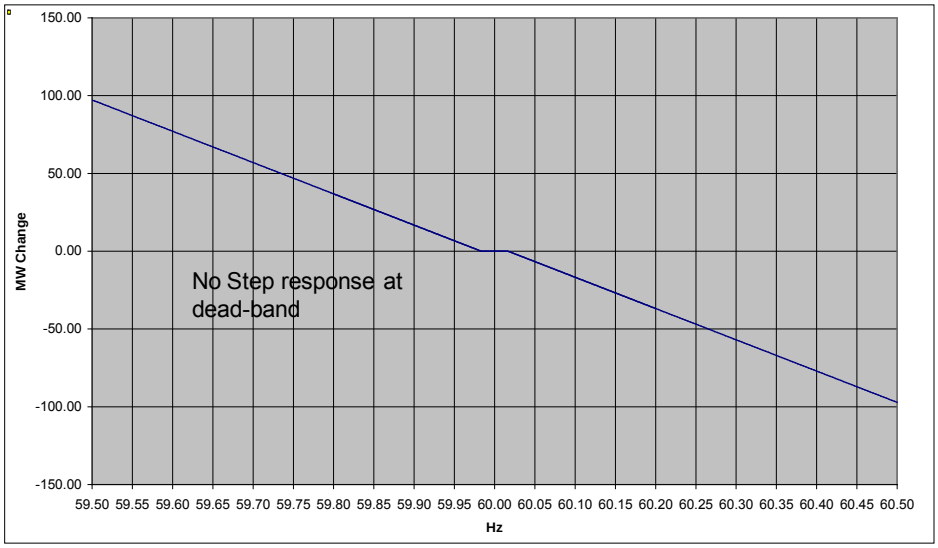
The ERCOT Performance Disturbance and Compliance Working Group (PDCWG) became increasingly concerned about the frequency instability and the realization of the risk of the step function in the governors (see figure 42). Because of their analysis, a member of the PDCWG discussed the issues with one large generating facility that was willing to try different deadband settings along with a specific droop curve implementation. This implementation required a straight linear curve from the deadband to full range of the governor, eliminating any step function shown in figure 43.

Figure 42: Frequency Response of 600 MW Unit ±36.0 mHz Deadband and Step Response



After brief testing of a number of different deadbands, a 1-rpm deadband (± 0.01666 Hz) was chosen. Four turbine governors were set in this manner on November 3, 2008 (about 2,500 MW capacity or 7.5% of the average grid capacity in November).

Figure 43: Frequency Response of 600 MW Unit ±16.67 mHz Deadband and No-Step Response



The possibility of leaving the deadband at ±0.036 Hz and just eliminating the stepped droop response was considered. Analysis showed that the droop performance at 59.900 Hz would be around 7.72% with a ±0.036 Hz deadband but only 5.97% droop with the ±0.0166 Hz deadband. That difference increases at 59.950 Hz, with a 17.64% droop performance for the ±0.036 Hz deadband and a 7.46% droop performance for the ±0.0166 Hz deadband. However, without the primary frequency response of the lower deadband, the frequency profile would return to the "flat top" frequency profile spanning the ±0.036 Hz deadbands, which is a less reliable state (less stable) for the interconnection. Also, with the larger deadband the interconnection or Balancing Authority may not have been able to meet the minimum frequency response requirements.

Turbine-Generator Performance with Reduced Deadbands

The general purpose for using governor deadbands is to minimize generator movement due to frequency regulation. In an interconnection where generators have various deadband settings, the diversity of settings creates diversity in responses to frequency changes. However, when a majority of the generators in an interconnection set the deadband the same and with a step function, the diversity of responses disappears, and frequency will move to the deadband frequently as demonstrated in the profile in figure 41. When the frequency exceeds the deadband, all units react with a stepped response simultaneously.

The amount of generator movement expected for a specific set of deadband settings can be compared by calculating the MW-minute average movement of a hypothetical generator exposed to actual measured frequency using the different governor settings.

Table 21 compares the movement of two generators with different governor settings: one with a ±0.036 Hz deadband and droop step function, and one with a ±0.01666 Hz deadband and no droop step function.

Table 21: Comparison of MW Movement for Response of Different Governor Settings

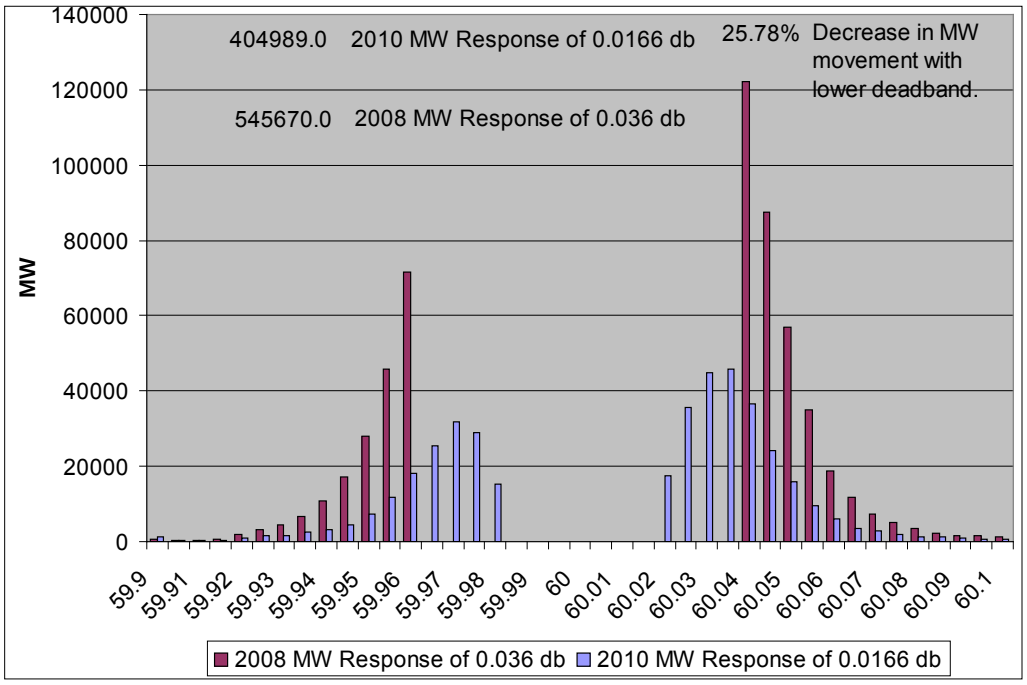
	±0.036 Hz Deadband with Droop Step Function	±0.01666 Hz Deadband with No Droop Step Function	Percent Increase for Smaller Deadband
2008 Frequency Profile	662,574.0 MW-min.	893,164.2 MW-min.	34.80%
2009 Frequency Profile	446,244.0 MW-min.	692,039.8 MW-min.	55.08%

Using the 2008 1-minute average frequency data, the generator with the lower deadband would have had 893,164.2 MW-minutes of primary frequency response while the generator with the larger deadband unit would have had 662,574.0 MW-minutes of primary frequency response. This is a 34.80% increase in movement for the lower deadband generator.

However, if the exact same comparison is made for ERCOT frequency data from 2009, where the new deadbands had an actual impact on frequency, the following observation scan be made. The lower deadband generator would have had 692,039.8 MW-minutes of primary frequency response compared to the larger deadband generator with 446,244.0 MW-minutes, a 55.08% increase in movement for the lower deadband. One observation is that the MW-minute movement of the lower deadband generator is only 4.45% higher than the movement of the larger deadband generator of the previous year (692,039.8 MW-minutes versus 662,574.0 MW-minutes).

Having the lower deadband in service for the entire year greatly reduced the frequency movement of the interconnection and reduced the primary frequency response movement as well. The lower deadband generator MW-minute movement decreased 201,124.4 MW-minutes, or 22.518%, between 2008 and 2009. This indicates the reduced impact on the generator movement with the smaller deadband and the non-step governor droop implementation when the governor becomes active, as compared to the "step" implementation.

Figure 44: MW-Minute Movement of a 600 MW Unit with 5% Droop



This benefit is further emphasized by the comparison in Figure 44, which shows the response of a theoretical 600 MW unit for the 2008 ERCOT frequency profile with a ±0.036 Hz deadband versus the same unit with a ±0.01666 Hz deadband for the 2010 frequency profile. Using the lower deadband, there is a savings of 140,641 MW-minutes of regulation movement because there were a larger number of generators using the ±0.01666 Hz deadband in 2010, which greatly influenced the frequency profile. Figure 45 shows a comparison of the actual January–September ERCOT frequency profiles for 2010 and 2008. The profile changed from a flat response between the ±0.036 Hz deadband to a more normal distribution.

Figure 45: ERCOT 2010 versus 2008 Frequency Profile (Jan.–Sept.)

Conclusion – The benefits of using the smaller ±0.01666 Hz deadband coupled with a non-step governor droop implementation results in the following:

- improved frequency response for small disturbances
- generators responding more often in smaller increments, saving fuel and wear and tear on turbines
- more stable operation when near boundary conditions of deadbands

Recommendation – NERC should embark immediately on the development of a Frequency Response Resource Guideline to define the performance characteristics expected of those resources for supporting reliability. That guideline should address appropriate parameters for:

Existing generator fleet – In order to retain or regain frequency response capabilities of the existing generator fleet, adopt:

deadbands of ±16.67 mHz,

droop settings of 3%-5% depending on turbine type,

continuous, proportional (non-step) implementation of the response,

appropriate operating modes to provide frequency response, and

appropriate outer-loop controls modifications to avoid primary frequency response withdrawal at a plant level.

Other frequency-responsive resources – Augment existing generation response with fast-acting electronically coupled frequency responsive resources, particularly for the arresting and rebound periods of a frequency event:

contractual high-speed demand-side response,

wind and photo-voltaic – particularly for over-frequency response,

storage – automatic high-speed energy retrieval and injection, and

variable speed drives – non-critical, short time load reduction.

Generator Governor Survey

On September 9, 2010, NERC issued a Generator Governor Information and Setting Alert (the alert) recommending that Generator Owners (GOs) and Generator Operators (GOPs) provide information and settings for turbine governors for all generators rated at 20 MVA or greater, or plants that aggregate to a total of 75 MVA or greater net rating at the point of interconnection (i.e., wind farms, PV farms, etc.). The alert was issued as a recommendation to industry, which requires reporting obligations (as specified in Section 810 of the Rules of Procedures) from industry to NERC and, subsequently, from NERC to FERC. Balancing Authorities in North America were the only functional group required to respond to this alert. A copy of the survey instructions is located in Appendix J of this report.

The survey requested three types of information:

1. policies on installation and maintenance, and testing procedures and testing frequency for governors;
2. unit-specific characteristics and governor settings; and
3. unit-specific performance information for a recent, single event.

NERC sent the survey instrument and instructions to 799 GOs and 748 GOPs in North America. Of the 794 GOs that acknowledged receipt of the survey, 749 developed and provided a response. Of the 743 GOPs that acknowledged receipt of the survey, 721 developed and provided a response.

Administrative Findings

NERC staff first reviewed the information submitted by the GOs and GOPs. This initial review led to the following findings from the administration of the survey:

1. There is a wide variety of levels of understanding among GOs and GOPs of the role of turbine governors in maintaining frequency response, including confusion in terminology and a lack of understanding of governor control settings. This indicates a need for education on settings and performance of turbine governors and the governor's role in interconnection frequency response.

Recommendation – NERC should address improving the level of understanding of the role of turbine governors through seminars and webinars, with educational materials available to GOs and GOPs on an ongoing basis.

2. There was a significant amount of duplication of reporting. This was mostly due to dual submittals by entities that are registered both as GOs and as GOPs. NERC staff sought to eliminate as much duplication as possible. However, eliminating duplication was difficult when the entities that own and operate a generator differ, yet both submitted information on the same generator. Hence, there remains some duplication in this analysis.

Summary of the Survey Responses

Table 22 summarizes, by interconnection, the aggregate characteristics of the generators analyzed.

Table 22: Number of Generators as Reported

Interconnection	Total	With Governors	Without Governors
Eastern	4,372 (648.7 GW)	4,217 (630.2 GW)	152 (18.5 GW)
Western	1,560 (171.6 GW)	1,445 (162.9 GW)	114 (8.7 GW)
ERCOT	503 (95.6 GW)	446 (85.6 GW)	53 (9.0 GW)
Totals	6,435 (915.9 GW)	6,110 (878.7 GW)	319 (36.2 GW)

Figures 46–48 summarize the responses on turbine governors for three of the interconnections. Data for the Québec Interconnection is not summarized in this report. The GOs and GOPs reported that governors were operational for 95%, 97%, and 99% of the total number of generating units that were reported as having governors in the Eastern, Western, and Texas Interconnections, respectively.

Figure 46: Eastern Interconnection Generator Responses

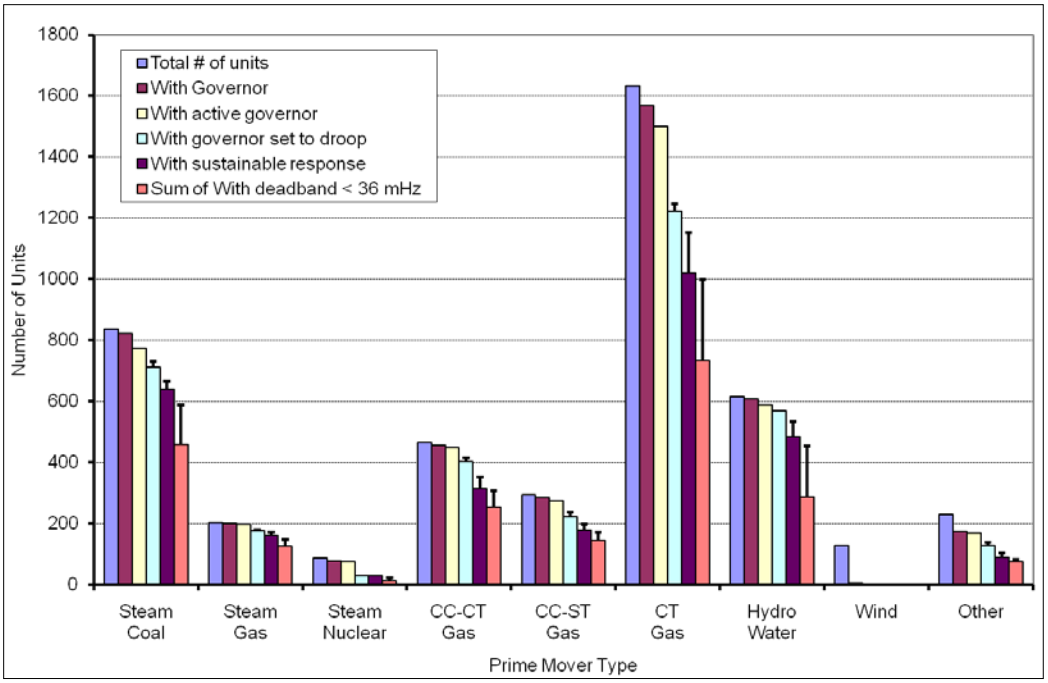


Figure 47: Western Interconnection Generator Responses

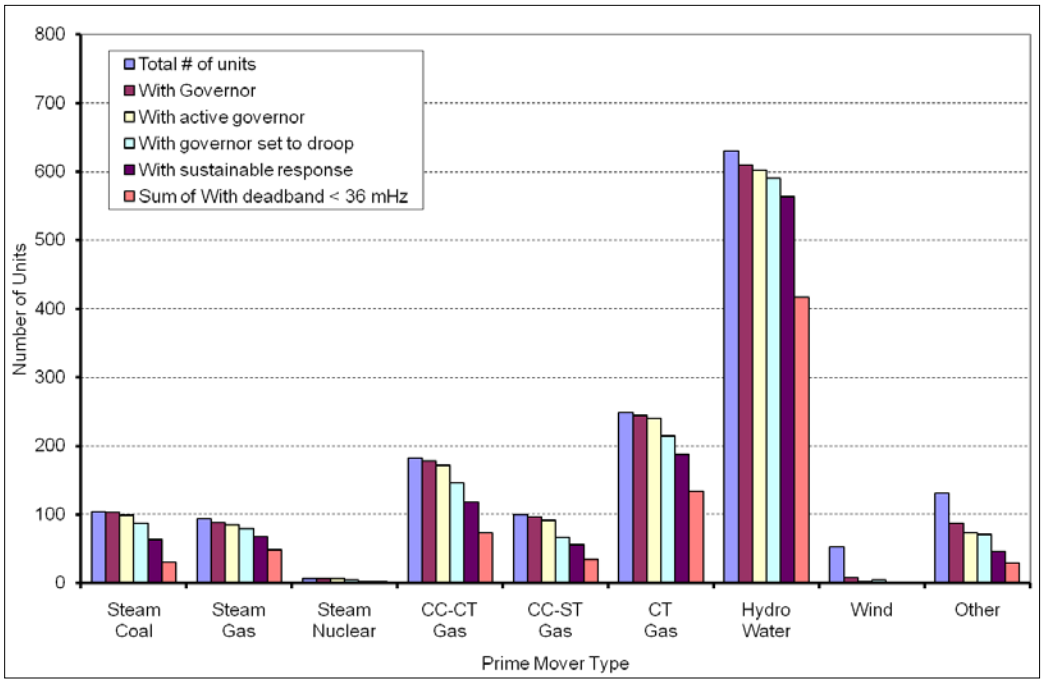
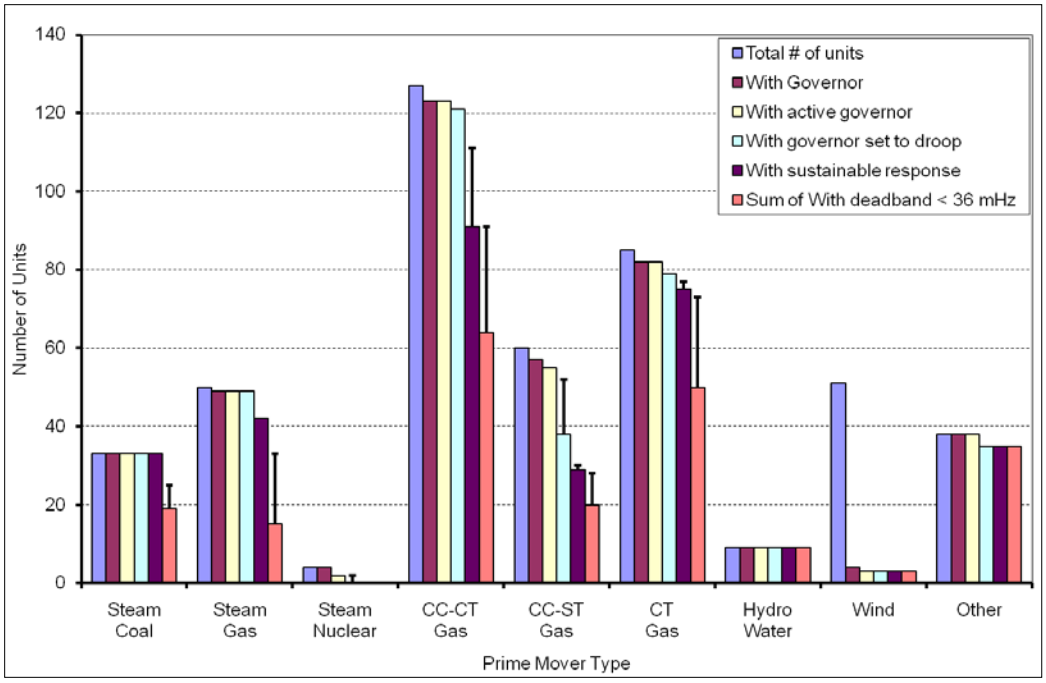


Figure 48: ERCOT Interconnection Generator Responses



Reported Deadband Settings

The deadband setting of a governor establishes a minimum frequency deviation that must be exceeded before the governor will act. Frequency deviations that are less than the setting will not cause the governor to act. Of the information provided by the GOs and GOPs on governor deadbands, 51%, 63%, and 79% of the number of units in the Eastern, Western, and Texas Interconnections, respectively, was usable. Figure 49 summarizes the usability of the deadband data submitted in the survey.

Figure 49: Usability of Information Provided on Governor Deadbands

Figure 50 summarizes the range of deadband settings reported by generating unit size for all three interconnections. The simple average, or mean, of the frequency response values calculated is indicated by the orange dot. A horizontal line inside the green box indicates the median of these values. The upper and lower boundaries of the box are the inter-quartile range, which is the range that contains half the calculated frequency response values. Finally, the end points of the upper and lower vertical lines indicate the lowest and highest calculated frequency response values, respectively.

The use of these descriptive statistics provides additional information on the distribution of values. For example, if the average is lower than the median, it means that the distribution has a small number of low values compared to the main body of values. Similarly, the height of the inter-quartile range (the top and bottom of the box) provides a measure of how widely the values are distributed. The location of the median within the box indicates whether values are evenly distributed on either side of the median (when the median is close to the center of the box) or whether values are disproportionately on one or the other side of the median (when the median is closer to the top or the bottom of the box).

Figure 50: Reported Governor Deadband Settings

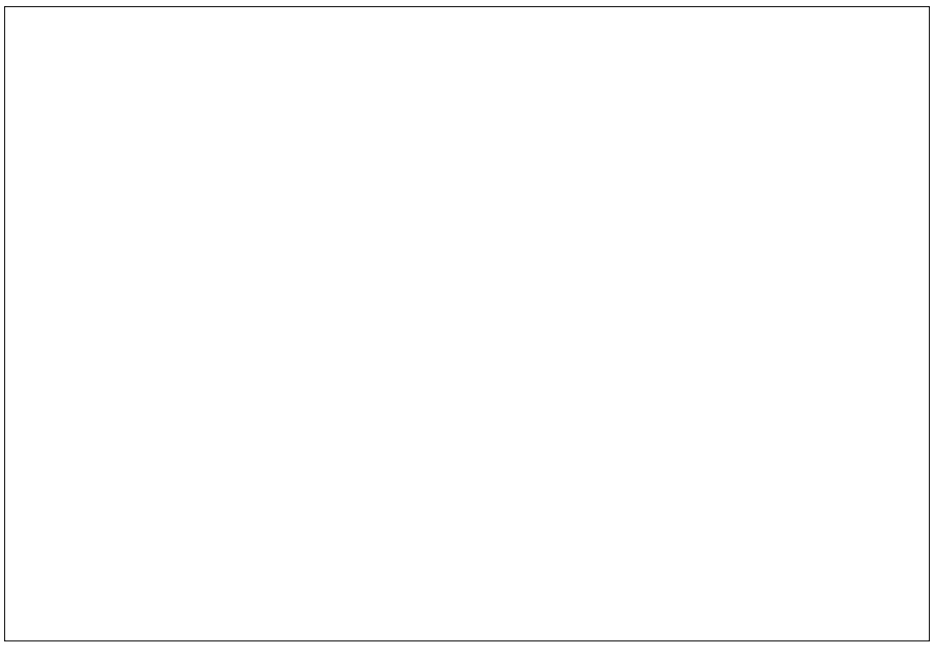


Figure 50 indicates:

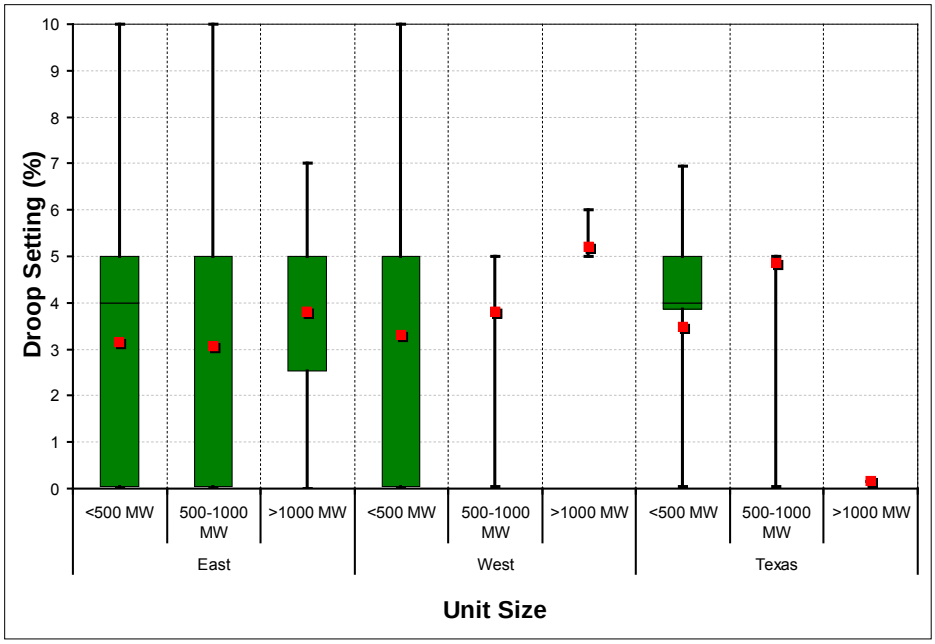
- Eastern Interconnection – Half of the deadband settings are between 0 and 100 mHz, with the smallest generating units having the lowest settings, followed by the mid-size, and then the largest units. The figure also indicates that there are a number of units in all size ranges with very high deadband settings (> 200 mHz).
- Western Interconnection – Half of the deadband settings are between 0 and 50 mHz for the smallest and mid-size generating units. However, the range is considerably broader for the largest units, with half of the settings lying between 0 and more than 300 mHz. The very large deadbands on units greater than 1,000 MW are attributable to the nuclear units.
- Texas Interconnection – The deadband settings are generally less than 50 mHz. There appears to be at least one very high deadband setting for a small generating unit.

Reported Droop Settings

Governor droop expresses the effect of changes in generating unit speed in terms of changes in power output as a function of the amount of frequency deviation from the reference frequency. Of the information provided by the GOs and GOPs on governor droop settings, 89%, 94%, and 87% of the number of units in the Eastern, Western, and Texas Interconnections, respectively, was usable.

Figure 51 summarizes the range of governor droop settings for the interconnections. Generally, the droop settings were in the range of expected values.

Figure 51: Range of Governor Droop Settings by Generating Unit Size



Governor Status and Operational Parameters

A number of the survey questions addressed the operational status and parameters of the governor fleet. As shown in Figure 52, the vast majority of the GOs and GOPs reported that their governors are operational.

Figure 53 shows that the governors also were reported to be able to sustain primary frequency response for longer than 1 minute if the frequency remains outside of its deadband. However, as shown in Figure 54, roughly half of the governors are expected to be overridden or limited by plant-level control schemes. This factor heavily influences the sustainability of primary frequency response, contributing to the withdrawal symptom often observed in the Eastern Interconnection, especially during light load periods.

Figure 52: Operational Status of Governors

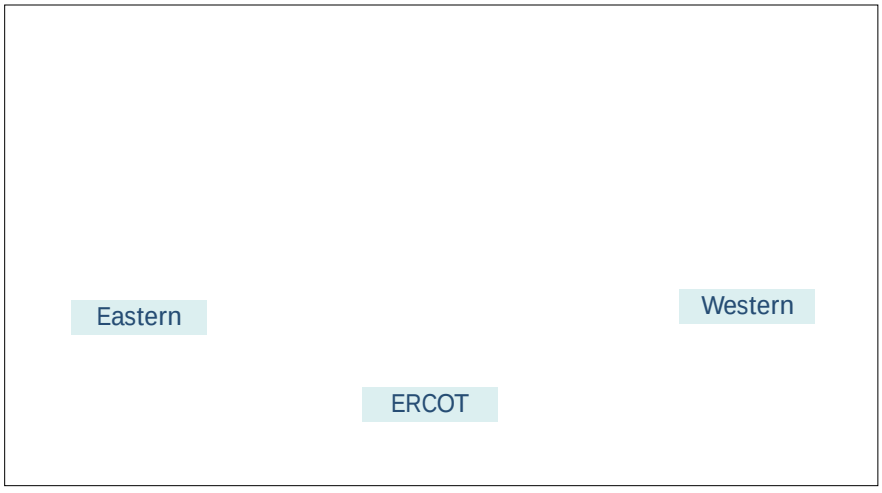


Figure 53: Response Sustainable for More Than 1 Minute if Outside Deadband

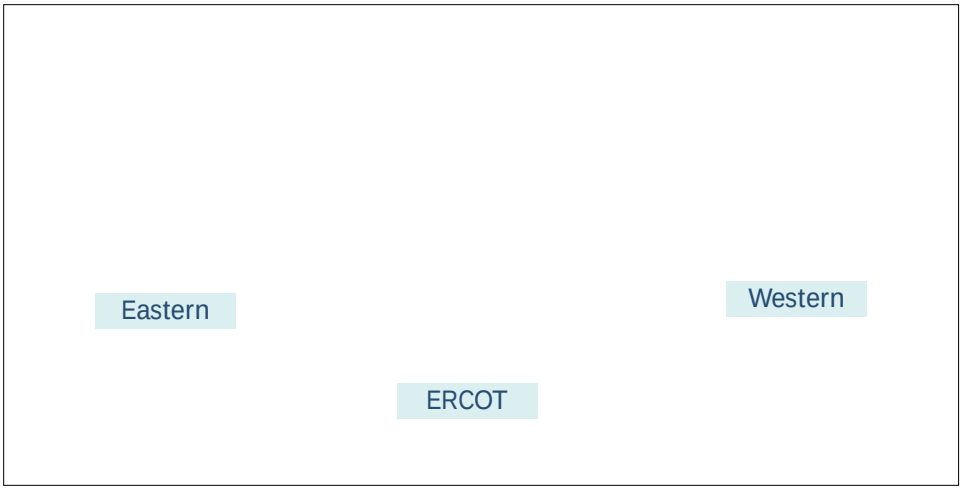
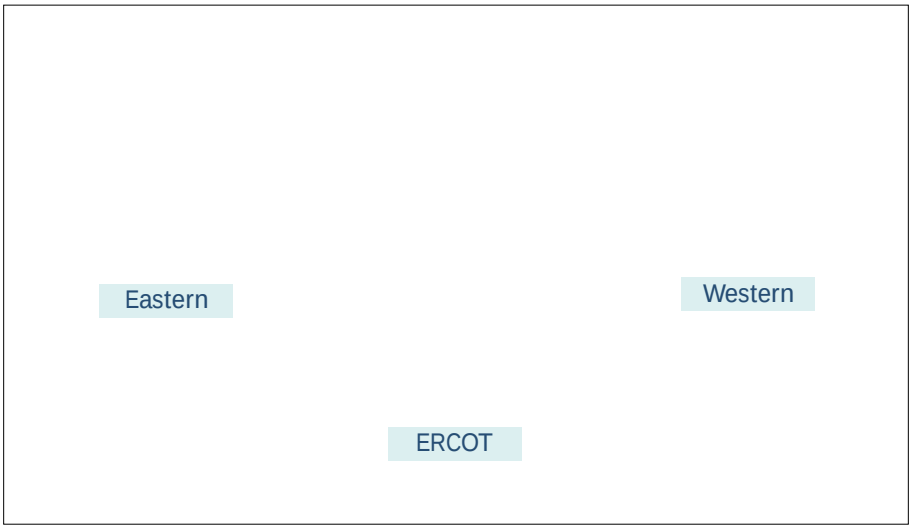


Figure 54: Unit-Level or Plant-Level Control Schemes that Override or Limit Governor Performance



Response to Selected Frequency Events

The GOs and GOPs were asked to provide information on the performance of turbine governors during a selected event in each interconnection. Table 23 lists the date and time of the events selected for the Eastern, Western, and Texas Interconnections (data was not requested from the Québec Interconnection).

Table 23: Selected Events for Provision of Generator Governor Performance Information			
Interconnection	Basis		Frequency
Eastern	8/16/2010	1:06:15 CST	1,200 MW
Western	8/12/2010	14:44:03 CST	1,260 MW
ERCOT	8/20/2010	14:25:29 CST	1,320 MW

Of the interconnections' total generating capacity, 64%, 58%, and 75% of the units were on-line at the time of the event for the Eastern, Western, and Texas Interconnections, respectively.

Figure 55: Governor Response by Total Generating Capacity On-Line

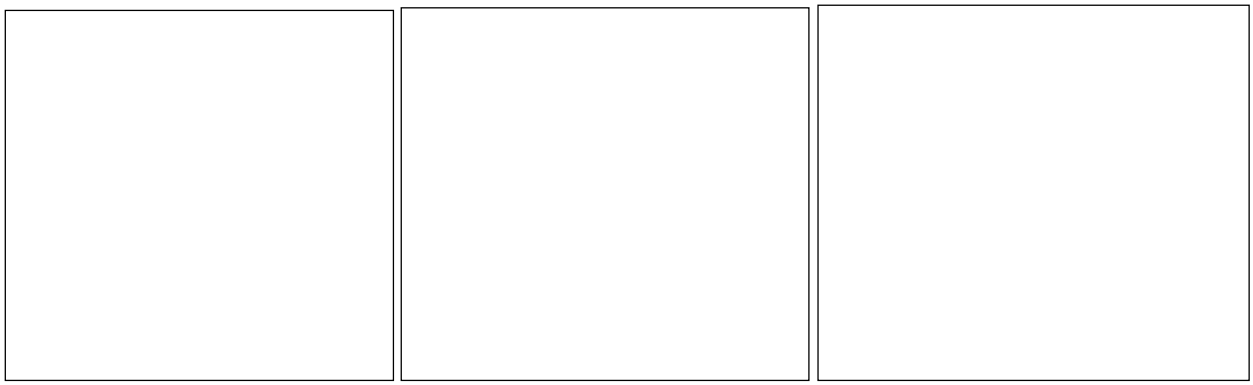


Figure 55 shows:

- Of the total generating capacity on-line, 30%, 44%, and 53% reported responding in the expected direction of response (i.e., to correct the change in frequency) for the Eastern, Western, and Texas Interconnections, respectively.
- Some generation reported no response to the frequency deviations (38%, 35%, and 13% for the Eastern, Western, and Texas Interconnections, respectively).
- Notably, 19%, 17%, and 20% were reported as responding in the opposite direction of the expected response (i.e., not in opposition to the change in frequency) for the Eastern, Western, and Texas Interconnections, respectively.

The values reported for the Eastern Interconnection for capacity providing expected response are in keeping with those calculated from the generic governor simulation of the frequency response to the August 4, 2007 Eastern Interconnection Frequency Disturbance. Those simulations showed that 30% of the capacity on-line responded, and 20% of the capacity on-line withdrew primary support, leaving only 10% of the capacity on-line providing sustained primary frequency response.

Figure 56 shows that for the Eastern Interconnection, total response in the expected direction was 973 MW, while response in the direction opposite expectations was -361 MW, for a total net response of 613 MW. Steam coal and combined-cycle gas turbine units, accounting for 327 MW and 244 MW of the net response, respectively, made the largest contributions. These contributions were made by steam coal and combine-cycle with a total on-line generating capacity of about 180 GW steam coal and about 60 GW combined-cycle gas turbine units, of which about 80 GW and about 10 GW of capacity provided response in the expected direction, respectively.

Figure 56: Eastern Interconnection Generator Governor Performance

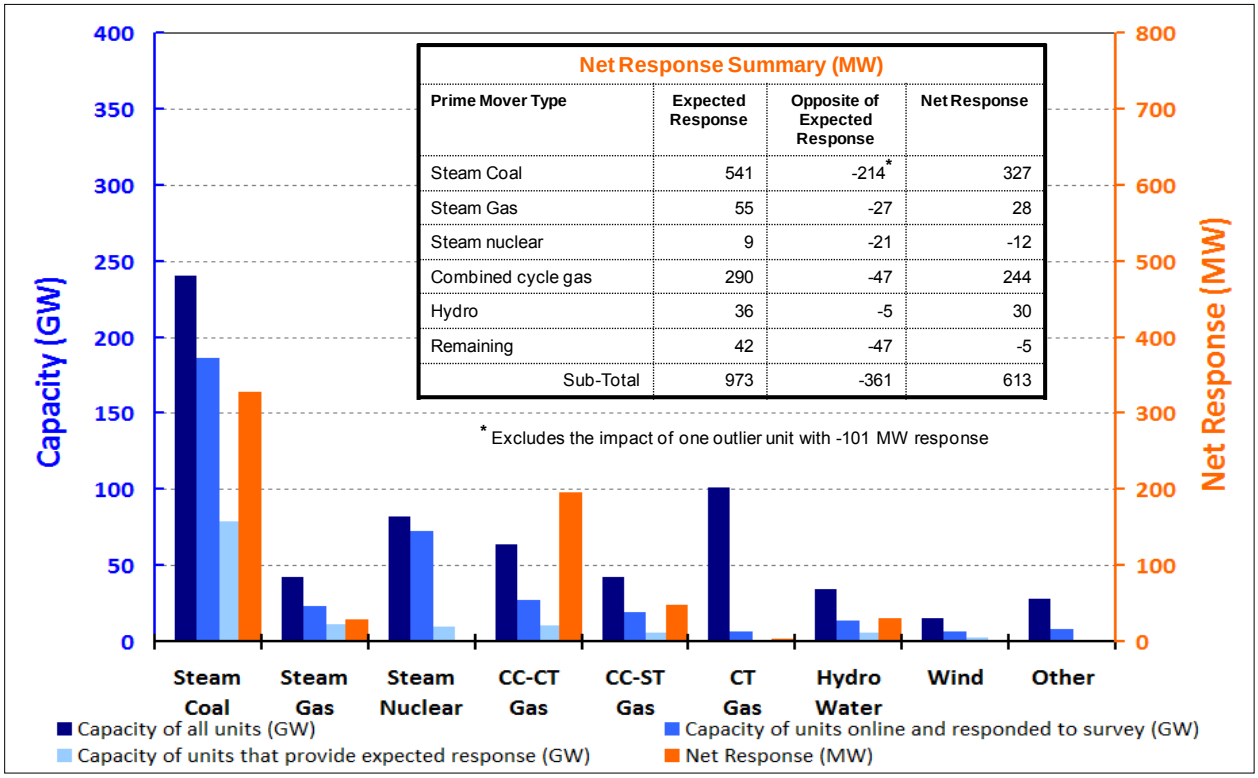
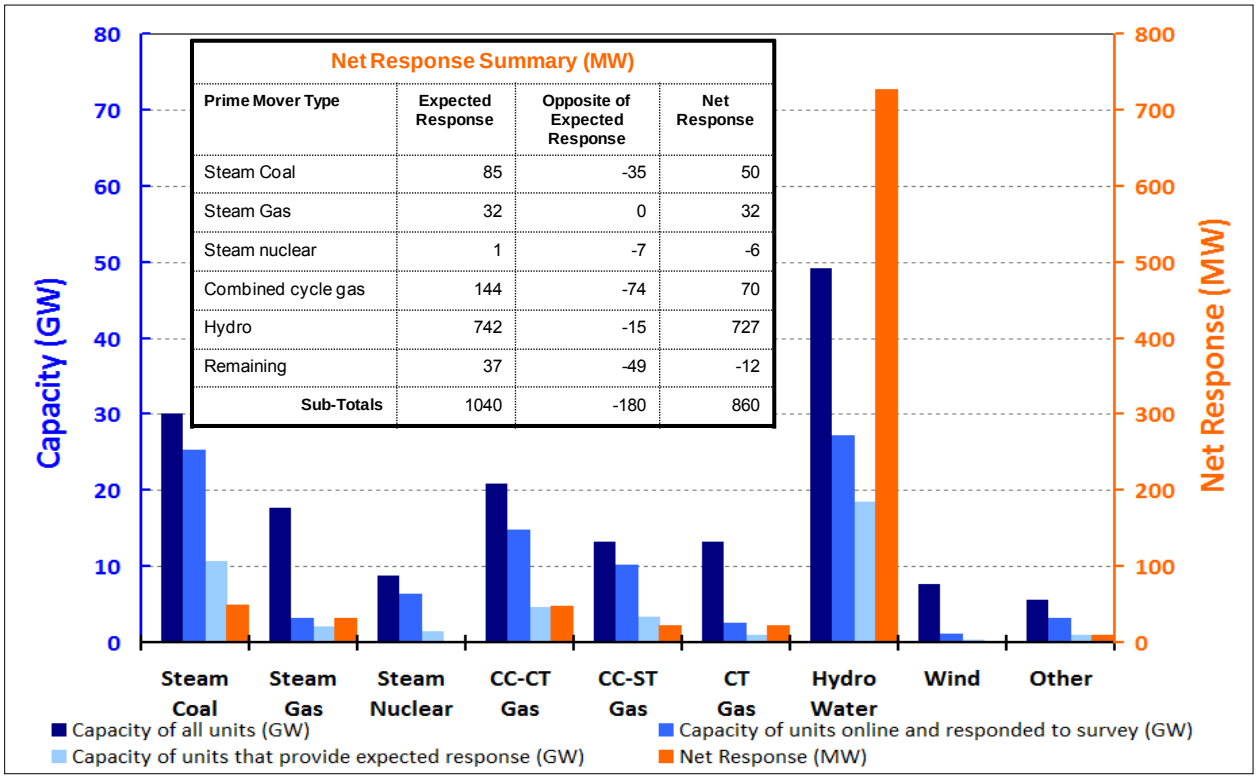


Figure 57 shows that for the Western Interconnection, total response in the expected direction was 1040 MW, while response in the direction opposite expectations was -180 MW, for a total net response of 860 MW. Hydro units, accounting for 727 MW of the net response, made the largest contribution. Hydro units made this contribution with a total on-line generating capacity of about 50 GW, of which about 19 GW of capacity provided response in the expected direction.

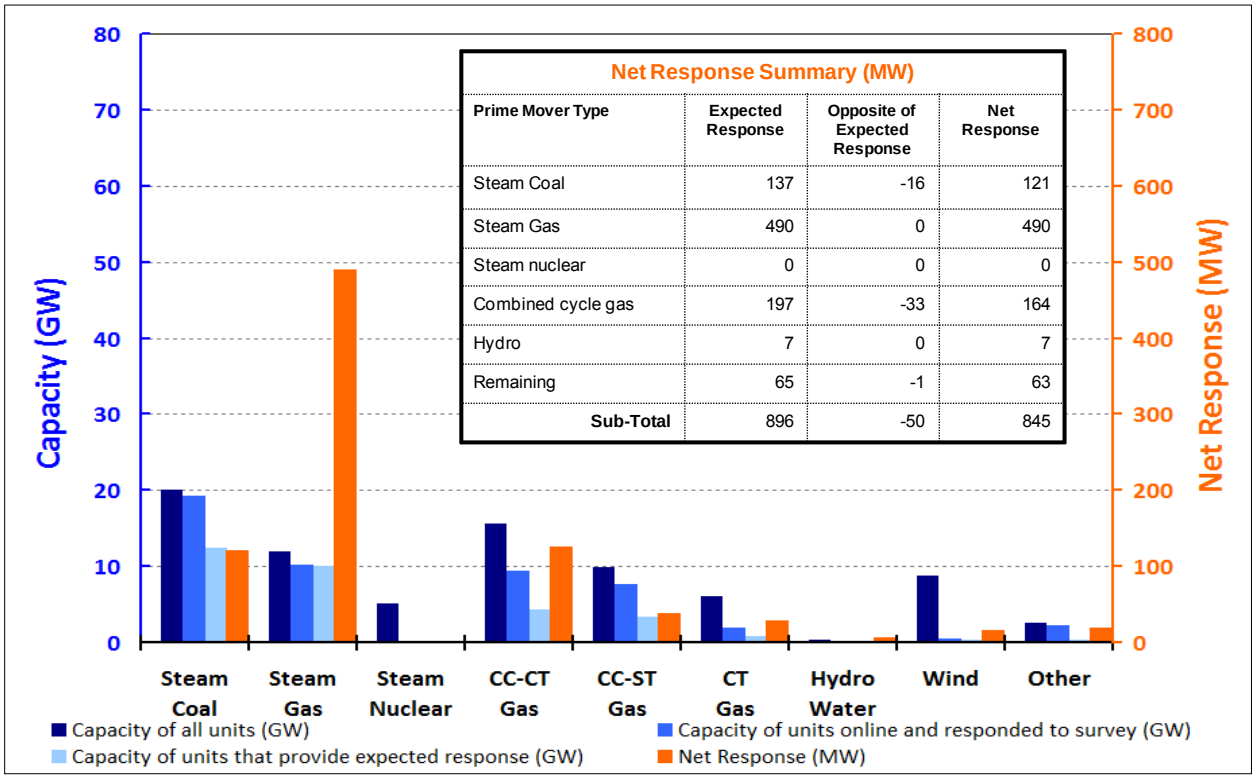
Figure 57: Western Interconnection Generator Governor Performance



Prime Mover Type	Expected Response	Opposite of Expected Response	Net Response
Steam Coal	85	-35	50
Steam Gas	32	0	32
Steam nuclear	1	-7	-6
Combined cycle gas	144	-74	70
Hydro	742	-15	727
Remaining	37	-49	-12
Sub-Totals	1040	-180	860

Figure 58 shows that for the ERCOT Interconnection, total response in the expected direction was 896 MW, while response in the direction opposite expectations was -50 MW, for a total net response of 845 MW. Steam gas units, accounting for 490 MW of the net response, made the largest contribution. Steam gas units made this contribution with a total on-line generating capacity of about 11 GW, of which ~10 GW of capacity provided response in the expected direction.

Figure 58: ERCOT Interconnection Generator Governor Performance



Net Response Summary (MW)

Prime Mover Type	Expected Response	Opposite of Expected Response	Net Response
Steam Coal	137	-16	121
Steam Gas	490	0	490
Steam nuclear	0	0	0
Combined cycle gas	197	-33	164
Hydro	7	0	7
Remaining	65	-1	63
Sub-Total	896	-50	845

Future Analysis Work Recommendations

Testing of Eastern Interconnection Maximum Allowable Frequency Deviations

The stability simulation testing of the Eastern Interconnection resource loss criteria used in the determination of the IFRO was limited to analysis using the generic governor stability case developed by the NERC Model Validation Working Group and the Eastern Interconnection Reliability Assessment Group (ERAG) Multi-Regional Modeling Working Group (MMWG) in December 2011 (based on the August 4, 2007 Eastern Interconnection Frequency Disturbance). Simulations using that stability simulation indicated a maximum sustainable generation loss of about 8,500 MW for the Eastern Interconnection. However, that simulation case was not for the light load conditions where system inertia and load response would be expected to be lower than in the generic case.

Recommendation – Dynamic simulation testing of the Western and ERCOT Resource Contingency Protection Criteria should be conducted as soon as possible.

Recommendation – When ERAG MMWG completes its review of turbine governor modeling, a new light-load case should be developed, and the resource loss criterion for the Eastern Interconnection's IFRO should be re-simulated.

Eastern Interconnection Inter-area Oscillations – Potential for Large Resource Losses

During the spring of 2012, a number of inter-area oscillations were observed between the upper Midwest and the New England/New Brunswick areas in the 0.25 Hz family. During one such event, a large generation outage in Georgia instigated that oscillation mode and was interpreted by the FNet frequency monitoring and event detection program as an 1,800 MW resource loss in the upper Midwest. Immediately, the FNet Oscillation Monitoring system detected the 0.025 Hz family oscillations between the upper Midwest and New England/New Brunswick. Investigation into the event showed that it occurred while the Dorsey – Forbes 500 kV transmission line was out of service for maintenance. During that line outage, the transfers on the Dorsey DC line from Northern Manitoba were significantly curtailed, and the oscillation of the Dorsey DC terminal capabilities for damping the 0.025 Hz oscillations were greatly reduced. This made the system more susceptible to such oscillations. In all instances, the energy magnitude under the oscillations was small, well-damped, and of little danger to the reliability of the Eastern Interconnection.

However, the instigation of those oscillations by a generator trip in Georgia seemed unlikely until reviewed in light of the inter-area oscillations detected following the South Florida disturbance of February 26, 2008. During that disturbance, a family of 0.22 Hz oscillations was detected between the Southeast and the upper Midwest. In both cases, the same generation

in the upper Midwest has a strong participation in both mode shapes, and since both oscillation modes are close in frequency, the 0.25 Hz family was easily perturbed by an instance of the 0.22 Hz mode oscillations caused by the Georgia generator tripping.

Recommendation – Eastern Interconnection inter-area oscillatory behavior should be further investigated by NERC, including during the testing of large resource loss analysis for IFRO validation.

Appendices Table of Contents

Appendix A – Contributors

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NERC Frequency Response Standard Drafting Team

NERC Frequency Working Group

NERC Resources Subcommittee

NERC System Analysis and Modeling Subcommittee (formerly the Transmission Issues Subcommittee)

[1] Participation made possible through funding provided by the U.S. Department of Energy Office of Electricity and Energy Reliability, coordinated through the Lawrence Berkeley National Laboratory.

Appendix B – Abbreviations

ACE	Area Control Error
ADF	Adjusted Delta Frequency
AGC	Automatic Generator Control
ALR	Acceptable Level of Reliability
ARLPC	Adjusted resource loss protection criteria adjusted for the credit for load resources
BA	Balancing Authority
BAA	Balancing Authority Area
CERTS	Consortium for Electric Reliability Technology Solutions
CPS	Control Performance Standard
CB_R	Ratio of the Point C to Value B to adjust the allowable delta frequency to account for that difference.
CC_{ADJ}	Adjustment to Point C for the differences between 1-second and sub-second measurements
COI	California-Oregon Interface (ac)
D	Load damping factor
dc	Direct current
DCS	Disturbance Control Standard
DF_{Base}	Base delta frequency
DF_{CC}	Delta frequency adjusted for the differences between 1-second and sub-second Point C observations for frequency events
EMS	Energy Management System
EPG	Electric Power Group
ERAG	Eastern Interconnection Reliability Assessment Group
ERCOT	Electric Reliability Council of Texas
ERO	Electric Reliability Organization
F_{Start}	Starting Frequency
FERC	The U.S. Federal Energy Regulatory Commission
FDR	Frequency Disturbance Recorder
FMA	Frequency Monitoring and Analysis tool
FNet	Frequency Monitoring Network (University of Tennessee, Knoxville, and Virginia Tech)
FRC	Frequency Response Characteristic
FRCC	Florida Reliability Coordinating Council
FRM	Frequency Response Measure
FRO	Frequency Response Obligation (FRO_{BA})
FRRSDT	Frequency Response Standard Drafting Team

FR	Frequency Response
FRS	Frequency Response Standard
FRSG	Frequency Response Sharing Group
FWG	Frequency Working Group
GOs	Generator Owners
GOPs	Generator Operators
GVD	Governor Valve Demand
GW	gigawatts (thousands of megawatts)
H	Inertial constant (of the interconnection)
Hz	hertz (cycles per second)
IFRO	Interconnection Frequency Response Obligation (FRO_{Int})
LaaR	Load Acting as a Resource
LBNL	Ernest Orlando Lawrence Berkeley National Laboratory
mHz	millihertz
MMWG	Multi-Regional Modeling Working Group
MVA	megavoltampere
MW	megawatts
N-1	Loss of one system element
N-2	Loss of two system elements
NI_A	Net Interchange Actual
NI_S	Net Interchange Scheduled
PAS	Performance Analysis Subcommittee
PDCI	Pacific Direct Current Intertie
PDCWG	Performance Disturbance and Compliance Working Group (ERCOT)
PMU	Phasor Measurement Unit
PV	Photovoltaic
RA	Resource Adequacy Tool
RARF	ERCOT Resource Asset Registration Form
RAS	Remedial Action Scheme (also known as a Special Protection Scheme – SPS)
RLPC	Resource Loss Protection Criteria
RPM	Revolutions per Minute
RC	Resources Subcommittee
SAMS	System Analysis and Modeling Subcommittee (formerly TIS)
SCADA	System Control and Data Acquisition
SEFRD	Single Event Frequency Response Data
SEFRD	Single Event Frequency Response Data
TIS	Transmission Issues Subcommittee (now SAMS)
TRE	Texas Regional Entity

UFLS	Under-Frequency Load Shedding

Appendix C – Definitions and Terminology

Definitions used in Standard BAL-003-1

Frequency Response Measure (FRM)

The median of all the Frequency Response observations reported annually by Balancing Authorities or Frequency Response Sharing Groups for frequency events specified by the ERO. This will be calculated as MW/0.1Hz.

Frequency Response Obligation (FRO)

The Balancing Authority's share of the required Frequency Response needed for the reliable operation of an Interconnection. This will be calculated as MW/0.1Hz.

Frequency Bias Setting

A number, either fixed or variable, usually expressed in MW/0.1 Hz, included in a Balancing Authority's Area Control Error equation to account for the Balancing Authority's inverse Frequency Response contribution to the interconnection, and discourage response withdrawal through secondary control systems.

Frequency Response Sharing Group (FRSG)

Groups, whose members consist of two or more Balancing Authorities, that collectively maintain, allocate, and supply operating resources required to jointly meet the sum of the Frequency Response Obligations of its members.

Area Control Error (ACE)*: The instantaneous difference between a Balancing Authority's net actual and scheduled interchange, taking into account the effects of Frequency Bias and correction for meter error.

Arrested Frequency – Value C – Point C – Frequency Nadir: The point of maximum frequency excursion in the first swing of the frequency excursion between time zero (Point A) and time zero plus 20 seconds.

Arresting Period: The period of time from time zero (Point A) to the time of Point C.

Arresting Period Frequency Response: A combination of load damping and the initial Primary Control Response acting together to limit the duration and magnitude of frequency change during the Arresting Period.

Automatic Generation Control (AGC)*: Equipment that automatically adjusts generation in a Balancing Authority Area from a central location to maintain the Balancing Authority's

interchange schedule plus Frequency Bias. AGC may also accommodate automatic inadvertent payback and time error correction.

Balancing Authority (BA)*: The responsible entity that integrates resource plans ahead of time, maintains load-interchange-generation balance within a Balancing Authority Area, and supports interconnection frequency in real time.

Beta: The factor by which the frequency deviation is multiplied by in the ACE equation to adjust the ACE to protect a BA's Frequency Response.

Contingency Protection Criteria of an interconnection: The selected capacity contingency that an interconnection must withstand at all times without the activation of the first tier of UFLS.

Contingency Reserve*: The provision of capacity deployed by the Balancing Authority to meet the Disturbance Control Standard (DCS) and other NERC and Regional Reliability Organization contingency requirements.

Frequency [i]: The rate at which a repeating waveform repeats itself. Frequency is measured in cycles per second or in hertz (Hz). The symbol is "F."

Frequency Bias Setting: The term of the ACE equation that is multiplied by frequency deviation portion. This is a corrective term to offset the tie-line flow error caused by generation/load responding to a frequency deviation.

Frequency Deviation*: A change in interconnection frequency.

Frequency Response*: (Equipment) The ability of a system or elements of the system to react or respond to a change in system frequency. (System) The sum of the change in demand, plus the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 hertz (MW/0.1 Hz).

Frequency Responsive Reserve (a.k.a., dynamic headroom): The capacity of Governor Response and/or Frequency-Responsive Demand Response that will be deployed for any frequency excursion.

Frequency-Responsive Demand Response: Voluntary load shedding that complements governor response. This load reduction is typically triggered by relays that are activated by frequency.

Frequency Sensitive Load: Customer loads that vary directly with changes in frequency or would trip as a result of frequency deviations.

Governor response[§]: The control response of turbine-governors to sensing a change in speed of the turbine as frequency increases or declines, causing an adjustment to the energy input of the turbine's prime mover.

Headroom: The difference between the current operating point of a generator and its maximum operating capability.

Inertia[i]: The property of an object that resists changes to the motion of an object. For example, the inertia of a rotating object resists changes to the object's speed of rotation. The inertia of a rotating object is a function of its mass, diameter, and speed of rotation.

Load damping[¥]: The damping effect of the load to a change in frequency due to the physical aspects of the load such as the inertia of motors and the physical load to which they are connected.

Load following[i]: Commitment of energy based resources (generation or energy schedule) to match the forecast load level for a given period. This is a form of course control for moment-by-moment resource/load matching.

Non-spinning reserve*: 1. That generating reserve not connected to the system but capable of serving demand within a specified time. 2. Interruptible load that can be removed from the system in a specified time.

Off-line Reserve[§]: The off-line capability above firm system demand required to provide for regulation, load forecasting error, equipment forced and scheduled outages, and local area protection.

On-line Reserve[§]: The on-line capability above firm system demand required to provide for regulation, load forecasting error, equipment forced and scheduled outages, and local area protection. This can consist of spinning reserve and interruptible load that can act as a resource.

Operating Reserve*: That capability above firm system demand required to provide for regulation, load forecasting error, equipment forced and scheduled outages, and local area protection. It consists of spinning and non-spinning reserves.

Other On-line Reserves[§]: On-line Resources that can increase their output or connected loads that can decrease their consumption (curtailable loads) in time frames outside the continuum of regulating or spinning reserve (i.e. on four hours' notice).

Other Off-line Reserves[§]: Resources that can be brought to bear outside the continuum of non-spinning reserve (i.e., on four hours' notice).

Plant secondary control[@]: Secondary control refers to controls affected through commands to a turbine controller issued by external entities not necessarily working in concert with frequency management objectives. It is common for a modern power plant to have several distinct modes of secondary control implemented within the plant and to be able to accept secondary control inputs from sources external to the plant.

Primary Control Response Withdrawal: The withdrawal of previously delivered Primary Control Response, through plant secondary controls.

Primary Frequency Control Response: The power delivered to the interconnection in response to a frequency deviation through generator governor response, load response (typically from motors), demand response (designed to arrest frequency excursions), and other devices that provide an immediate response to frequency based on local (device-level) control systems, without human or remote intervention.

Primary Frequency Control Reserves: Frequency-responsive reserves that respond nearly instantaneously (starting in less than 1 second) to oppose any changes in power system frequency.

Quick Start Reserve: A form of non-spinning reserve that can be put on-line and the capacity that can be deployed in ten minutes.

Recovery Period: The period of time from when Secondary Control Response are deployed (typically about zero plus 53 seconds) to the time of the return of frequency to within pre-established ranges of reliable continuous operation.

Regulation[¥]: Controllable resources necessary to provide for the continuous balancing of resources (generation and interchange) with load and for maintaining scheduled interchange and interconnection scheduled frequency. Regulation is accomplished by committing on-line generation whose output is raised or lowered (predominantly through the use of automatic generating control equipment) as necessary to follow the moment-by-moment changes actual net interchange.

Regulating reserve*: An amount of reserve responsive to Automatic Generation Control, which is sufficient to provide a normal regulating margin.

Settling frequency[¥, #]: Refers to the third key event during a disturbance when the frequency stabilizes following a frequency excursion. Point B represents the interconnected system frequency at the point immediately after the frequency stabilizes due to governor action but before the contingent control area takes corrective AGC action.

Secondary Control Response: The power delivered by a Balancing Authority or Reserve Sharing Group in response to a frequency deviation through Secondary Control actions, such as manual or automated dispatch from a centralized control system. Secondary control actions are intended to restore Primary Control Response and restore frequency from the Arrested Frequency back to Scheduled Frequency, or maintain Scheduled Frequency.

Secondary Frequency Control: Actions provided by an individual BA or its Reserve Sharing Group intended to restore Primary Control Response and restore frequency from the Arrested Frequency back to Scheduled Frequency, or to maintain Scheduled Frequency deployed in the “minutes” time frame. Secondary Control comes from either manual or automated dispatch from a centralized control system. Secondary Control also includes initial reserve deployment for disturbances and maintains the minute-to-minute balance throughout the day and is used to restore frequency to normal following a disturbance and is provided by both spinning and non-spinning reserves.

Secondary Frequency Control Reserves: Frequency-responsive reserves that respond over slightly longer time frames (starting in 20-30 seconds). Following the sudden loss of generation, they assist in restoring frequency to the scheduled value after Primary Frequency Control Reserves have been deployed. They also safeguard Primary Frequency Control Reserves (so that primary reserves remain available to respond to these sudden events) by controlling frequency in response to slower imbalances that arise between electricity demand and generation such as the normal rise and fall of system load over the course of a day.

Spinning reserve*: Unloaded generation that is synchronized and ready to serve additional demand.

Tertiary frequency control[§]: Encompasses actions taken to get resources in place to handle current and future changes in load or contingencies. Reserve deployment and Reserve restoration following a disturbance is a common type of Tertiary frequency control.

Under-frequency load shedding[i]: The tripping of customer load based on magnitudes of system frequency. For example, a utility may dump 5% of their connected load if frequency falls below 59.3 Hz, dump an additional 10% if frequency falls below 58.9 Hz, and dump a final 10% if frequency falls below 58.5 Hz. These three steps of load shedding would form this utility's UFLS plan. The purpose of UFLS is a final effort (safety net) to arrest a frequency decline.

Sources:

* NERC Glossary of Terms Used in Reliability Standards, http://www.nerc.com/files/Glossary_of_Terms.pdf

[¥] NERC Reference Document Understand and Calculating Frequency Response (June 19, 2008)

[§] NERC Balancing and Frequency Control (July 5, 2009)

[#] NERC Frequency Response Characteristic Survey Training Document, http://www.nerc.com/docs/standards/sar/opman_12-13Mar08_FrequencyResponseCharacteristicSurveyTrainingDocument.pdf (January 1, 1989)

[@] Undrill, J.M. 2010. *Power and Frequency Control as it Relates to Wind-Powered Generation*. LBNL-4143E. Berkeley: Lawrence Berkeley National Laboratory

[i] Definitions taken from the EPRI Power Systems Dynamics Tutorial. EPRI, Palo Alto, CA: 2009. 1016042

Appendix D – Interconnection Frequency Deviation Duration Plots

Figure D1: Summary of Eastern Interconnection Frequency 2007–2011

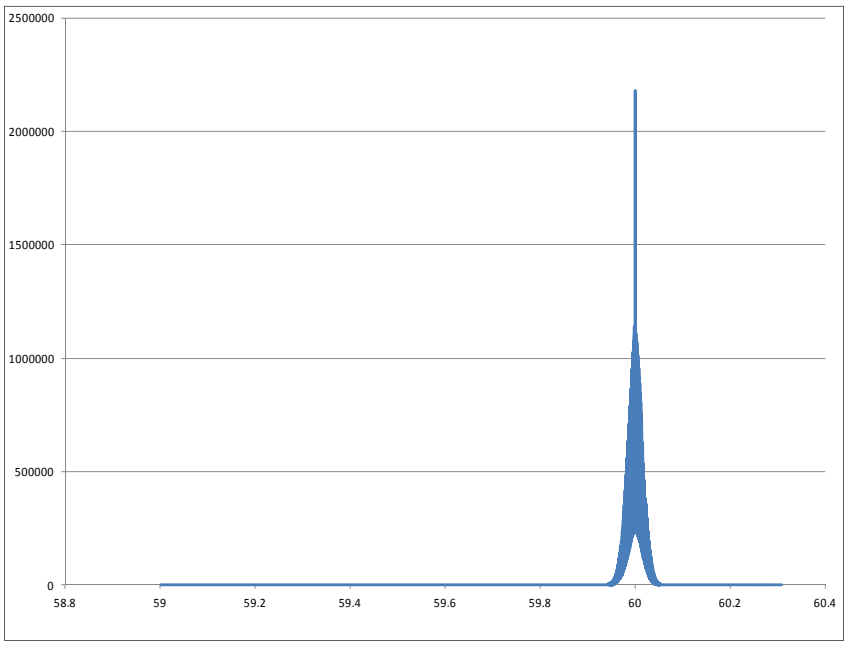


Figure D2: Eastern Interconnection 2007–2011 Frequency Histogram

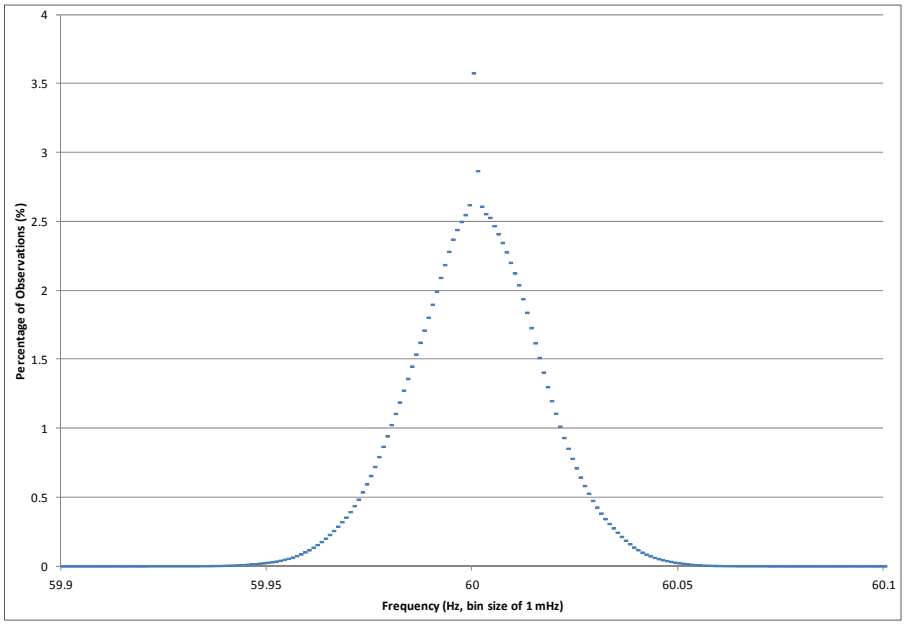


Figure D3: Eastern Interconnection Frequency 2007–2011 Cumulative Distribution

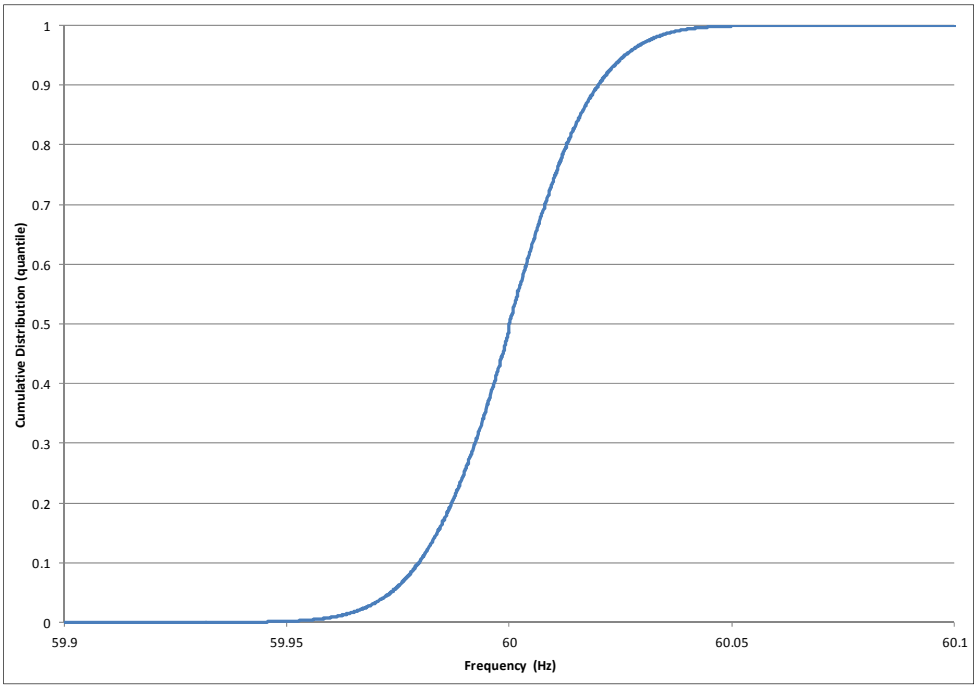


Figure D4: Summary of Western Interconnection Frequency 2007–2011

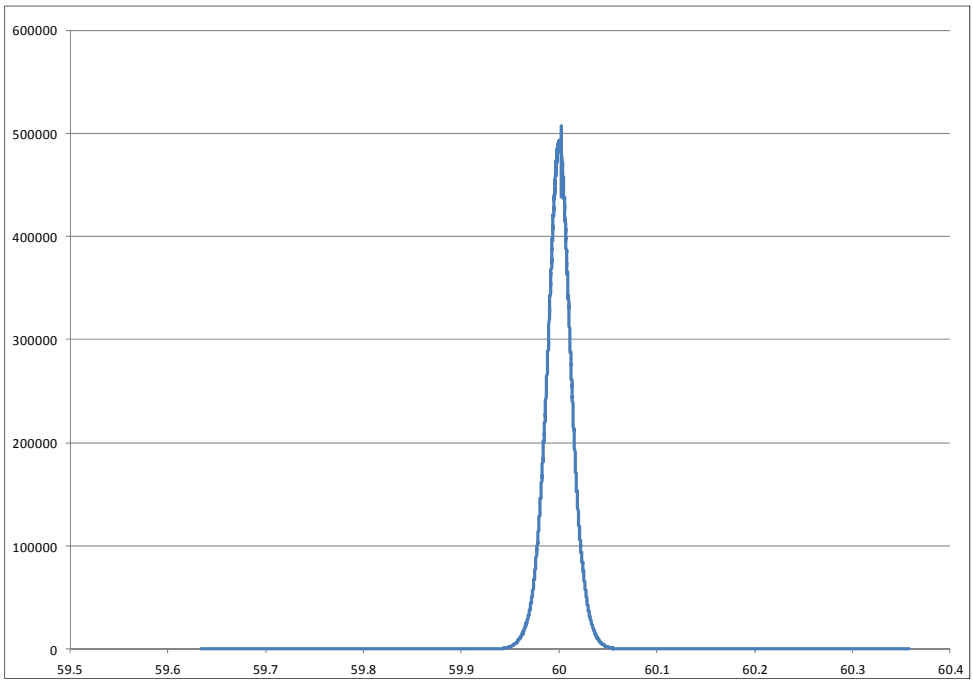


Figure D5: Western Interconnection 2007–2011 Frequency Histogram

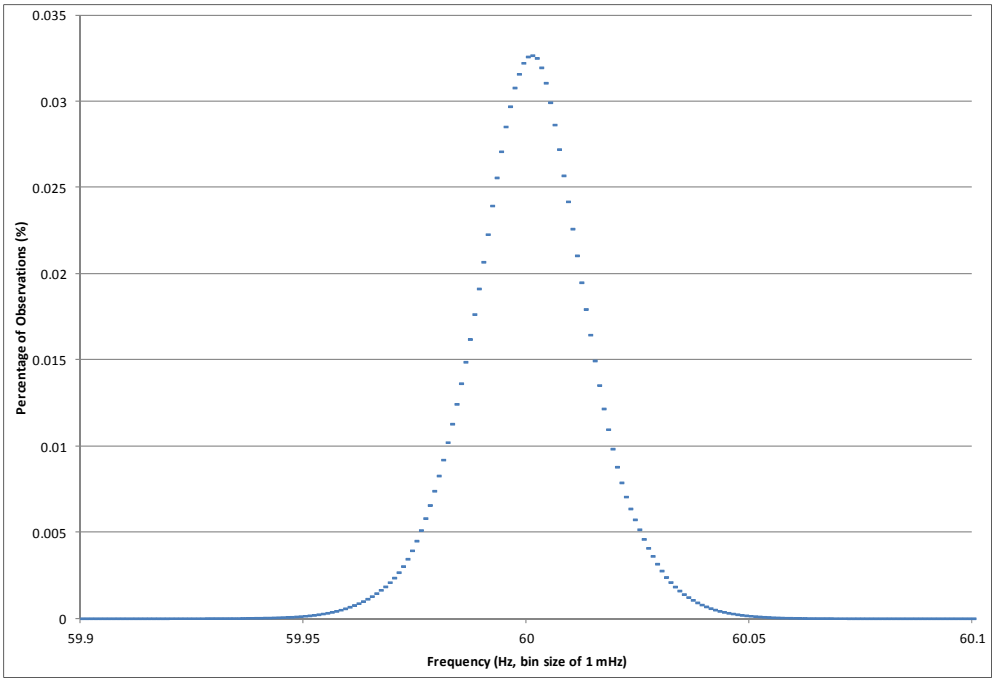


Figure D6: Western Interconnection Frequency 2007–2011 Cumulative Distribution

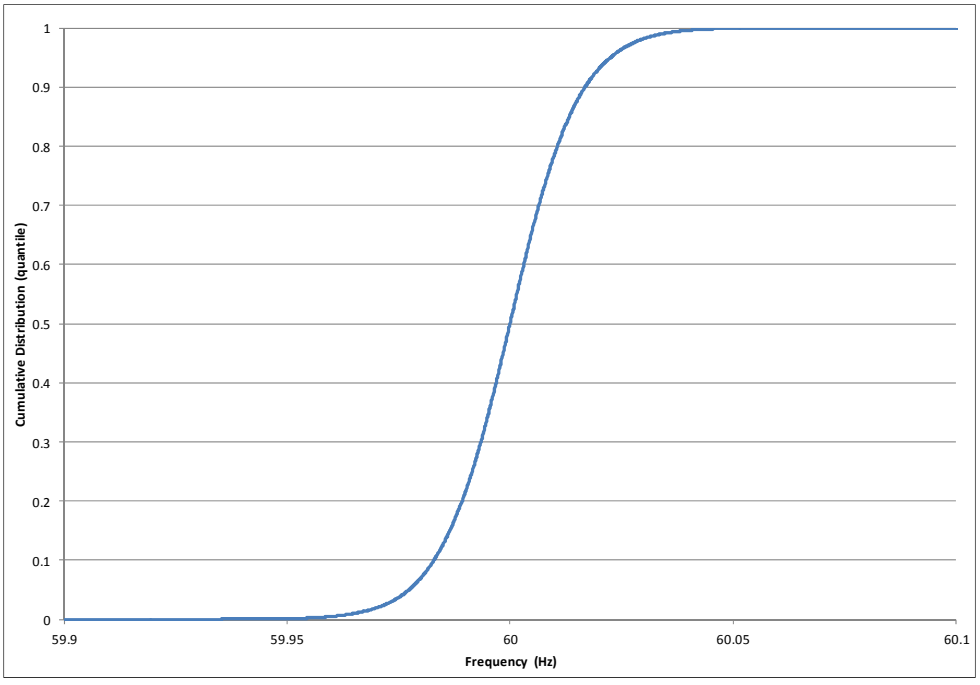


Figure D7: Summary of ERCOT Interconnection Frequency 2007–2011

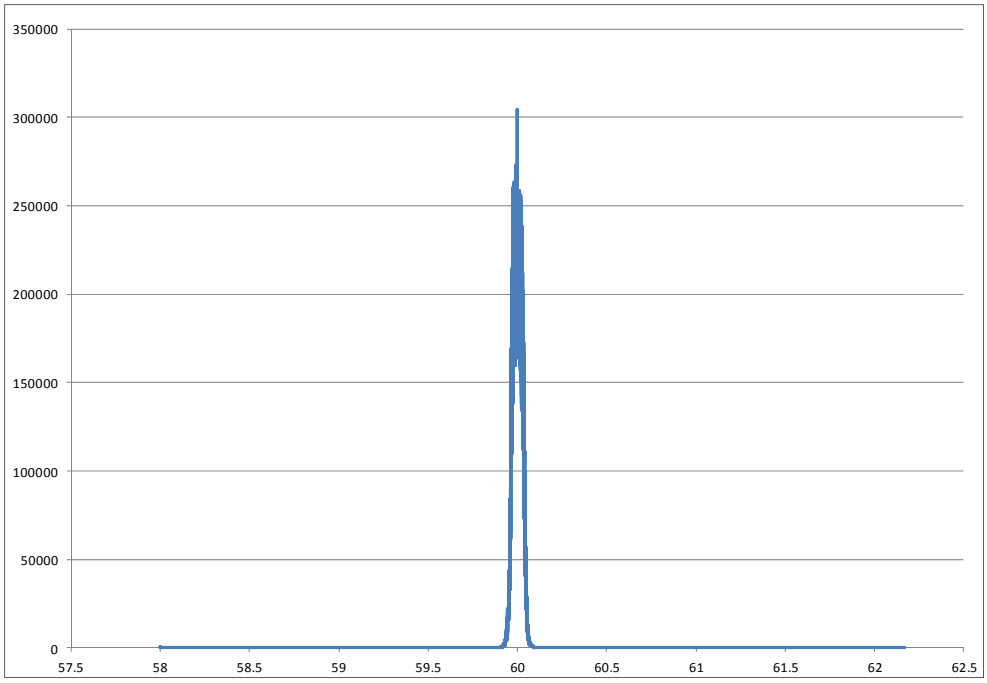


Figure D8: ERCOT Interconnection 2007–2011 Frequency Histogram

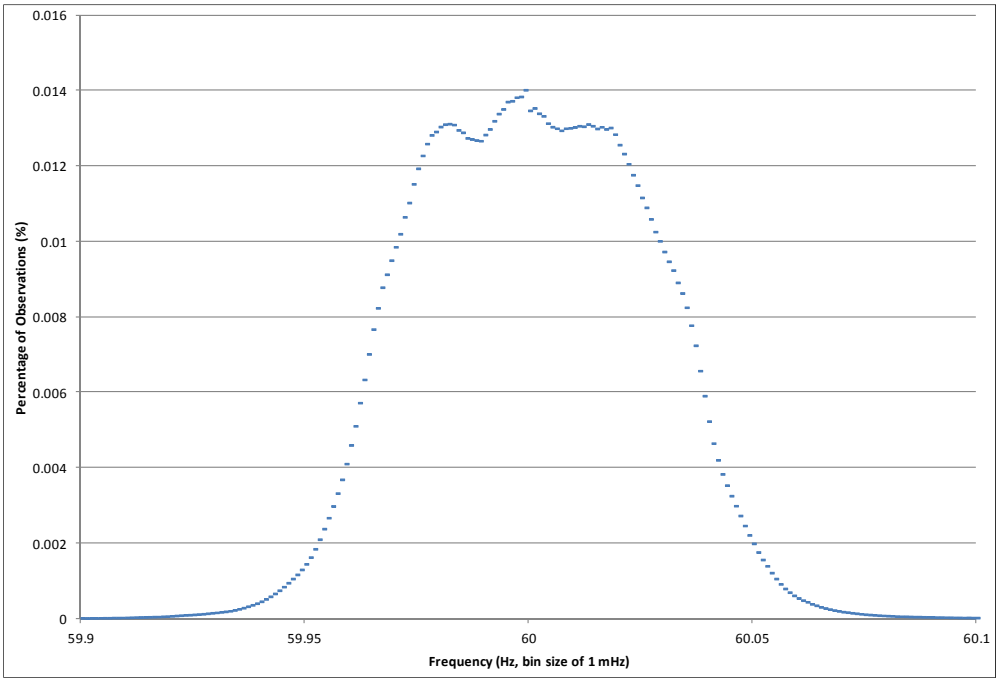


Figure D9: ERCOT Interconnection Frequency 2007–2011 Cumulative Distribution

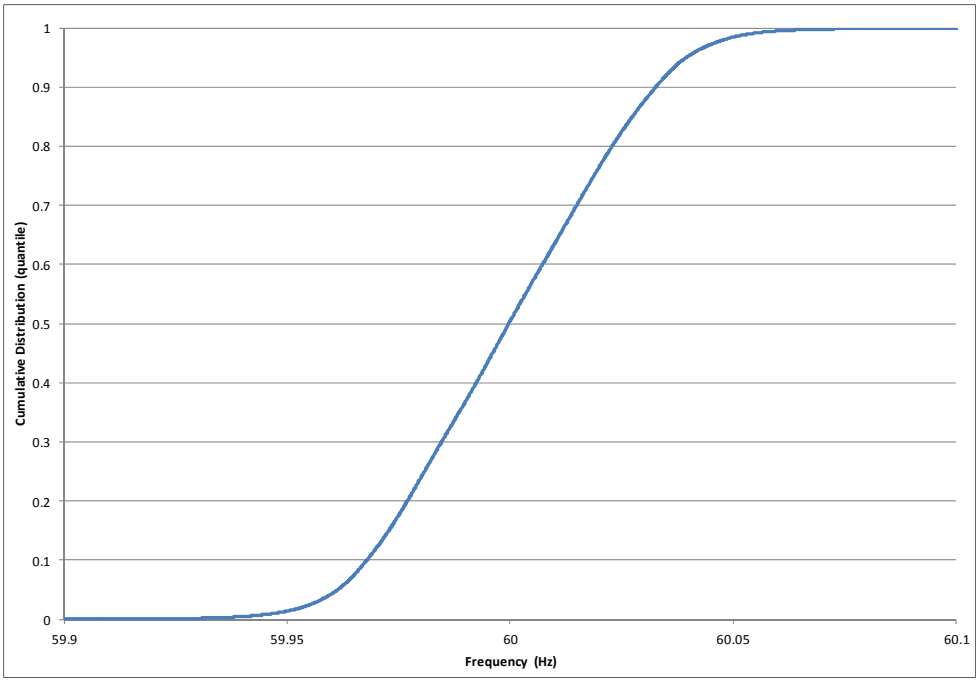


Figure D10: Summary of Québec Interconnection Frequency 2010–2011

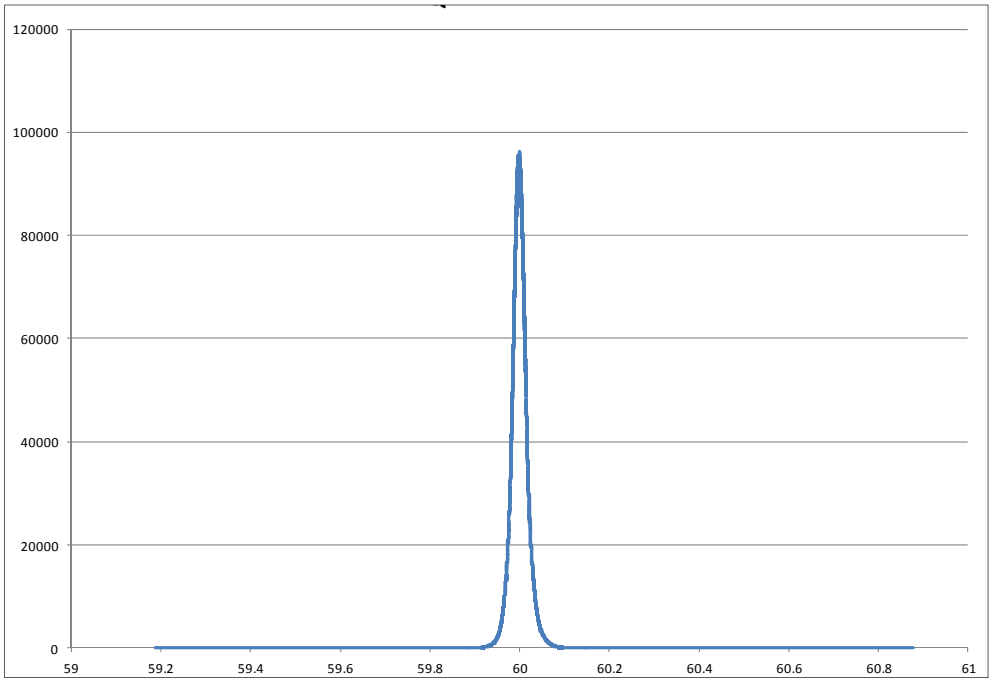


Figure D11: Québec Interconnection 2010–2011 Frequency Histogram

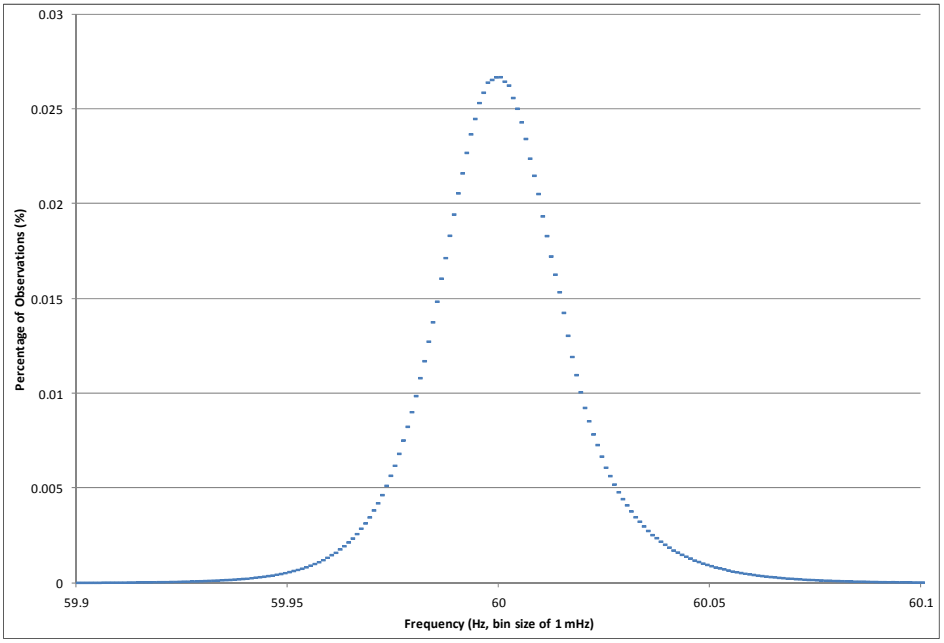
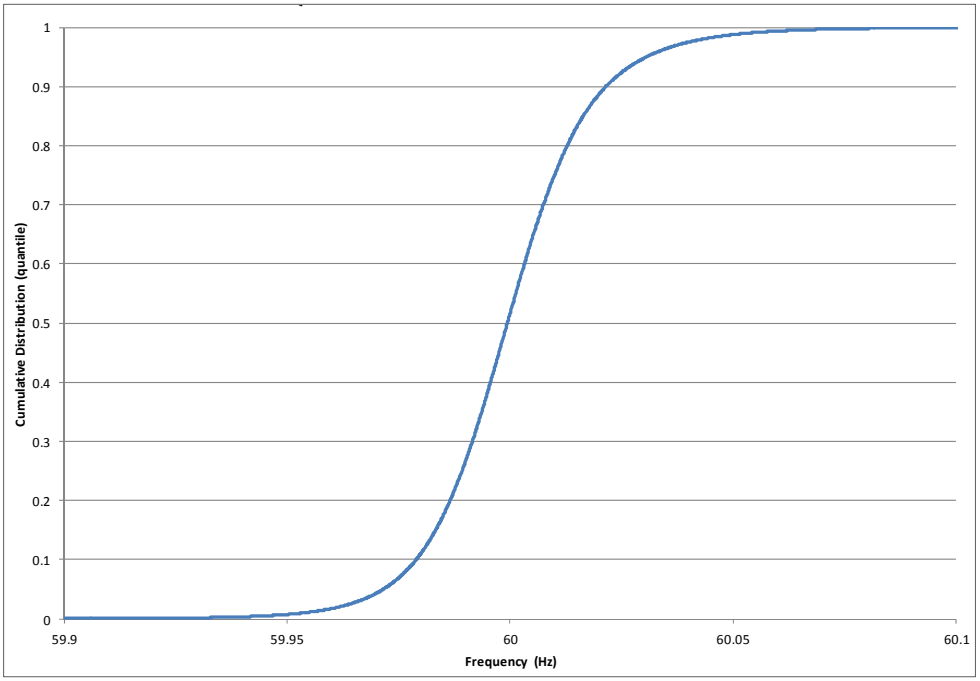


Figure D12: Québec Interconnection Frequency 2010–2011 Cumulative Distribution



Appendix E – ALR1-12 Metric Event Selection Process

1. CERTS-EPG produces a monthly spreadsheet for four interconnections (Eastern Interconnection or EI, Western or WI, ERCOT Interconnection or TI, and Québec). The spreadsheet captures significant frequency events based on the Resources Subcommittee (RS) specified threshold. The Frequency Monitoring and Analysis tool (FMA) gathers and stores the raw data.
2. The spreadsheet is sent by CERTS-EPG to the Frequency Working Group (FWG) on the 15th of each month for the previous month's raw data.
3. The FNET application uses automatic e-mails to flag frequency deviations. Generation loss is estimated.
4. The actual generation loss for the FNET flagged frequency events is determined by the NERC Situation Awareness Coordinator from the Regional Entities and sent to the FWG.
5. The FWG members validate the data and add the actual generation loss values into the spreadsheet.
6. FWG sends the validated monthly sheet to the Resource Subcommittee (RS) and the Performance Analysis Subcommittee (PAS) on the 30th of each month for the previous month's raw data.
7. NERC staff will update the candidate event list on the NERC website that will be used to support the standard. The final official event list for a year will be identified as a subset of the posted candidate list.
8. PAS publishes the quarterly Frequency Response metric data on NERC's Reliability Indicators webpage. The initial trending will be based on annual median/mean and rolling 12 month values.

Background Information

The frequency delta thresholds recommended by RS for the Eastern, Western, ERCOT and Québec Interconnections are shown in Table E1.

Table E1: Frequency delta thresholds recommended by RS

Interconnections	Frequency Delta for events captured in (mHz)	Frequency Delta for Significant events that have a higher Delta	Time Window (Seconds)
Eastern	24	36	15
Western	40	70	15
ERCOT	45	90	15
Québec	140	200	15

The raw statistics for events in 2008, 2009, 2010 and the first half of 2011 are listed in Table E2 below. This was sent by CERTS-EPG to the FWG on August 31, 2011.

Table E2: Raw Statistics for frequency events from 2008 to July 2011

Interconnection	Eastern	Western	ERCOT	Québec
2008	195	102	26	No Data
2009	78	72	85	No Data
2010	132	85	122	No Data
2011 (until July)	70	37	61	159

The statistics for TI from 2008 to 2011 were validated and modified by the FWG. Table E3 shows the statistics for TI that were sent by the FWG to the RS on September 02, 2011.

Table E3: Validated Statistics for TI frequency events from 2008 to July 2011

Interconnections	TI
2008	8
2009	51
2010	67
2011 (until July)	40

The FWG Lead members who will validate the data and add the actual generation loss values into the spreadsheet for the four interconnections are listed in Table E4.

Table E4: Lead members for the four interconnections

Terry L. Bilke	Eastern Interconnection
Don E. Badley	Western Interconnection
Sydney L. Niemeyer	ERCOT Interconnection
Michael Potishnak	Québec Interconnection

In July 2011, CERTS-EPG produced the first of the monthly reports for the FWG. July 2011 has 22 frequency events and a summary is shown in Table E5.

Table E5: Summary of the 1st monthly report produced by CERTS-EPG for the FWG in July 2011

NERC INTERCONNECTION JULY, 2011 FREQUENCY EVENTS – SUMMARY DATA

Eastern Interconnection

Event Time				Event Frequency Data						Interconnection	Resource Information			Candidate	Candidate	Load Resources	
UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Local Time (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Day	Time Zone Pull Dn	A Value Freq Error (from 60)	A Value (t-16 to t-2) average	B Value (t+20 to t+52) average	Hz Delta B-A	Point C (w/in 8 sec after t-0) delta from A_{ave}		Bias Setting MW/0.1 Hz	MW Lost Gross	MW Lost Net	Name BA	for BA List Y or N	for beta calc	Tripped Before Value B	Point C MW/0.1 Hz
07/02/2011 6:45:21	07/02/2011 2:45:21	Sat	EDT	0.004	60.004	59.956	-0.048	59.969	-0.035	6349		-975	EES				-2024
07/02/2011 14:57:18	07/02/2011 10:57:18	Sat	EDT	-0.003	59.997	59.967	-0.031	59.958	-0.039	6349		-496	TVA				-1600
07/16/2011 7:07:00	07/16/2011 3:07:00	Sat	EDT	-0.007	59.993	59.948	-0.045	59.952	-0.041	6349		-613	TVA				-1370
07/21/2011 1:28:03	07/20/2011 21:28:03	Wed	EDT	0.009	60.009	59.967	-0.042	59.968	-0.041	6349		-902	TVA				-2167
07/25/2011 18:39:08	07/25/2011 14:39:08	Mon	EDT	0.019	60.019	59.989	-0.030	59.978	-0.041	6349		-985	PJM				-3242
07/28/2011 18:47:52	07/28/2011 14:47:52	Thu	EDT	-0.004	59.996	59.946	-0.050	59.947	-0.049	6349		-1242	PJM				-2486
07/30/2011 13:41:21	07/30/2011 9:41:21	Sat	EDT	-0.013	59.987	59.945	-0.042	59.947	-0.040	6349		-1386	PJM				-3337

Western Interconnection

Event Time					Event Frequency Data						Interconnection	Resource Information			Candidate	Candidate	Load Resources	
Event ID	Event #	UTC (t-0) (MM/DD/YY HH:MM:SS)	Local Time (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Day	Time Zone Pull Dn	A Value Freq Error (from 60)	A Value (t-16 to t-2) average	B Value (t+20 to t+52) average	Hz Delta B-A	Point C (w/in 8 sec after t-0) delta from A_{ave}		Bias Setting MW/0.1 Hz	MW Lost Gross	MW Lost Net	Name BA	for BA List Y or N	for beta calc	Tripped Before Value B	Point C MW/0.1 Hz
		07/03/2011 7:17:08	07/03/2011 0:17:08	Sun	PDT	-0.025	59.975	59.929	-0.046	59.901	-0.074	2024		-255	CISO				-526
		07/11/2011 4:17:33	07/10/2011 21:17:33	Sun	PDT	0.005	60.005	59.952	-0.052	59.911	-0.094	2024		-267	SRP				-496
		07/15/2011 2:46:41	07/14/2011 19:46:41	Thu	PDT	-0.035	59.965	59.928	-0.037	59.873	-0.092	2024		-264	BCHA				-706
		07/30/2011 9:17:34	07/30/2011 2:17:34	Sat	PDT	-0.007	59.993	59.937	-0.056	59.907	-0.086	2024		-426	NWMT				-763

ERCOT Interconnection

Event Time					Event Frequency Data						Interconnection	Resource Information			Candidate	Candidate	Load Resources	
Event ID	Event #	UTC (t-0) (MM/DD/YY HH:MM:SS)	Local Time (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Day	Time Zone Pull Dn	A Value Freq Error (from 60)	A Value (t-16 to t-2) average	B Value (t+20 to t+52) average	Hz Delta B-A	Point C (w/in 8 sec after t-0) delta from A_{ave}		Bias Setting MW/0.1 Hz	MW Lost Gross	MW Lost Net	Name BA	for BA List Y or N	for beta calc	Tripped Before Value B	Point C MW/0.1 Hz
		07/14/2011 20:53:55	07/14/2011 15:53:55	Thu	CDT	0.023	60.023	59.923	-0.100	59.917	-0.106	653		-259	ERCOT				-259
		07/17/2011 15:18:00	07/17/2011 10:18:00	Sun	CDT	-0.005	59.995	59.894	-0.101	59.879	-0.115	653		-144	ERCOT				-143
		07/18/2011 14:13:00	07/18/2011 9:13:00	Mon	CDT	-0.042	59.958	59.863	-0.094	59.879	-0.079	653		-127	ERCOT				-134
		07/21/2011 0:17:10	07/20/2011 19:17:10	Wed	CDT	0.006	60.006	59.811	-0.194	59.799	-0.206	653		-892	ERCOT				-459
		07/24/2011 16:59:24	07/24/2011 11:59:24	Sun	CDT	-0.025	59.975	59.872	-0.102	59.846	-0.128	653		-167	ERCOT				-163
		07/25/2011 22:57:12	07/25/2011 17:57:12	Mon	CDT	0.013	60.013	59.929	-0.084	59.918	-0.095	653		-306	ERCOT				-363

Hydro Quebec

Event Time					Event Frequency Data						Interconnection	Resource Information			Candidate	Candidate	Load Resources	
Event ID	Event #	UTC (t-0) (MM/DD/YY HH:MM:SS)	Local Time (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Day	Time Zone Pull Dn	A Value Freq Error (from 60)	A Value (t-16 to t-2) average	B Value (t+20 to t+52) average	Hz Delta B-A	Point C (w/in 8 sec after t-0) delta from A_{ave}		Bias Setting MW/0.1 Hz	MW Lost Gross	MW Lost Net	Name BA	for BA List Y or N	for beta calc	Tripped Before Value B	Point C MW/0.1 Hz
		07/29/2011 2:23:18	07/28/2011 22:23:18	Thu	EDT	0.006	60.006	59.879	-0.127	59.508	-0.498	420		-707	HQ				-559
		07/29/2011 2:23:26	07/28/2011 22:23:26	Thu	EDT	-0.178	59.822	59.891	0.069	59.874	0.052	420		588	HQ				-848
		07/29/2011 5:06:20	07/29/2011 1:06:20	Fri	EDT	-0.030	59.970	60.033	0.064	60.146	0.176	420		329	HQ				-517
		07/30/2011 8:06:58	07/30/2011 4:06:58	Sat	EDT	-0.025	59.975	60.022	0.047	60.109	0.134	420		113	HQ				-239
		07/31/2011 19:32:24	07/31/2011 15:32:24	Sun	EDT	-0.003	59.997	60.081	0.085	60.402	0.405	420		447	HQ				-527

Appendix F – Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard (BAL-003-1)

Event Selection Process

This procedure outlines the ERO process for supporting the Frequency Response Standard (FRS). A procedure revision request may be submitted to the ERO for consideration. The revision request must provide a technical justification for the suggested modification. The ERO will post the suggested modification for a 45-day comment period and discuss the revision request in a public meeting. The ERO will make a recommendation to the NERC BOT, which may adopt the revision request, adopt it with modifications, or reject it. Any approved revision to this procedure will be filed with FERC for informational purposes.

Event Selection Objectives

The goals of this procedure are to outline a transparent, repeatable process to annually identify a list of frequency events to be used by Balancing Authorities (BA) to calculate their Frequency Response to determine:

- whether the BA met its Frequency Response Obligation; and
- an appropriate fixed bias setting.

Event Selection Criteria

1. The ERO will use the following criteria to select FRS frequency excursion events for analysis. The events that best fit the criteria will be used to support the FRS. The evaluation period for performing the annual Frequency Bias Setting and the Frequency Response Measure (FRM) calculation is December 1 of the prior year through November 30 of the current year.
2. The ERO will identify 20–35 frequency excursion events in each interconnection for calculating the Frequency Bias Setting and the FRM. If the ERO cannot identify 20 frequency excursion events in a 12-month evaluation period satisfying the criteria below, then similar acceptable events from the subsequent year's evaluation period will be included with the data set by the ERO for determining FRS compliance.
3. The ERO will use three criteria to determine if an acceptable frequency excursion event for the FRM has occurred:
    a. The change in frequency as defined by the difference from the A Value to Point C and the arrested frequency Point C exceeds the excursion threshold values specified for the interconnection in Table F1 below.
        i. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline.

ii. Point C is the arrested value of frequency observed within 12 seconds following the start of the excursion.

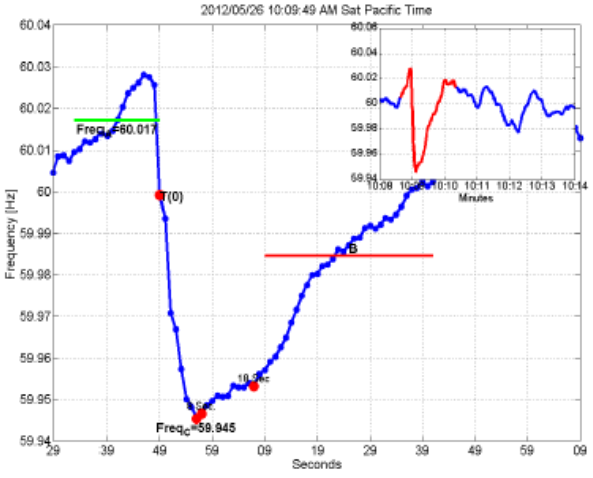
Table F1: Interconnection Frequency Excursion Threshold Values (Hz)

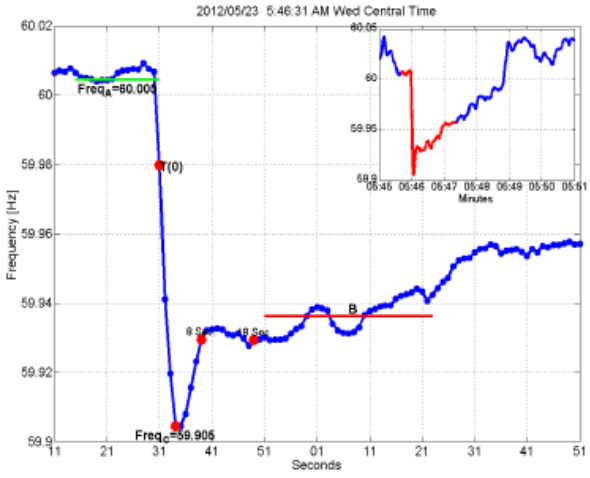
Interconnection	A Value to Pt C	Point C (Low)	Point C (High)
Eastern	0.04	< 59.96	> 60.04
Western	0.07	< 59.95	> 60.05
ERCOT	0.15	< 59.90	> 60.10
Québec	0.30	< 59.85	> 60.15

b. The time from the start of the rapid change in frequency until the point at which frequency has stabilized within a narrow range should be less than 18 seconds.

c. If any data point in the B Value average recovers to the A Value, the event will not be included.

4. Pre-disturbance frequency should be relatively steady and near 60.000 Hz for the A Value. The A Value is computed as an average over the period from -16 seconds to 0 seconds before the frequency transient begins to decline. For example, given the choice of the two events below, the one on the right is preferred as the pre-disturbance frequency is stable and also closer to 60 Hz.





5. Excursions that include two or more events that do not stabilize within 18 seconds will not be considered.

6. Frequency excursion events occurring during periods when large interchange schedule ramping or load change is happening, and frequency excursion events occurring within 5

minutes of the top of the hour, will be excluded from consideration if other acceptable frequency excursion events from the same quarter are available.

7. The ERO will select the largest (A Value to Point C) two or three frequency excursion events occurring each month. If there are not two frequency excursion events that satisfy the selection criteria in a month, then other frequency excursion events should be picked in the following order of priority:
    1) from the same event quarter of the year
    2) from an adjacent month
    3) from a similar load season in the year (shoulder vs. summer/winter)
    4) the largest unused event

As noted earlier, if a total of 20 events are not available in an evaluation year, then similar acceptable events from the next year's evaluation period will be included with the data set by the ERO for determining FRO compliance. The first year's small set of data will be reported and used for Bias Setting purposes, but compliance evaluation on the FRO will be done using a 24 month data set.

To assist Balancing Authority preparation for complying with this standard, the ERO will provide quarterly posting of candidate frequency excursion events for the current year FRM calculation. The ERO will post the final list of frequency excursion events used for standard compliance as specified in Attachment A of BAL-003-1. The following is a general description of the process that the ERO will use to ensure that BAs can evaluate events during the year in order to monitor their performance throughout the year.

Monthly

Candidate events will be initially screened by the "Frequency Event Detection Methodology" shown on the following link located on the NERC Resources Subcommittee area of the NERC website:
http://www.nerc.com/docs/oc/rs/Frequency_Event_Detection_Methodology_and_Criteria_Oct_2011.pdf.

Each month's list will be posted by the end of the following month on the NERC website, http://www.nerc.com/filez/rs.html and listed under "Candidate Frequency Events."

Quarterly

The monthly event lists will be reviewed quarterly with the quarters defined as:

- December through February
- March through May
- June through August
- September through November

Based on criteria established in the "Procedure for ERO Support of Frequency Response and Frequency Bias Setting Standard," events will be selected to populate the FRS Form 1 for each interconnection. Each interconnection's Form 1 will be posted on the NERC website, in the Resources Subcommittee area under the title "Frequency Response Standard Resources." The updated Form 1 documents will be posted at the end of each quarter listed above after a review by the NERC RS Frequency Working Group. While the events on this list are expected to be final, as outlined in the selection criteria, additional events may be considered, if the number of events throughout the year do not create a list of at least 20 events. It is intended that this quarterly posting of updates to the FRS Form 1 would allow BAs to evaluate the events throughout the year, lessening the burden when the yearly posting is made.

Annually

The final FRS Form 1 for each interconnection, which will contain the events from all four quarters listed above, will be posted as specified in Attachment A. Each Balancing Authority reports its previous year's Frequency Response Measure (FRM), Frequency Bias Setting and Frequency Bias type (fixed or variable) to the ERO as specified in Attachment A using the final FRS Form 1. The ERO will error check and use the FRS Form 1 data to calculate CPS limits and FROs for the upcoming year.

Once the data listed above is fully reviewed, the ERO may adjust the implementation specified in Attachment A for changing the Frequency Bias Settings and CPS limits. This allows flexibility in when each BA implements its settings.

Appendix G – Statistical Analysis of Frequency Response (Eastern Interconnection)

Statistical Analysis of Frequency Response

Eastern Interconnection August 7, 2012

Introduction

An interconnected electric power system is a complex system that must be operated within a safe frequency range to reliably maintain the instantaneous balance between generation and load, and is directly reflected in the frequency of the interconnection. Frequency Response is one measurement of how a power system has performed in response to the sudden loss of generation or load. This white paper analyzes the Frequency Response data for the Eastern Interconnection using statistical methods to study the probability distribution of the Frequency Response and its changes from year-to-year, as well as construct a set of variables that strongly influence Frequency Response.

Objectives and Method

The main goals of the statistical analysis of the Frequency Response data for the Eastern Interconnection are to study the:

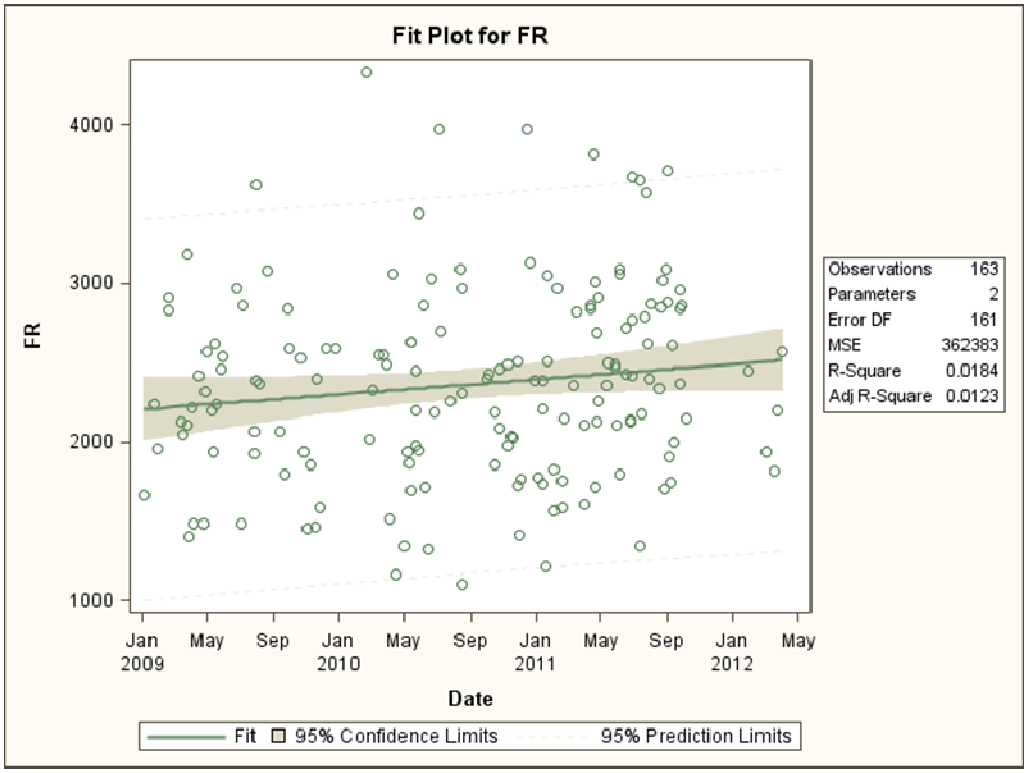
1. time trend of Frequency Response by selecting an appropriate model describing the relationship between a point in time when an event happens and the absolute value of Frequency Response for this event, and to use this model for Frequency Response forecasting with a given confidence level;
2. probability distribution of the Frequency Response and its changes over the years;
3. seasonal changes in Frequency Response distribution and correlation between Frequency Response value and season when the event happened (summer/non-summer);
4. impact of pre-disturbance frequency on Frequency Response;
5. impact of on-peak/off-peak hours on Frequency Response;
6. impact of interconnection load on Frequency Response; and
7. hierarchy of these explanatory factors of Frequency Response.

The analysis uses the Frequency Response dataset for the Eastern Interconnection for the calendar years 2009-2011 and the first three months of 2012. The size of this dataset is 163 frequency events (with 44 observations for the year of 2009, 49 for 2010, 65 for 2011, and 5 for 2012). Since interconnection load data are not yet available for 2012, the part of the study involving interconnection load deals with the 158 Frequency Response events occurred in 2009-2011. For purposes of this whitepaper, Frequency Response pertains to the absolute value of Frequency Response.

Key Findings

1. A linear regression equation with the parameters defined in the Appendix of this whitepaper is an adequate statistical model to describe a relationship between time (predictor) and Frequency Response (response variable). The graph of the linear regression line and Frequency Response scatter plot is given in Figure G1. For the dataset, the regression line has a small positive slope estimate, meaning that the Frequency Response variable has a slowly increasing general trend in time. The value of the slope estimate is 0.00000303805 (the time unit is a second). This means that, on average, Frequency Response increases daily by 0.26 MW/0.1Hz, monthly by 7.87 MW/0.1 Hz, and annually by 95.81 MW/ 0.1Hz (for a month with 30 days , and a year with 365 days). A 90% confidence interval for slope, CI=[-0.00000041605, 0.00000649214], has a negative left-end point (the same is true for a 95% CI and a 99% CI). With new data available the trend line can (a) increase its positive slope, (b) change the positive slope to a slight negative one, or (c) become essentially flat that will correspond to an absence of a correlation between time and Frequency Response.

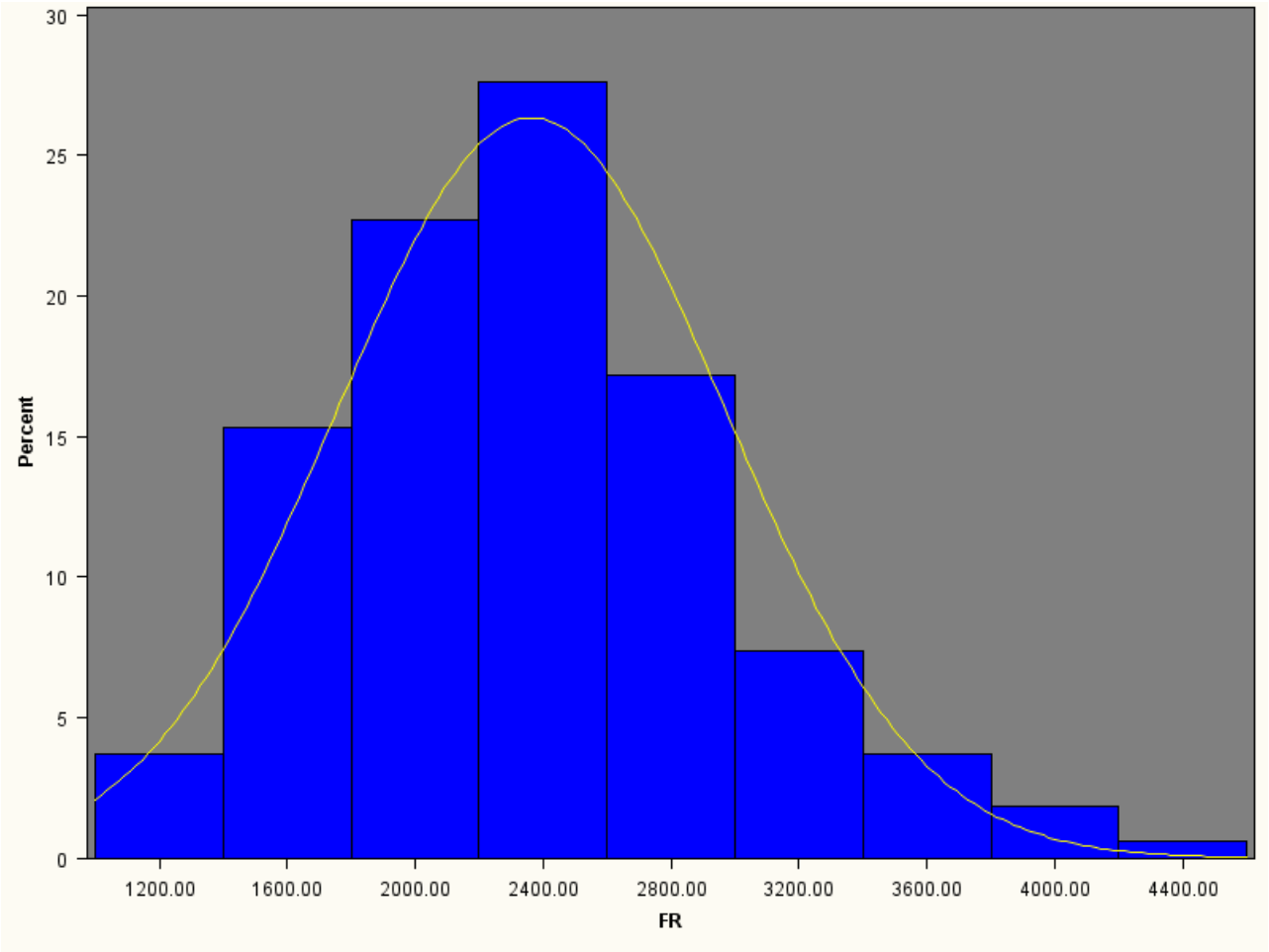
Figure G1: Frequency Response Scatter Plot



2. The probability distribution of the whole Frequency Response dataset is approximately normal with the expected Frequency Response of 2363 MW/0.1 Hz and the standard deviation of 605.7 MW/0.1 Hz as shown in Figure G2. The comparative statistical analysis for every pair of years shows that the changes in the 2010 data versus the 2009 data (and in the 2011 data versus the 2010 data) are not statistically significant enough to lead to the conclusion that the mean value of Frequency Response for any two consecutive years changes. However, the data for 2009 and 2011 differ at the level that results in accepting

the hypothesis that the expected value of Frequency Response for 2011 is greater than for 2009.

Figure G2: Probability Distribution of the Entire Frequency Response Data Set



3. A season (summer/non-summer) is a significant contributor to the variability of Frequency Response. There is a positive correlation of 0.24 between the indicator function for summer (defined as 1 for events that occur in June–August and 0 otherwise) and Frequency Response: summer events have a statistically significantly greater expected Frequency Response (the sample mean equals to 2598MW/0.1 Hz) than non-summer events (the mean equals to 2271 MW/0.1 Hz).

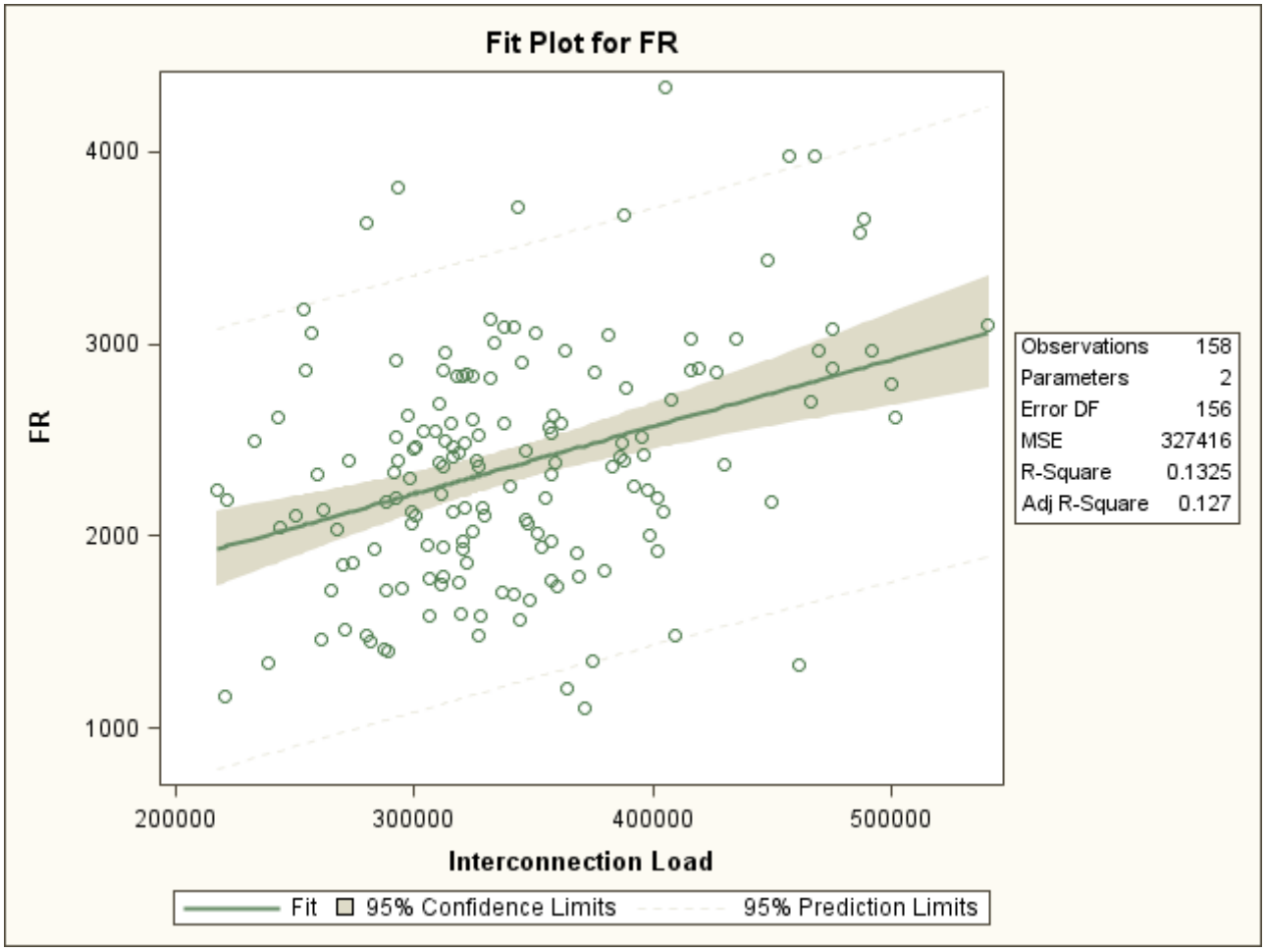
4. Pre-disturbance (average) frequency (A) is another significant contributor to the variability of Frequency Response. There is a negative correlation of -0.27 between the indicator function of A>60 Hz and Frequency Response: the events with A>60 Hz have a statistically significantly smaller expected Frequency Response (the sample mean equals to 2188 MW/0.1 Hz) than the events with A≤60 Hz (the mean equals to 2513 MW/0.1 Hz).

5. According the NERC definition, for Eastern Interconnection on-peak hours are designated as follows: Monday to Saturday hours from 0700 to 2200 (Central Time) excluding six holidays (New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day). It turns out that on-peak/off-peak variable is not a statistically significant

contributor to the variability of Frequency Response. There is a positive correlation of 0.06 between the indicator function of on-peak hours and Frequency Response; however, difference in average Frequency Response between on-peak events and off-peak events is not statistically significant and could occur by chance (P-value is 0.49).

6. There is a strong positive correlation of 0.364 between interconnection load and Frequency Response for the 2009-2011 events; this correlation indicates to a statistically significant linear relationship between interconnection load (predictor) and Frequency Response (response variable). The graph of the linear regression line and Frequency Response scatter plot is given in Figure G3. For the dataset, the regression line has a positive slope estimate of 0.00349; thus, the Frequency Response variable increases when interconnection load grows. On average, when interconnection load changes by 1000 MW, Frequency Response changes by 3.5 MW/0.1Hz.

Figure G3: Linear Regression for Frequency Response and Interconnection Load



7. For the 2009–2011 dataset, five variables (time, summer, high pre-disturbance frequency, on-peak/off-peak hour, interconnection load) have been involved in the statistical analysis of Frequency Response. Four of these (time, summer, on-peak hours, and interconnection load) have a positive correlation with Frequency Response (0.16, 0.24, 0.06, and 0.36,

respectively), and the high pre-disturbance frequency has a negative correlation with Frequency Response (-0.26). The corresponding coefficients of determination R^2 are 2.6%, 5.8%, 0.4%, 13.3% and 6.9%. These values indicate that about 2.6% in variability of Frequency Response can be explained by the changes in time, about 5.8% of Frequency Response variability is seasonal, 0.4% is due to on-peak/off-peak changes, 13.3% is the effect of the interconnection load variability, and about 6.9% can be accounted for by a high pre-disturbance frequency. However, the correlation between Frequency Response and On-Peak hours is not statistically significant and with the probability about 0.44 occurred by mere chance (the same holds true for the corresponding R^2). Therefore, out of the five parameters, interconnection load has the biggest impact on Frequency Response followed by the indicator of high pre-disturbance frequency. A multivariate regression with interconnection load and A>60 as the explanatory variables for Frequency Response yields a linear model with the best fit (it has the smallest mean square error among the linear models with any other set of explanatory variables selected from the five studied). Still, together these two factors can account for about 20% in variability of Frequency Response. Therefore, there are other parameters that affect Frequency Response, have a low correlation with those studied, together account for a remaining share in Frequency Response variability, and minimize a random error variance. Note that interconnection load is positively correlated with summer (0.55), on-peak hours (0.45), and Date (0.20) but uncorrelated with A>60 (P-value of the test on zero correlation is 0.90).

Explanatory Variables for EI Frequency Response (2009-2011)

Variable X	Sample Correlation (X,FR)	P-value	Linear Regression Statistically Significant?	Coefficient of Determination R^2 (Single Regression)
Interconnection Load	0.36	<0.0001	Yes	13.3%
A>60	-0.26	0.0008	Yes	6.9%
Summer	0.24	0.0023	Yes	5.8%
Date	0.16	0.044	Yes	2.6%
On-Peak Hours	0.06	0.438	No	N/A

Appendix – Background Materials

Frequency Response is a metric used to track and monitor Interconnection Frequency Response. Frequency Response[2] is a measure of an interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load. It is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. The metric measures the average Frequency Response for all events where frequency drops more than the interconnection's defined threshold as shown in Table 1.

Frequency Response Definition

For a given interconnection, Frequency Response is defined as the sum of the change in demand, plus the change in generation, divided by the change in frequency, expressed in megawatts per 0.1 hertz (MW/0.1 Hz).

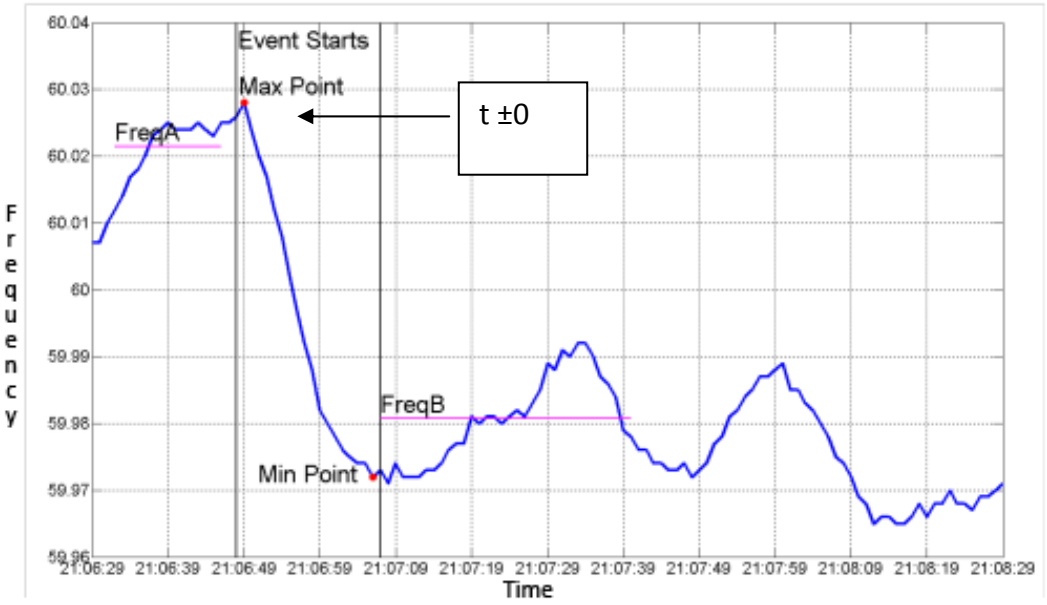
Table 1: Frequency Event Triggers for Data Collection

Interconnection	ΔFrequency (mHz)	MW Loss Threshold	Rolling Windows (seconds)
Eastern	40	800	15
Western	70	700	15
ERCOT	90	450	15
Québec	300	450	15

The change in frequency is the difference between pre-disturbance frequencies A and setting frequency B. Figure 3 shows the criteria for calculating average values A and B. The event starts at time t ±0. Value A is the average from t -16 to t -2 and Value B is the average from t +20 to t +52. These lengths of time used to calculate these values accounts for the variability in Supervisory Control and Data Acquisition (SCADA) scan rates that vary from 2 to 6 seconds in the multiple-Balancing Authority interconnections. For Balancing Authority SCADA data, t ±0 represents the first scan of data that is part of the disturbance. Value A is the average of all SCADA scans between 2 and 16 seconds before t ±0. Value B is the average of all SCADA scans between 20 and 52 seconds after t ±0.

[2] Frequency Response is in fact a negative value. However to reduce confusion for the reader, Frequency Response is expressed in this report as positive values (the absolute value of the actual calculated value).

Figure 3: Criteria for Calculating Value A and Value B



The actual MW loss for the flagged frequency events is determined jointly by NERC and Regional Entity situation awareness staff. Both the change in frequency and the MW loss determine whether the event qualifies for further consideration in the monthly frequency event candidate list.

Statistical Analysis

Linear Regression for Time Trend

Assumptions: Frequency Response and time are related by the following regression equation:

$$FR = A * Time + B + \varepsilon$$

Where:

- $Time$ variable represents a time (year, month, day, hour, minute, second) when a Frequency Response event happened. For each event the Frequency Response is calculated and recorded. This record represents an observation from the dataset. Time is an explanatory variable (predictor, regressor) of the linear regression;
- FR is the Frequency Response value measured in MW/0.1 Hz (response variable of the model);
- A is a slope of the regression line;
- B is an intercept of the regression line; and
- ε is a random error which has a centered normal distribution with variance σ^2.

A SAS program for the linear regression analysis yields the following results shown in figure G3.

(a) The equation of the regression line derived by the least squares method is $y = 0.00000304x - 2493.41315$ with $x = Time(\text{sec})$ elapsed between midnight of January 1, 1960 (the time origin for the date format in SAS) and the time of a FR event;
(b) Estimate for the variance σ^2 of the random error ε is 362,383 and for the standard deviation of ε is 601.98255;
(c) Statistical test for significance of the regression (based on the analysis of variance approach) is an important part of assessing the adequacy of the linear regression model for time and FR variables. The procedure tests a null-hypothesis that the slope A = 0 versus an alternative hypothesis that it is not 0. Sample value of F-statistic, 3.0170, has P-value of 0.0843 implying that the null hypothesis should be rejected (and the alternative hypothesis accepted) at any significance level above 0.0843. Therefore, the data are statistically significant to support a hypothesis about a linear relationship between time and Frequency Response assuming that the 8.43% significance level (i.e., the probability to reject the null hypothesis when it is true) is appropriate for the model selection. Alternatively, the hypothesis about the correlation coefficient ρ(time, FR) can be tested (with the null hypothesis ρ=0). These tests are equivalent and result in the same P-values for their test statistics.

Another important part of the verification of the linear regression model is testing the assumptions on the random error ε. Student's t-test on location and goodness-of-fit test for normality both result in acceptance the corresponding null-hypothesis (with P-values of 1.0000 and 0.881, respectively).

The linear regression equation with the parameters defined above is an adequate statistical model to describe the relationship between variables time of a FR event and Frequency Response value for this event. For the dataset, the regression line has a small positive slope estimate, meaning that Frequency Response variable has a slowly increasing general trend in time. However, the value of this slope estimate is very small, and confidence intervals for slope at 90%, 95% and 99% levels all have a negative left-end point. By using T-distribution for the slope estimator, we estimate that the probability that the slope of the regression is negative is below 5%.

The coefficient of determination R^2 for the linear regression model equals to 0.0184. This small value indicates very low degree of dependence of Frequency Response on time variable. Essentially, the linear regression model connecting FR and time accounts for 1.8% of variability in the Frequency Response data.

The random error ε has a large estimated variance that makes the "error" term of the linear regression equation a major component of the Frequency Response value. Our next goal is to consider the Frequency Response data as observations of a random variable independent of time and to study properties of its distribution.

Distribution of Frequency Response

Goodness-of-Fit test for normality of the distribution of the Frequency Response data results in acceptance on the null hypothesis at a significance level below 0.177 (including the standard levels of 1%, 5% and 10%). The sample estimate for the expected Frequency Response equals to 2363 MW/0.1 Hz and the sample standard deviation is 605.7 MW/0.1 Hz.

Since for each full year (2009, 2010, and 2011) the sample size of the Frequency Response data exceeds 40, we ran a large-sample test for the difference in the mean Frequency Response for 2009 versus 2010, 2010 versus 2011, and 2009 versus 2011. The null hypothesis that the difference is zero is accepted when the 2009 data are compared to the 2010 data, and when the 2010 data are compared to the 2011 data at any standard significance level (P-values of the two-sided tests are 0.54 and 0.28, respectively). For the 2009 versus 2011 comparison, the test result is not that conclusive (its P-value equals to 0.03 and, therefore, the null hypothesis should be rejected at the 5% and 10% significance levels but is accepted at the 1% level if tested versus an alternative hypothesis that the 2011 mean value is greater than the 2009 mean value).

Seasonal Variability of Frequency Response

Let a function summer be defined as follows: it equals to 1 for Frequency Response events that occur in June-August and 0 otherwise. The FR dataset is therefore divided in two subsets: the Frequency Response data for summer events and non-summer events, respectively. Summer Frequency Response set has 46 observations and non-summer set has 117 observations. The sample mean and the sample variance for the first dataset are 2597.7 MW/0.1 Hz and 675.5 MW/0.1 Hz, respectively. The sample mean and the sample variance for the second dataset are 2270.9 MW/0.1 Hz and 552.2 MW/0.1 Hz. A large-sample test for the difference in the mean Frequency Response for these distributions results in rejection of the null hypothesis that the difference is zero and acceptance of an alternative hypothesis that the expected Frequency Response for summer events is greater than for other events (P-value of the one-sided z-test is 0.0018).

Variables summer and Frequency Response are positively correlated (with the correlation equal to 0.24351), and the coefficient of determination R^2 of the linear regression model is 0.0593. The null hypothesis about zero correlation (no linear relationship between FR and summer) should be rejected (P-value is 0.0017). This analysis indicates that seasonality is a significant factor affecting Frequency Response: almost 6% of its variability is the seasonal variability.

Impact of Pre-Disturbance Frequency

Let a function high pre-disturbance frequency be defined as follows: it equals to 1 for Frequency Response events with A>60 Hz and 0 otherwise. The FR dataset is therefore divided in two subsets: the Frequency Response data for events with A>60 Hz and events with A≤60 Hz, respectively. High pre-disturbance frequency set has 75 observations and its complement has 88 observations. The sample mean and the sample variance for the first dataset are 2187.6 MW/0.1 Hz and 531.5 MW/0.1 Hz, respectively. The sample mean and the sample variance for the second dataset are 2512.8 MW/0.1 Hz and 627.4 MW/0.1 Hz. A large-sample test for the difference in the mean Frequency Response for these distributions results in rejection of the null hypothesis that the difference is zero and acceptance of an alternative hypothesis that the

expected Frequency Response for events with A>60 Hz is smaller than for other events (P-value of the one-sided z-test is 0.0002).

Variables high pre-disturbance frequency and Frequency Response are negatively correlated (with the correlation equal to -0.26844), and the coefficient of determination R^2 of the linear regression model is 0.0721. The null hypothesis about zero correlation (no linear relationship between FR and high pre-disturbance frequency) should be rejected (P-value is 0.0005). This analysis indicates that the high pre-disturbance frequency is a factor that accounts for 7.2% of the Frequency Response variability. In fact, out of the four variables involved in this study (time, summer, high pre-disturbance frequency, on-peak/off-peak hours), it is the biggest contributor to the variability of Frequency Response.

Impact of On-Peak/Off-Peak hours

Let a function on-peak hour be defined as follows: it equals to 1 for Frequency Response events occurred during an on-peak hour and 0 otherwise. The FR dataset is therefore divided in two subsets: the Frequency Response data for on-peak hours and off-peak hours, respectively. On-peak set contains 108 observations, and off-peak set has 55 observations. The sample mean and the sample variance for the first dataset are 2386.9 MW/0.1 Hz and 602.9 MW/0.1 Hz, respectively. The sample mean and the sample variance for the second dataset are 2316.6 MW/0.1 Hz and 614.1 MW/0.1 Hz. A large-sample test for the difference in the expected Frequency Response for these distributions results in acceptance of the null hypothesis that the difference is zero and rejection of an alternative hypothesis that the expected Frequency Responses for on-peak events and off-peak events are different (P-value of the two-sided z-test is 0.49).

Variables on-peak hour and Frequency Response are positively correlated (with the correlation equal to 0.005505), and the coefficient of determination R^2 of the linear regression model is 0.0030. However, the correlation is not statistically significant since the null hypothesis about zero correlation (no linear relationship between FR and on-peak hour) should be accepted (P-value is 0.4852). The same is true for the coefficient of determination: there is a high probability that on-peak hours have no explanatory power in the Frequency Response variability. Out of the four variables involved in this study (time, summer, high pre-disturbance frequency, on-peak/off-peak hours), it is the only factor with no statistically significant impact on Frequency Response.

Linear Model that relates Frequency Response to Interconnection Load

Assumptions: Frequency Response and interconnection load are related by the following regression equation:

$$FR = C * IL + D + \varepsilon$$

Where:

- IL is the value of interconnection load (in MW) for a Frequency Response event.
- FR is the Frequency Response value measured in MW/0.1 Hz (response variable of the model);

- C is a slope of the regression line;
- D is an intercept of the regression line; and
- ε is a random error which has a zero mean and variance of σ^2.

A SAS program for the linear regression analysis yields the following results shown in figure G3.:

(a) The equation of the regression line derived by the least squares method is

$$y = 0.00349x + 1174.09949;$$

(b) Estimate for the variance σ^2 of the random error ε is 327,416 and for the standard deviation of ε is 572.2; and

(c) Statistical test for significance of the regression (based on the analysis of variance approach) is an important part of assessing the adequacy of the linear regression model for interconnection load and FR variables. The procedure tests a null-hypothesis that the slope $C = 0$ versus an alternative hypothesis that it is not 0. Sample value of F-statistic, 23.83, has P-value of 0.0001 implying that the null hypothesis should be rejected (and the alternative hypothesis accepted) at any significance level above 0.0001. Therefore, the data are statistically significant to support a hypothesis about linear relationship between interconnection load and Frequency Response. Alternatively, the hypothesis about the correlation coefficient ρ between interconnection load and Frequency Response can tested (with the null hypothesis ρ=0). These tests are equivalent and result in the same P-values for their test statistics.

The coefficient of determination R^2 for the linear regression model equals to 0.1325. This value indicates high degree of dependence of Frequency Response on interconnection load. Essentially, the linear regression model connecting FR and interconnection load accounts for about 13.3% of variability in the Frequency Response data.

Multiple Linear Regression

A statistically significant linear regression model connects interconnection load and high pre-disturbance frequency (regressors) and Frequency Response (response variable). The estimates of the linear regression coefficients are listed in the Table 2 (P-value of the model is below 0.0001). An error term, ε, has a zero mean and the standard deviation of 551 MW/0.1 Hz. This multiple regression model accounts for 19.96% of the variability in Frequency Response data.

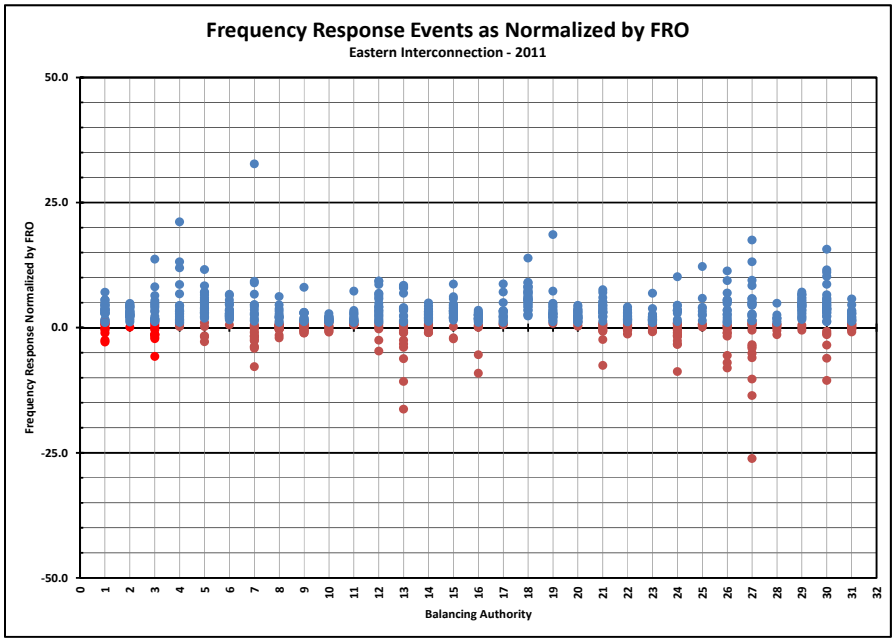
Table 2: Parameter Estimates of Multiple Regression

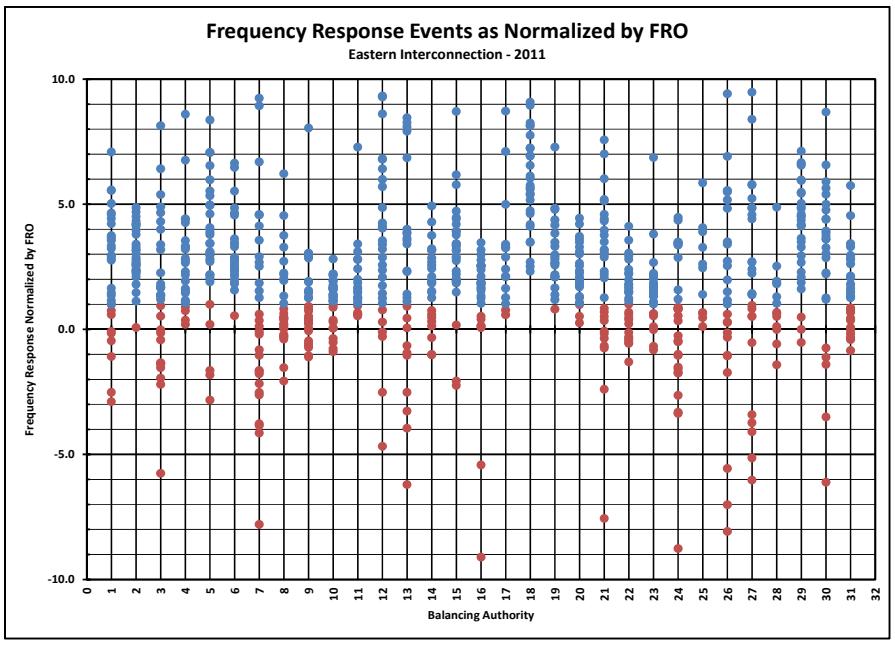
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1325.96255	243.49079	5.45	<.0001
A>60	1	-317.95091	88.191	-3.61	0.0004
Interconnection Load	1	0.00347	0.00068929	5.03	<.0001

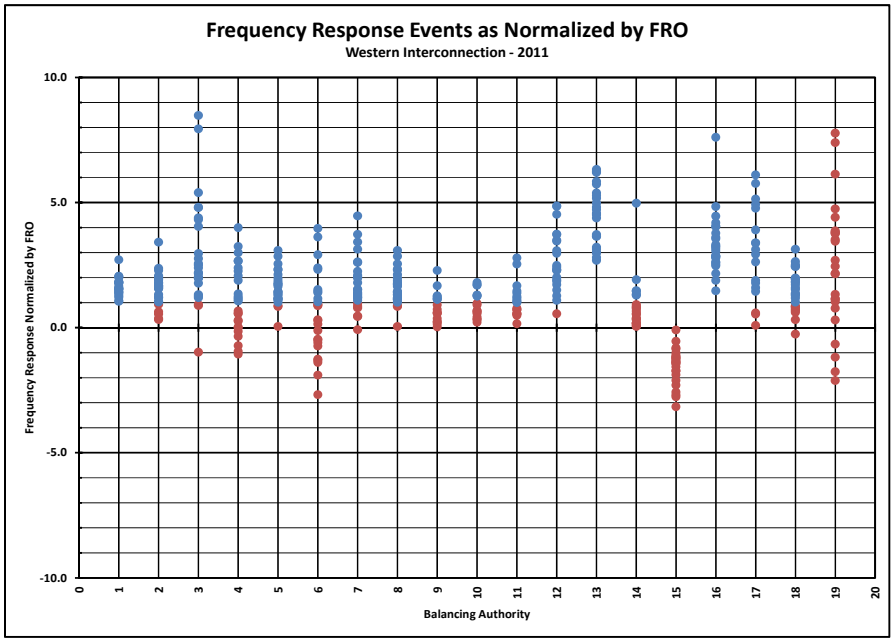
Note that even though time and summer both have a statistically significant positive correlation with Frequency Response, adding one or both of them to the set of explanatory variables does not improve the linear model. This can be explained by a high correlation between interconnection load and summer (0.55) and time (0.20), respectively: addition of these variables does not increase the explanatory power of the model enough to offset an increase of its cumulative error.

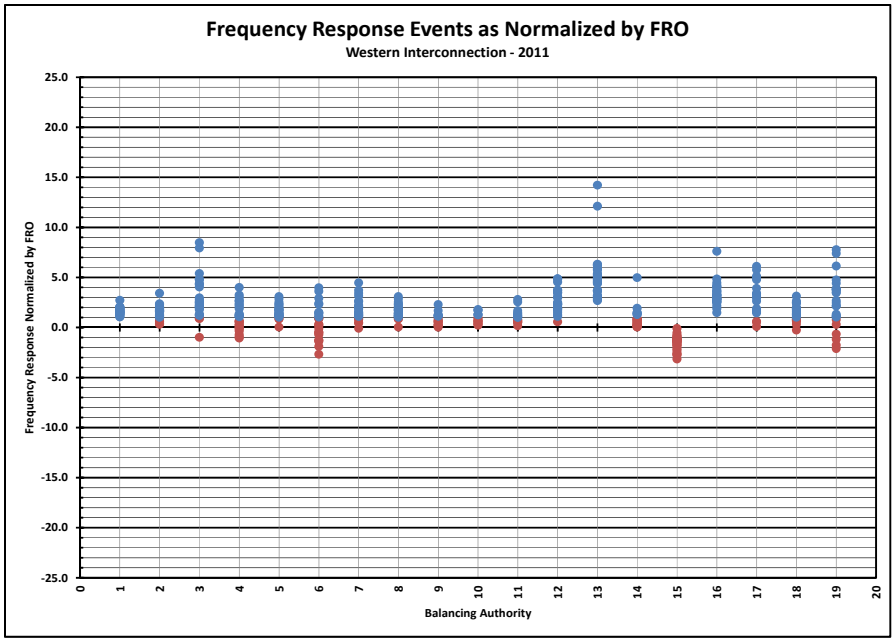
Appendix H – Frequency Response Field Trial Analysis Graphs

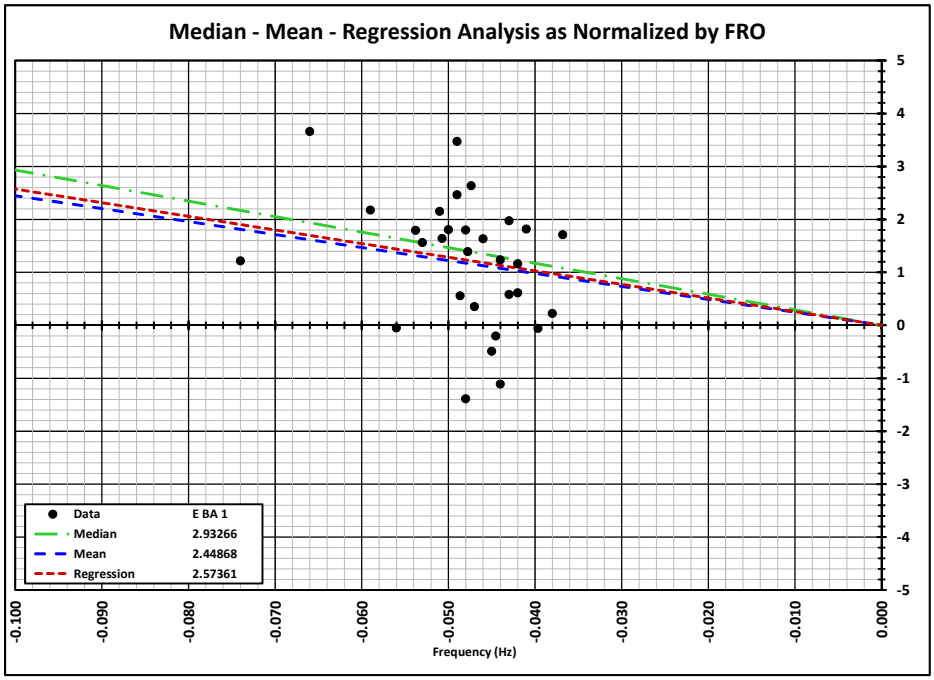
NOTE: These are the background graphics of the Frequency Response Field Trial Analysis of BA performance measurements.

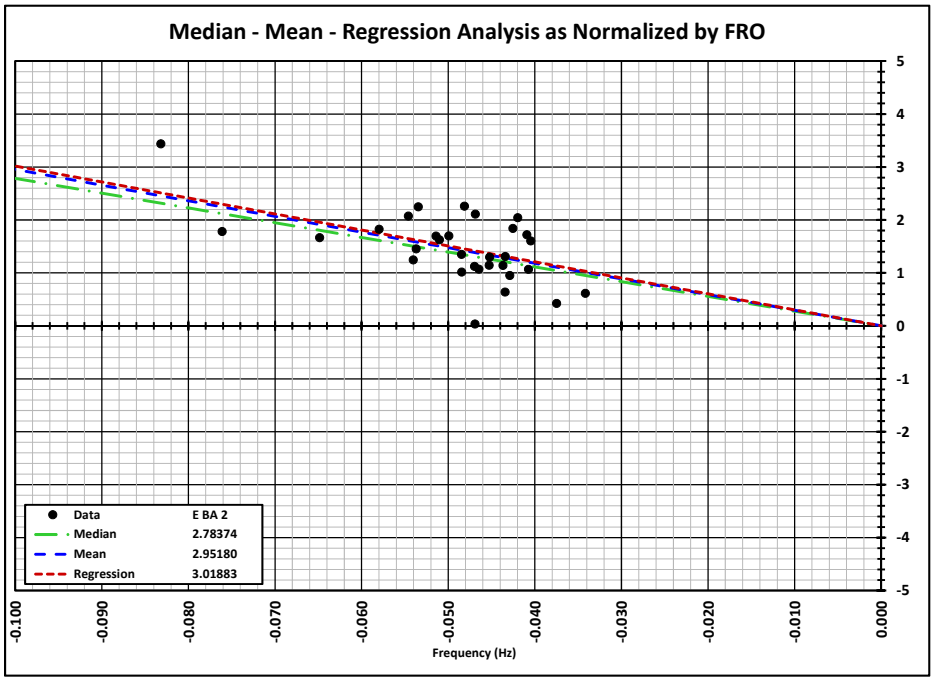


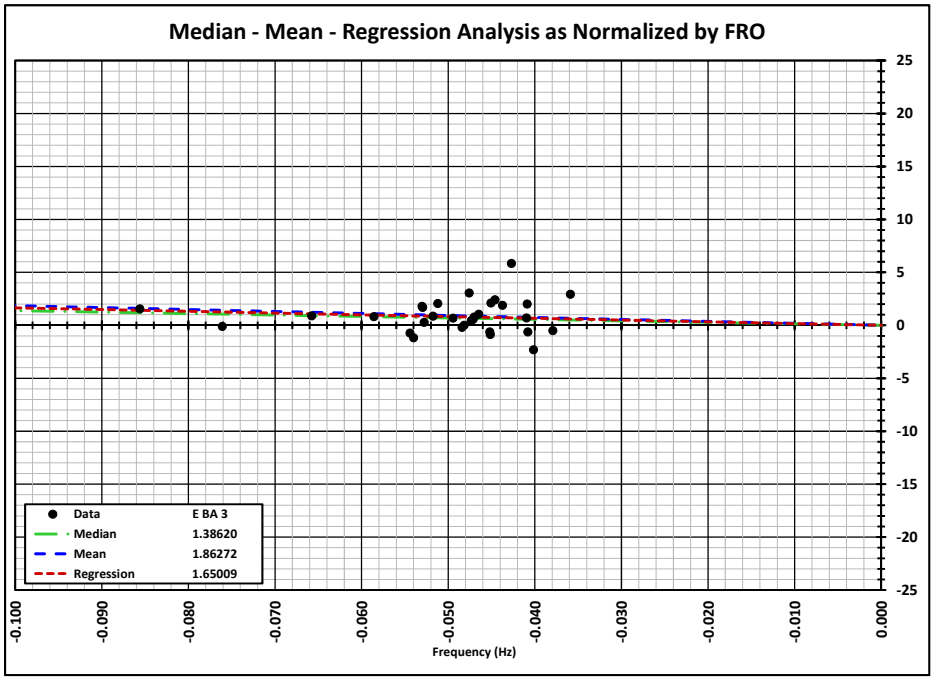


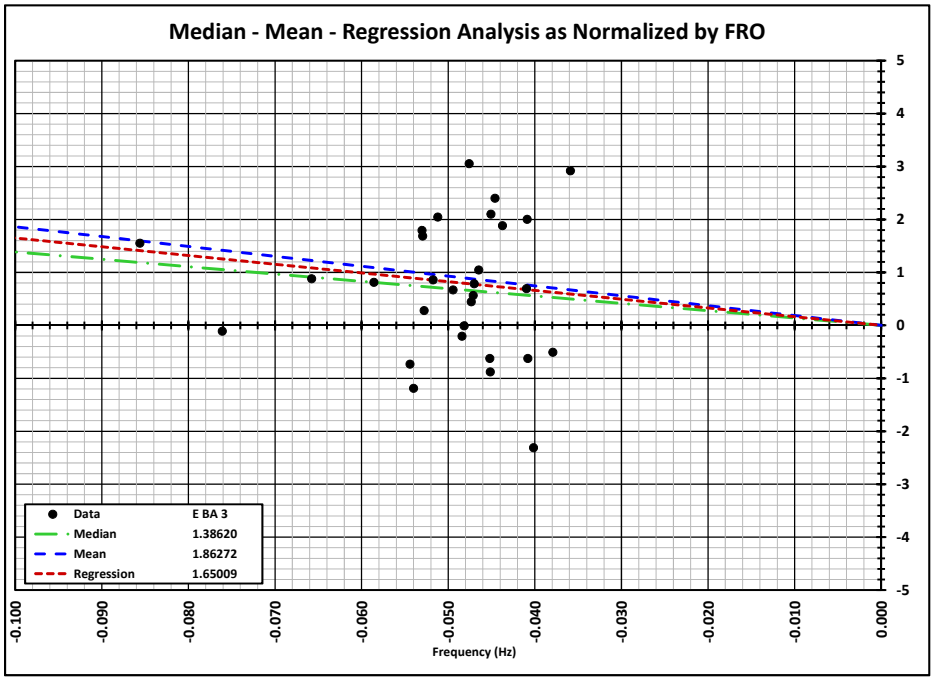

Frequency Response Events as Normalized by FRO
Western Interconnection - 2011
Frequency Response Normalized by FRO
10.0
5.0
0.0
-5.0
-10.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Balancing Authority

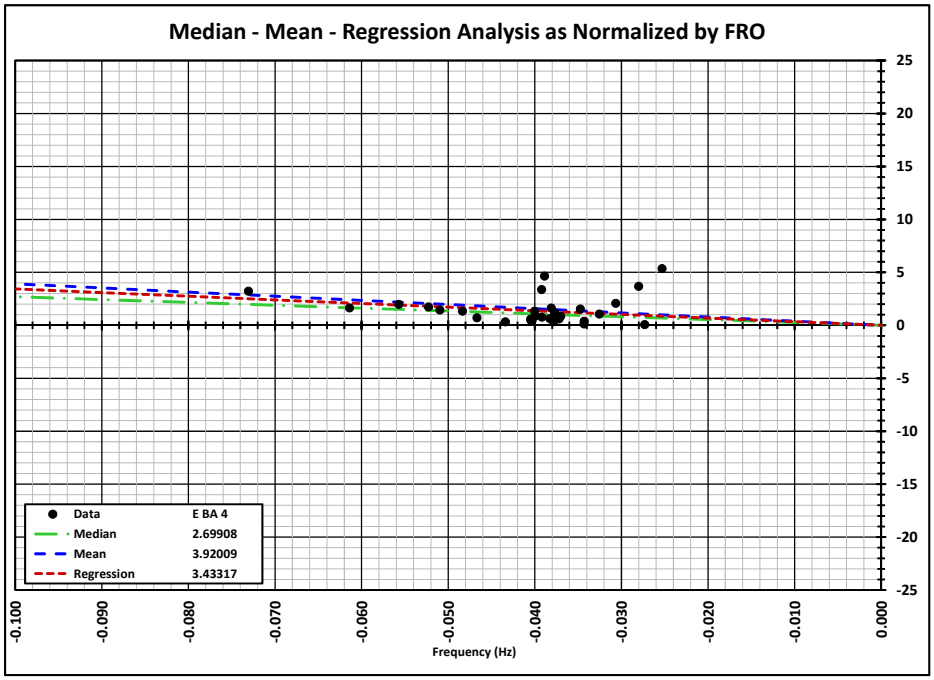

Frequency Response Events as Normalized by FRO
Western Interconnection - 2011
Frequency Response Normalized by FRO
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Balancing Authority

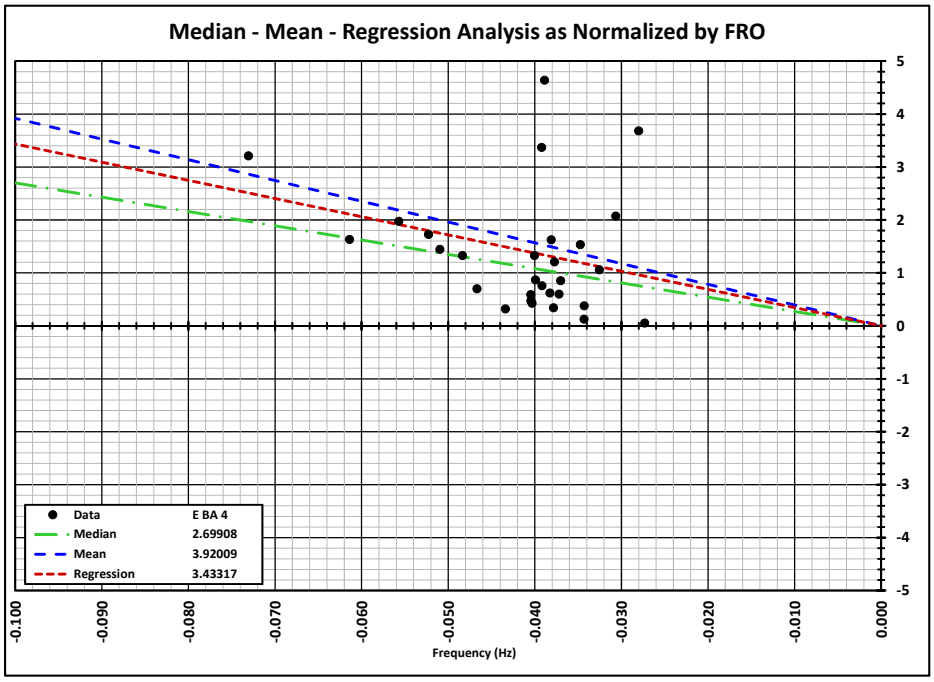

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 1
Median 2.93266
Mean 2.44868
Regression 2.57361
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

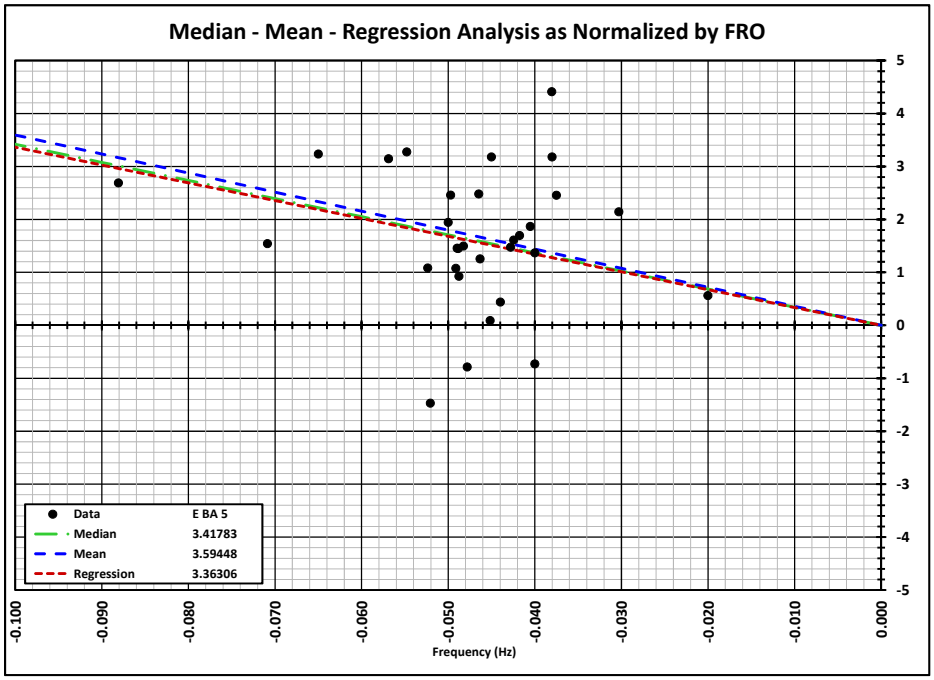

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 2
Median 2.78374
Mean 2.95180
Regression 3.01883
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

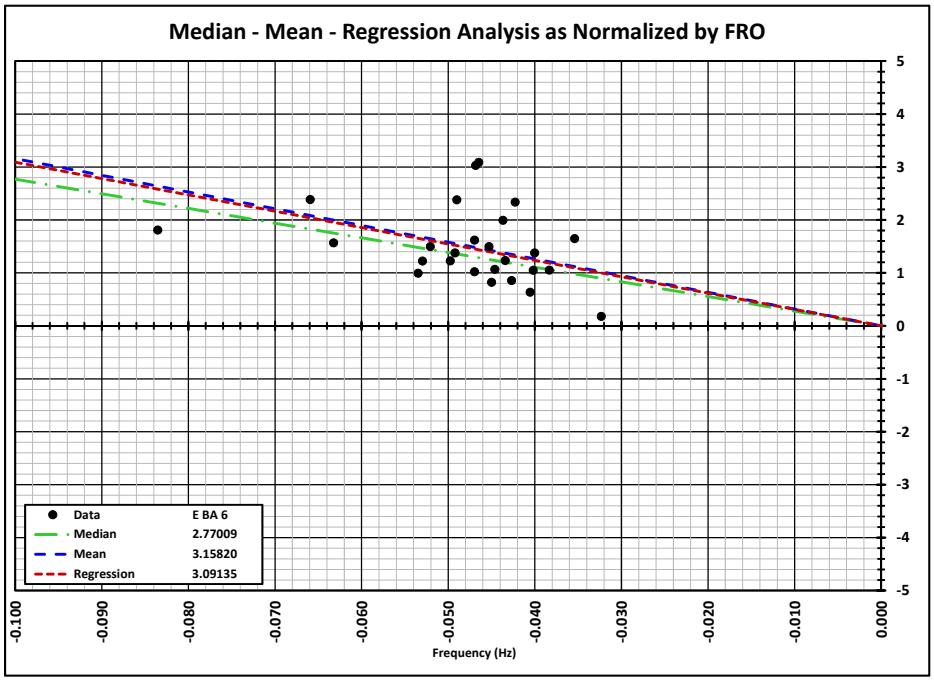

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 3
Median 1.38620
Mean 1.86272
Regression 1.65009
Frequency (Hz)

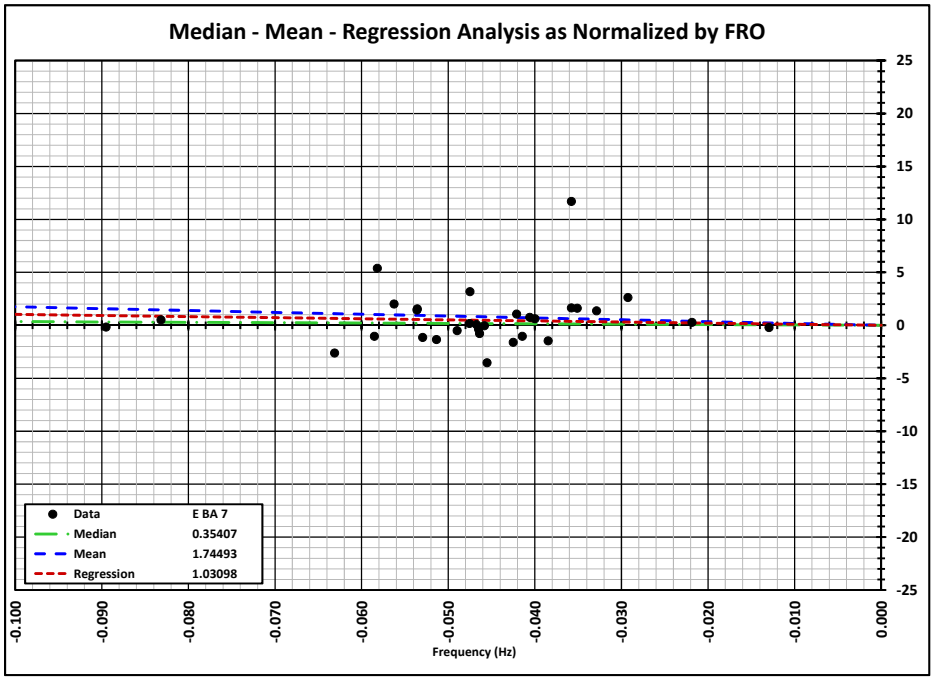

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 3
Median 1.38620
Mean 1.86272
Regression 1.65009
Frequency (Hz)

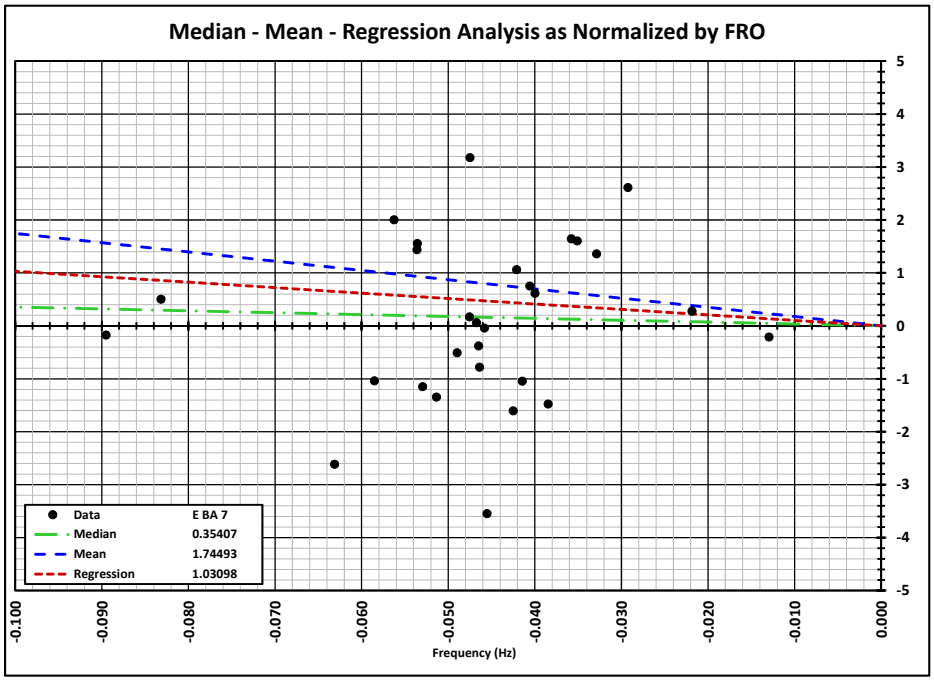

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 4
Median 2.69908
Mean 3.92009
Regression 3.43317
Frequency (Hz)

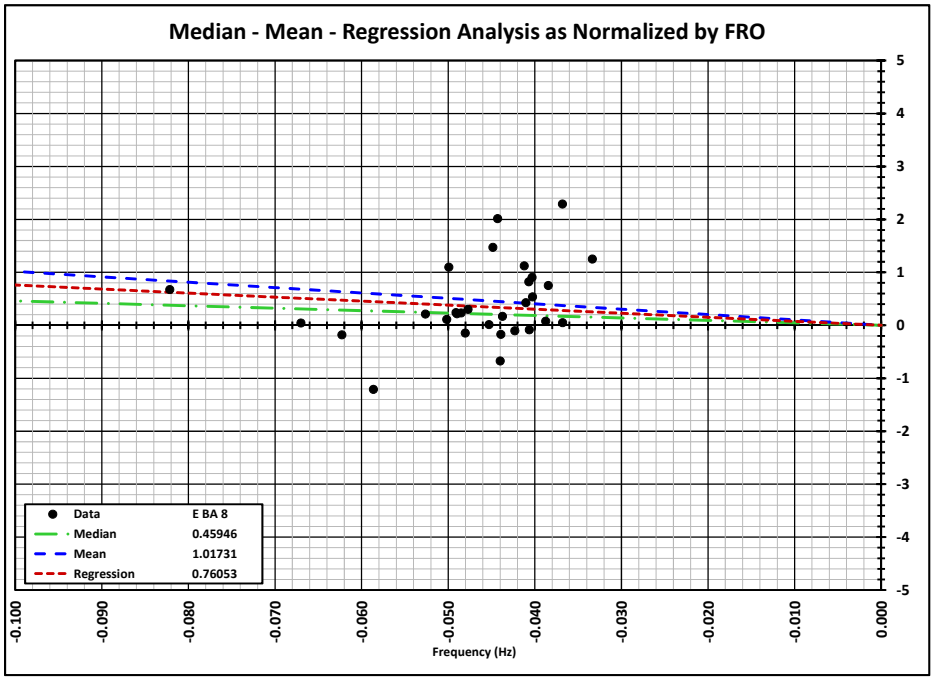

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 4
Median 2.69908
Mean 3.92009
Regression 3.43317
Frequency (Hz)

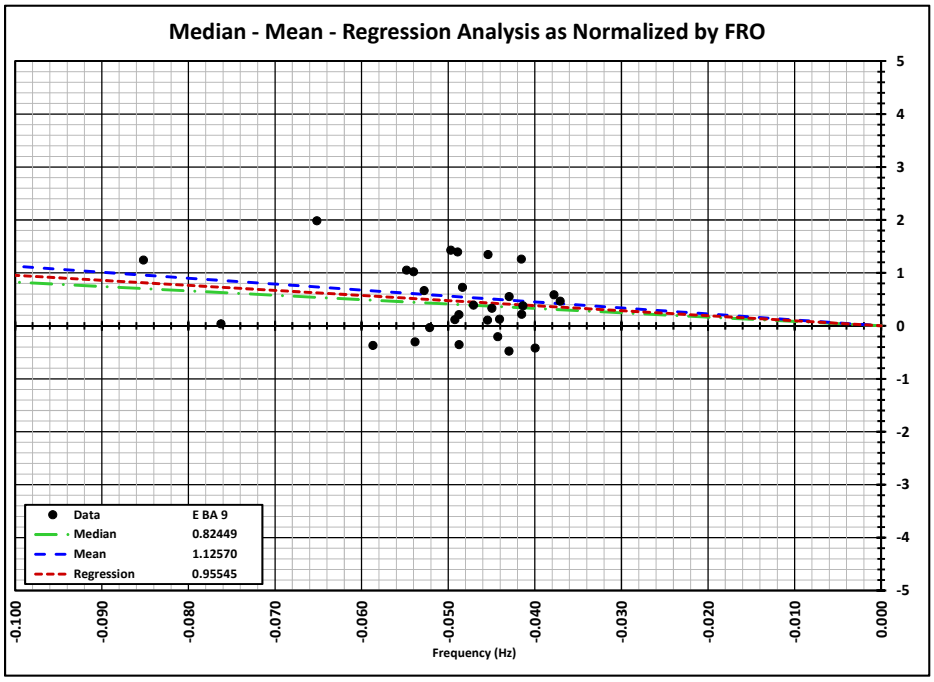

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 5
Median 3.41783
Mean 3.59448
Regression 3.36306
Frequency (Hz)

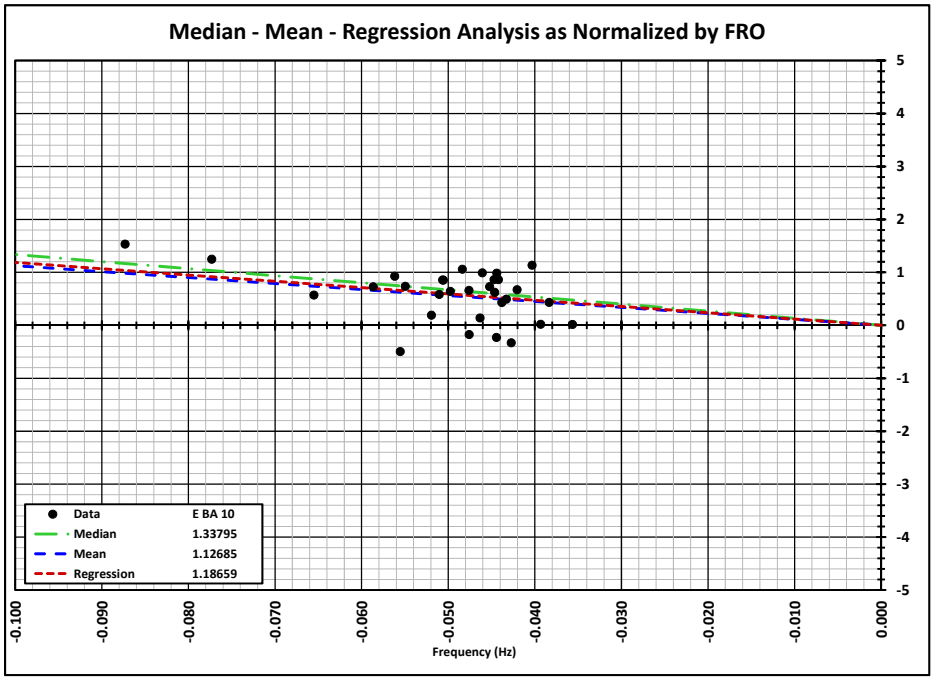

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 6
Median 2.77009
Mean 3.15820
Regression 3.09135
Frequency (Hz)

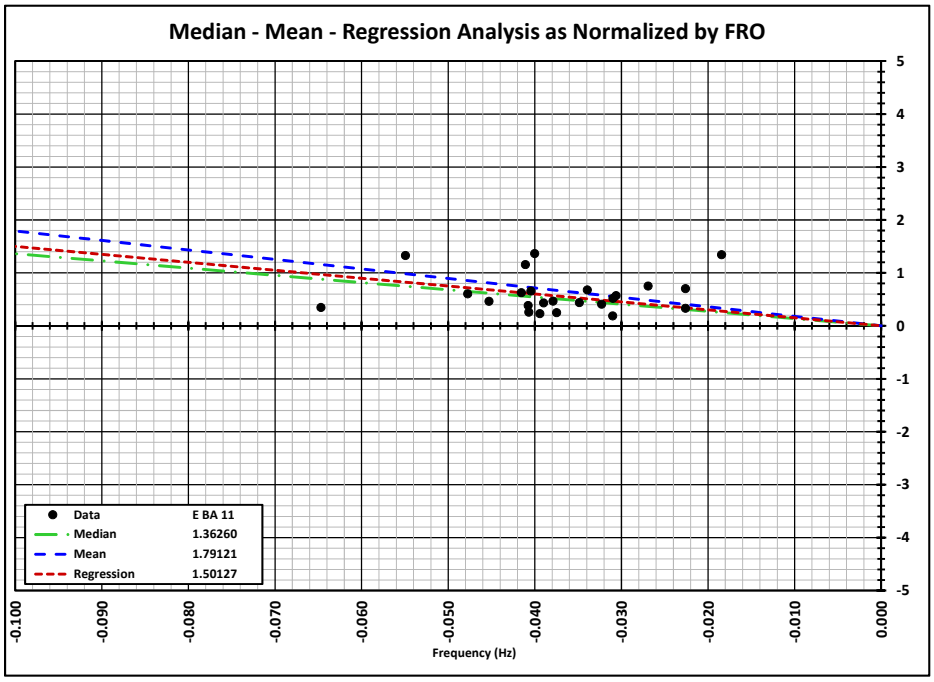

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 7
Median 0.35407
Mean 1.74493
Regression 1.03098
Frequency (Hz)

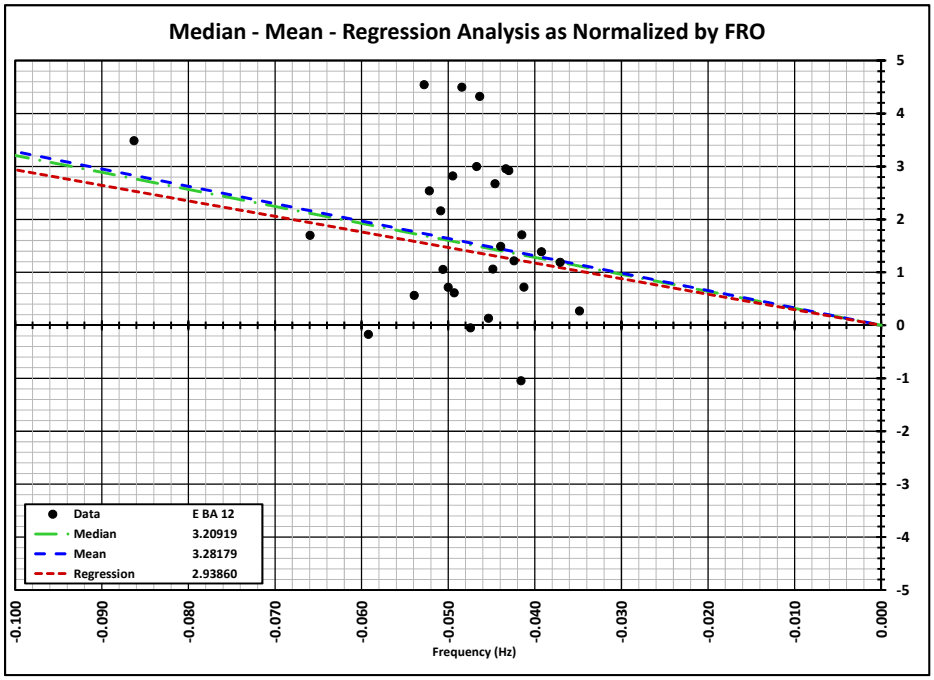

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 7
Median 0.35407
Mean 1.74493
Regression 1.03098
Frequency (Hz)

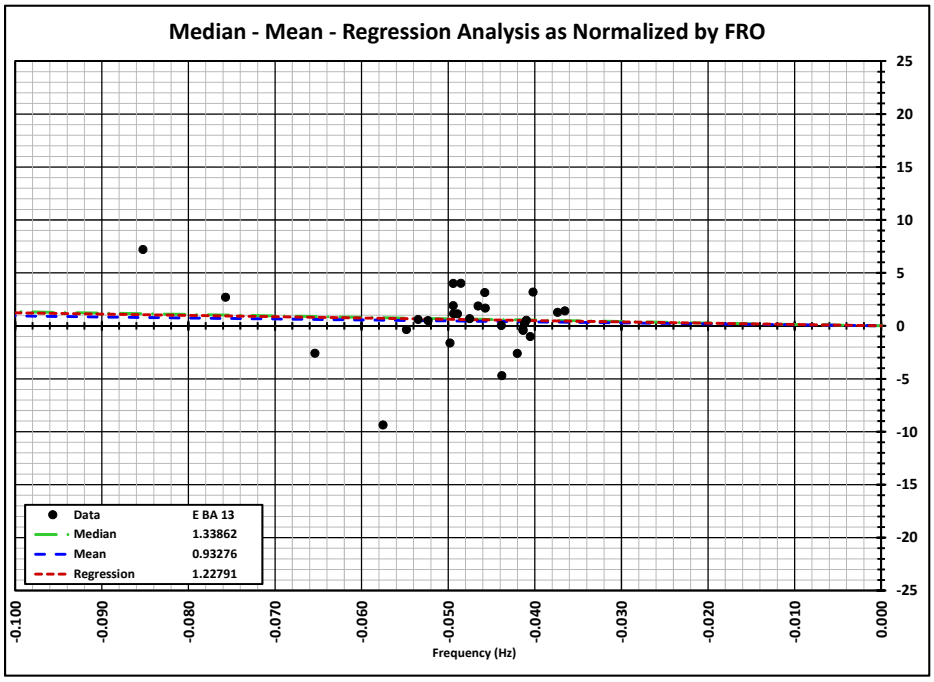

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 8
Median 0.45946
Mean 1.01731
Regression 0.76053
Frequency (Hz)

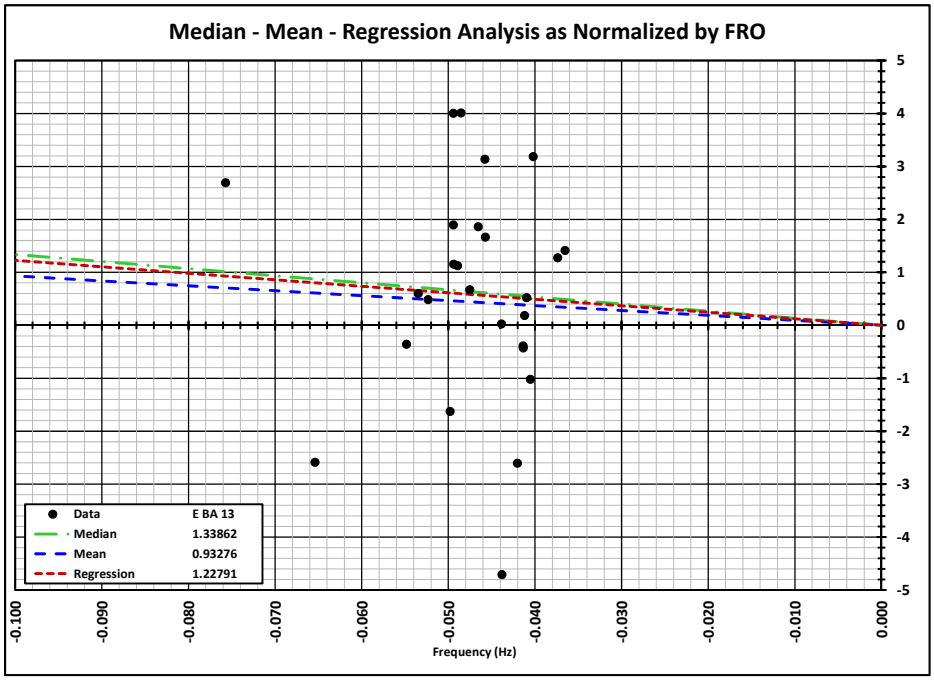

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 9
Median 0.82449
Mean 1.12570
Regression 0.95545
Frequency (Hz)

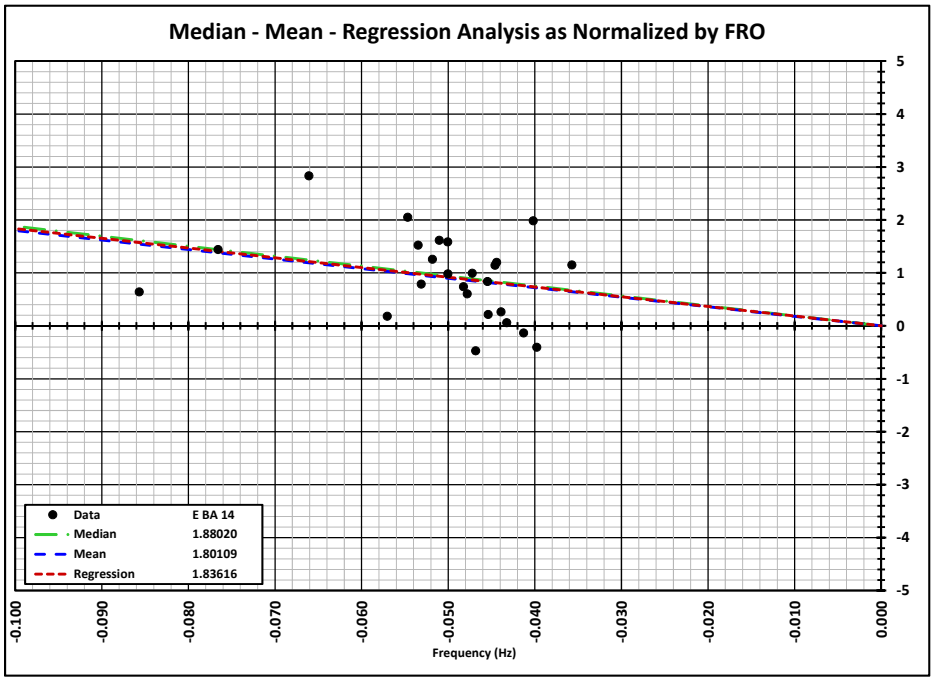

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 10
Median 1.33795
Mean 1.12685
Regression 1.18659
Frequency (Hz)

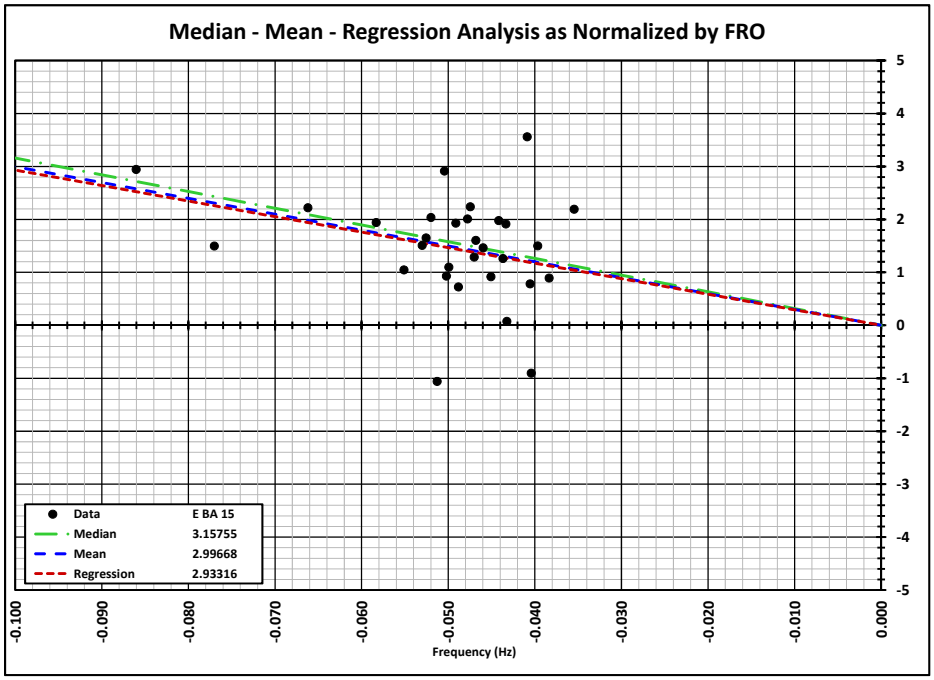

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 11
Median 1.36260
Mean 1.79121
Regression 1.50127
Frequency (Hz)

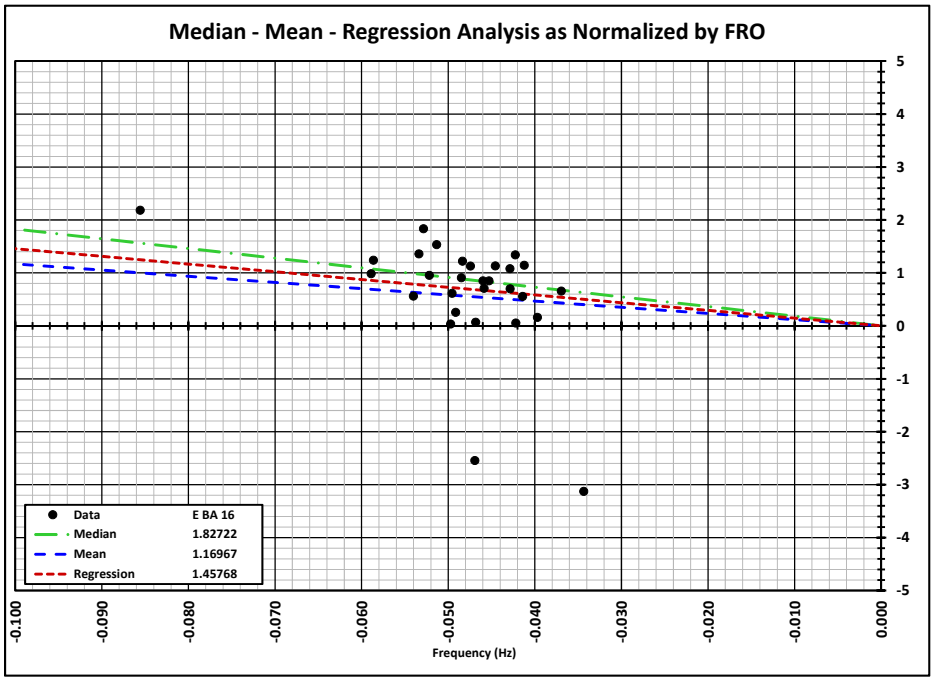

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 12
Median 3.20919
Mean 3.28179
Regression 2.93860
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

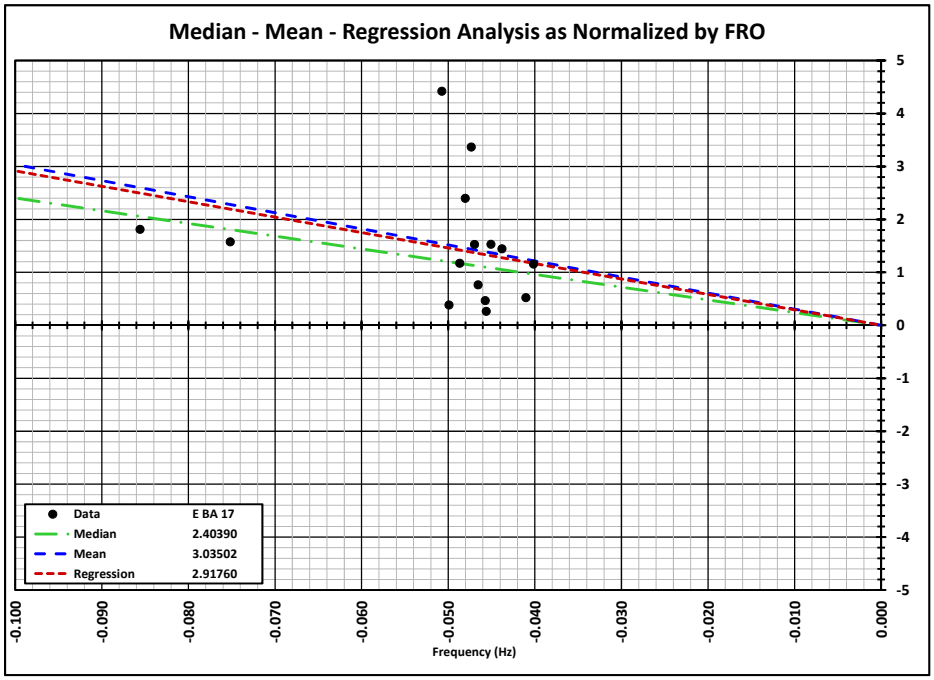

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 13
Median 1.33862
Mean 0.93276
Regression 1.22791
25
20
15
10
5
0
-5
-10
-15
-20
-25
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

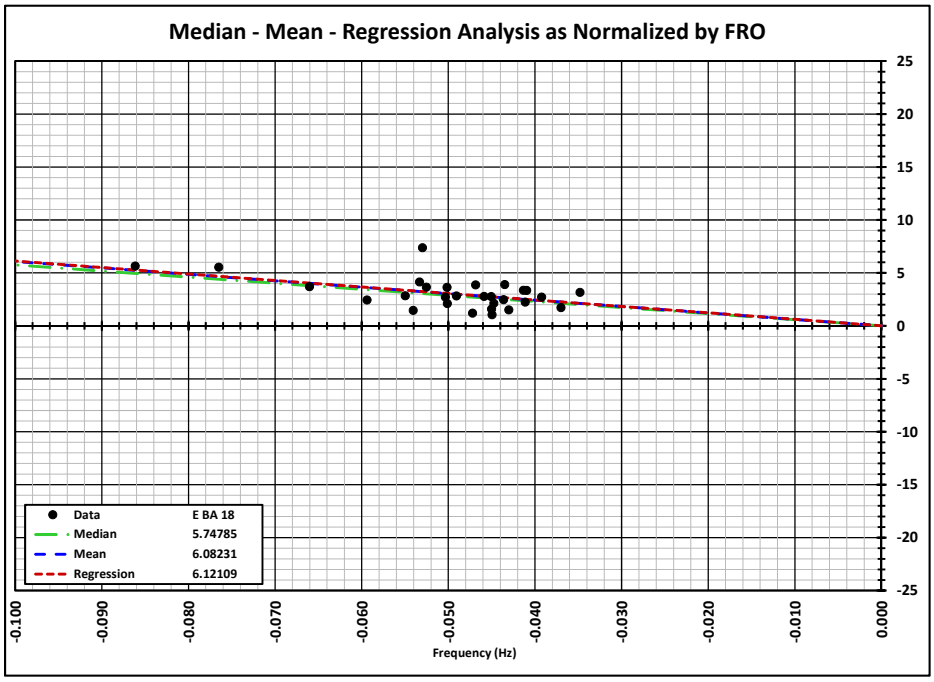

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 13
Median 1.33862
Mean 0.93276
Regression 1.22791
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

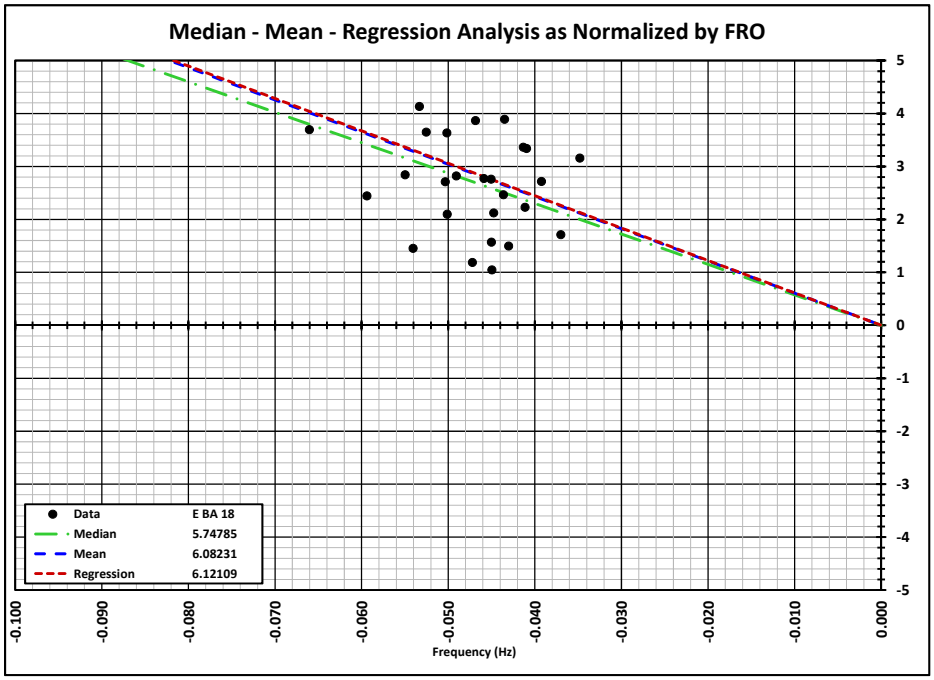

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 14
Median 1.88020
Mean 1.80109
Regression 1.83616
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

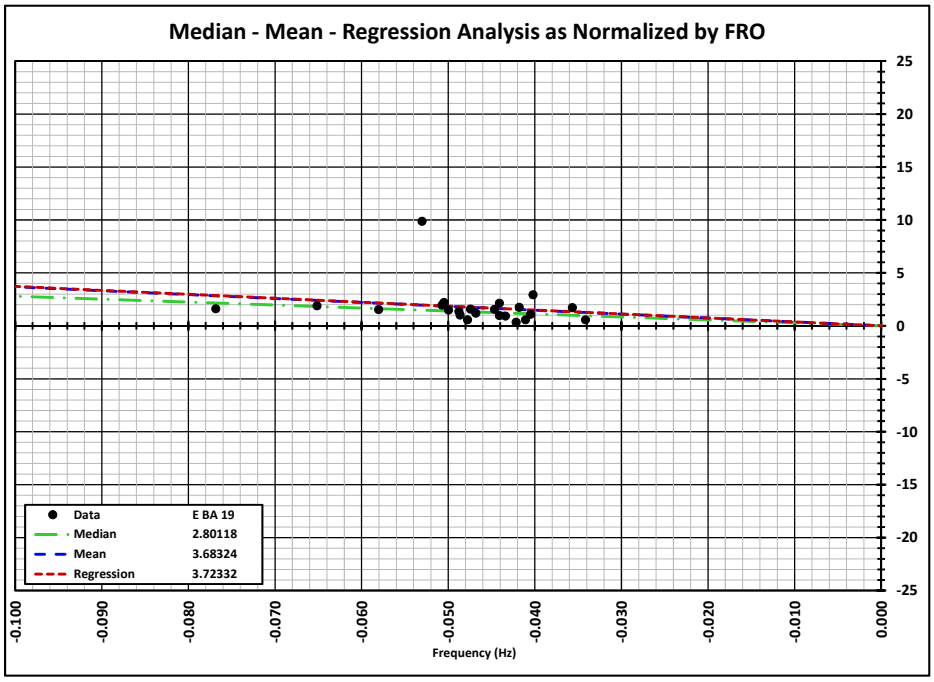

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 15
Median 3.15755
Mean 2.99668
Regression 2.93316
Frequency (Hz)

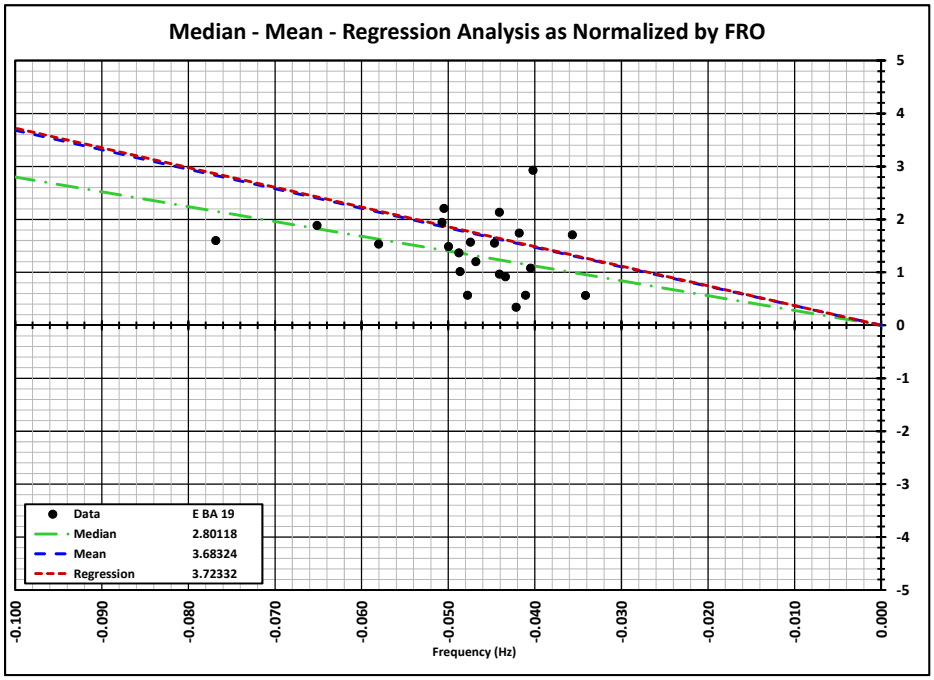

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 16
Median 1.82722
Mean 1.16967
Regression 1.45768
Frequency (Hz)

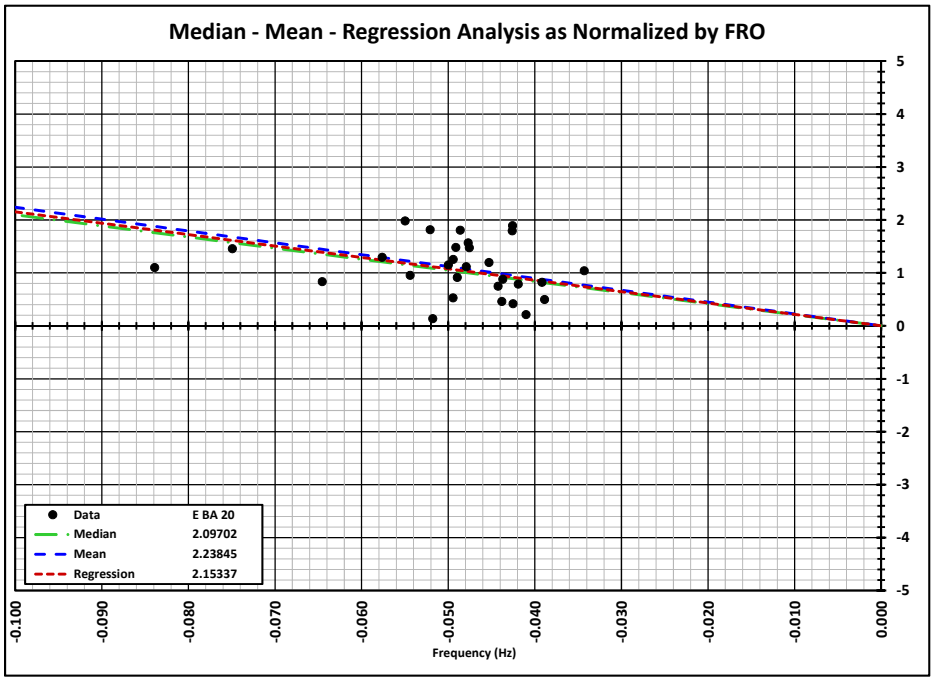

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 17
Median 2.40390
Mean 3.03502
Regression 2.91760
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

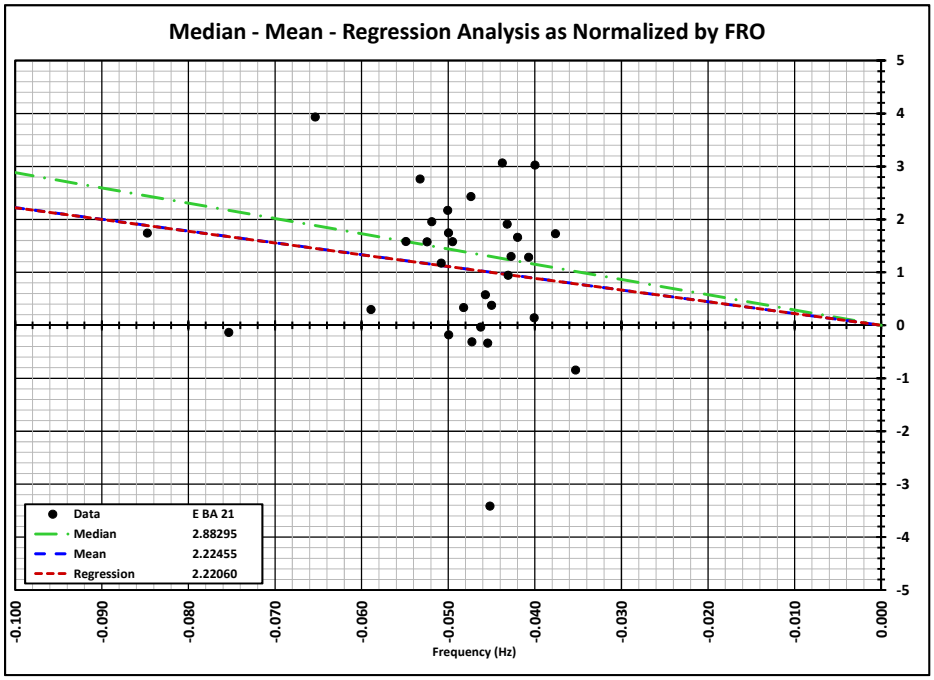

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 18
Median 5.74785
Mean 6.08231
Regression 6.12109
25
20
15
10
5
0
-5
-10
-15
-20
-25
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

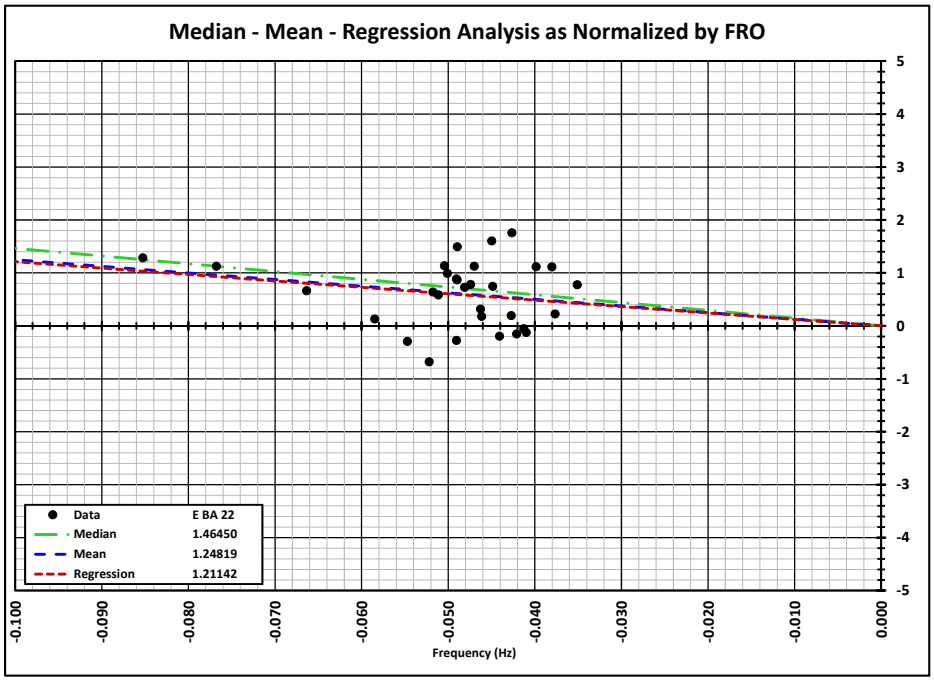

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 18
Median 5.74785
Mean 6.08231
Regression 6.12109
Frequency (Hz)

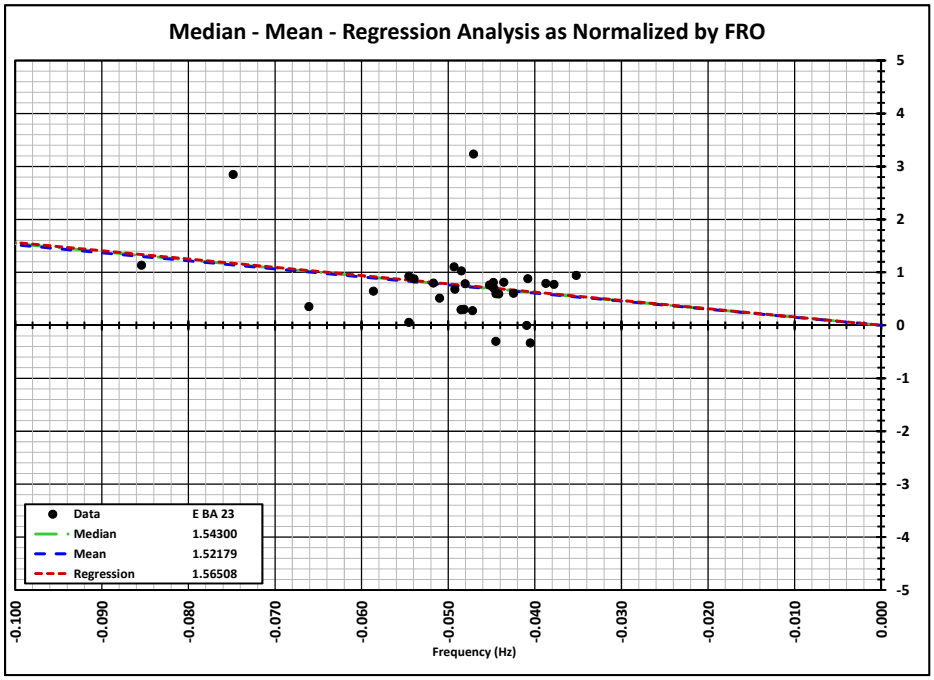

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 19
Median 2.80118
Mean 3.68324
Regression 3.72332
Frequency (Hz)

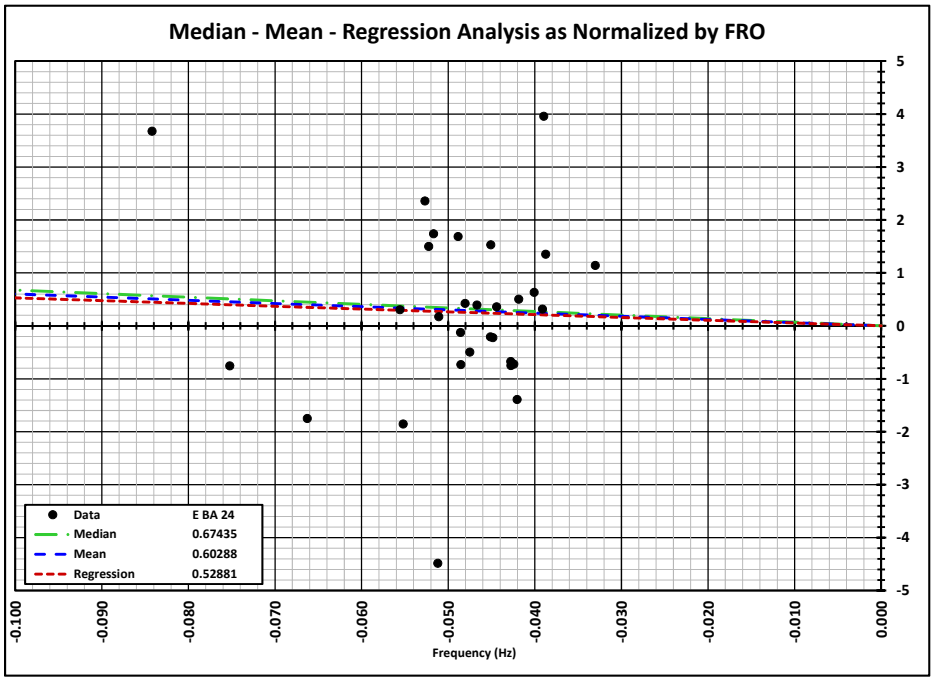

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 19
Median 2.80118
Mean 3.68324
Regression 3.72332
Frequency (Hz)

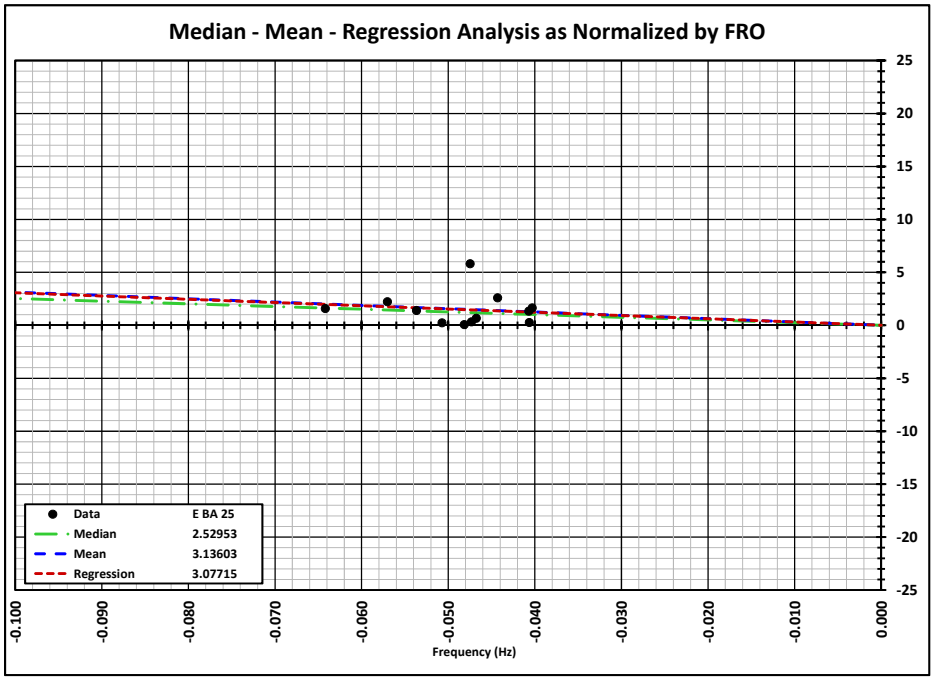

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 20
Median 2.09702
Mean 2.23845
Regression 2.15337
Frequency (Hz)

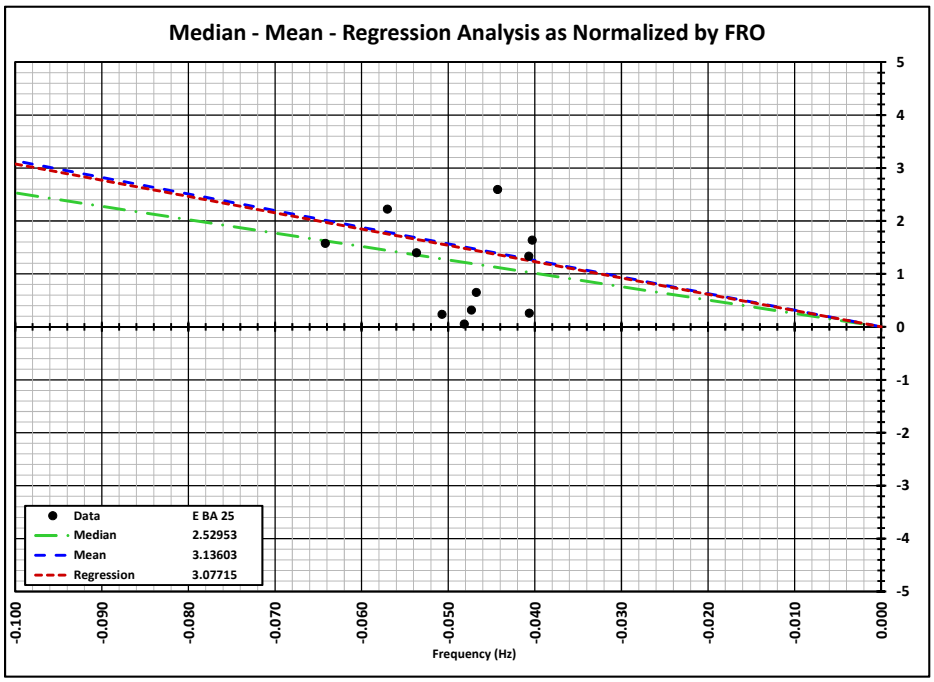

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 21
Median 2.88295
Mean 2.22455
Regression 2.22060
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

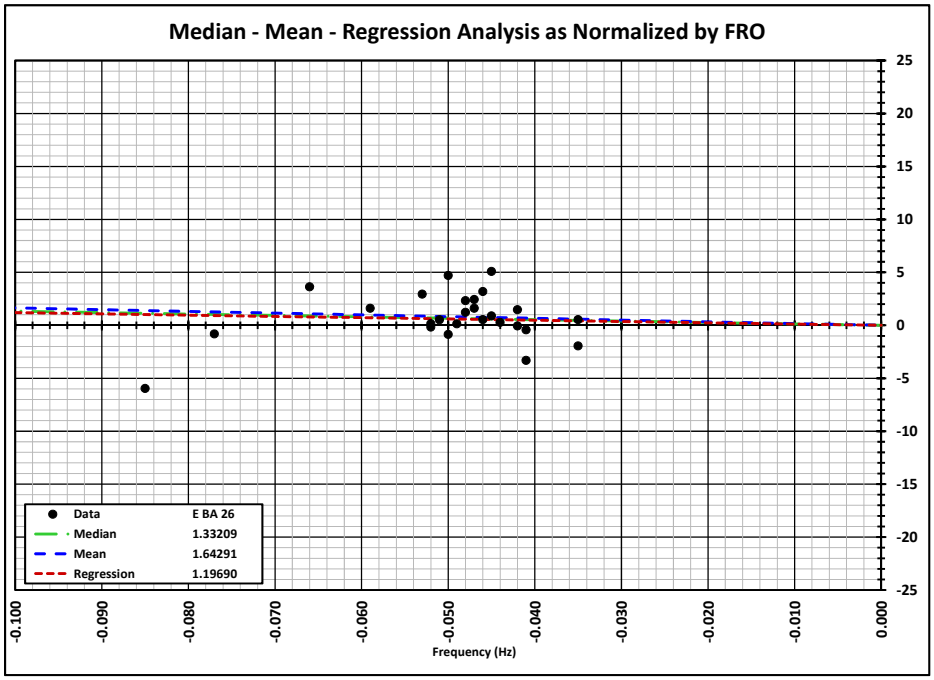

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 22
Median 1.46450
Mean 1.24819
Regression 1.21142
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

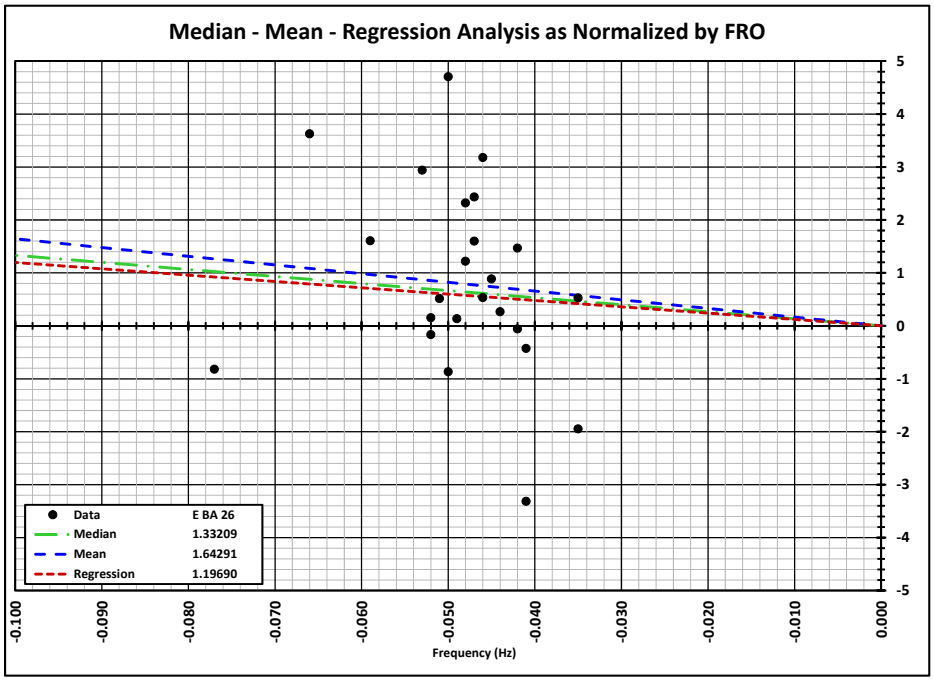

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 23
Median 1.54300
Mean 1.52179
Regression 1.56508
Frequency (Hz)

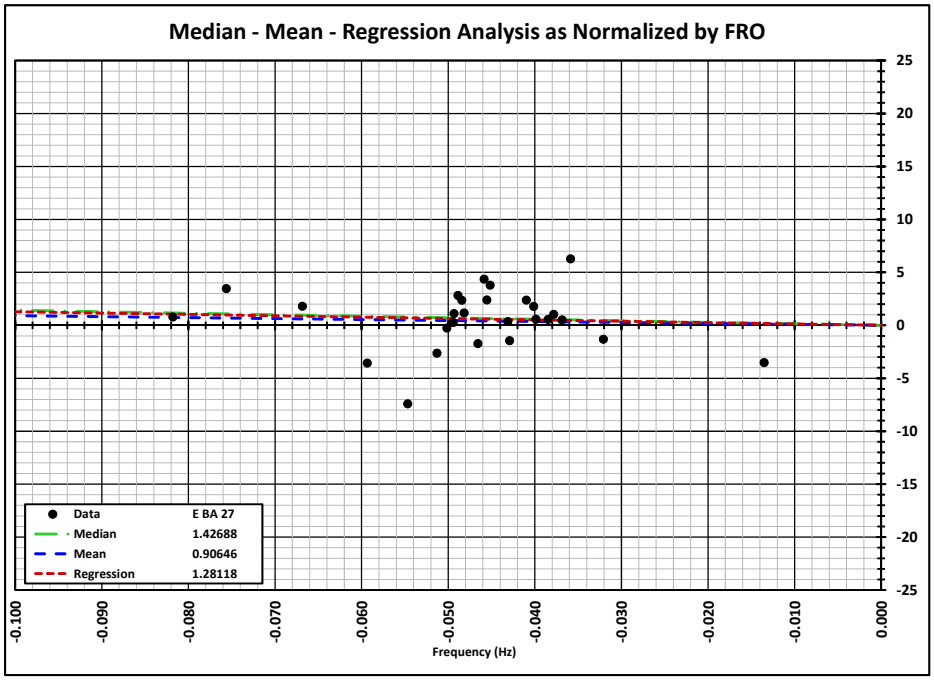

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 24
Median 0.67435
Mean 0.60288
Regression 0.52881
Frequency (Hz)

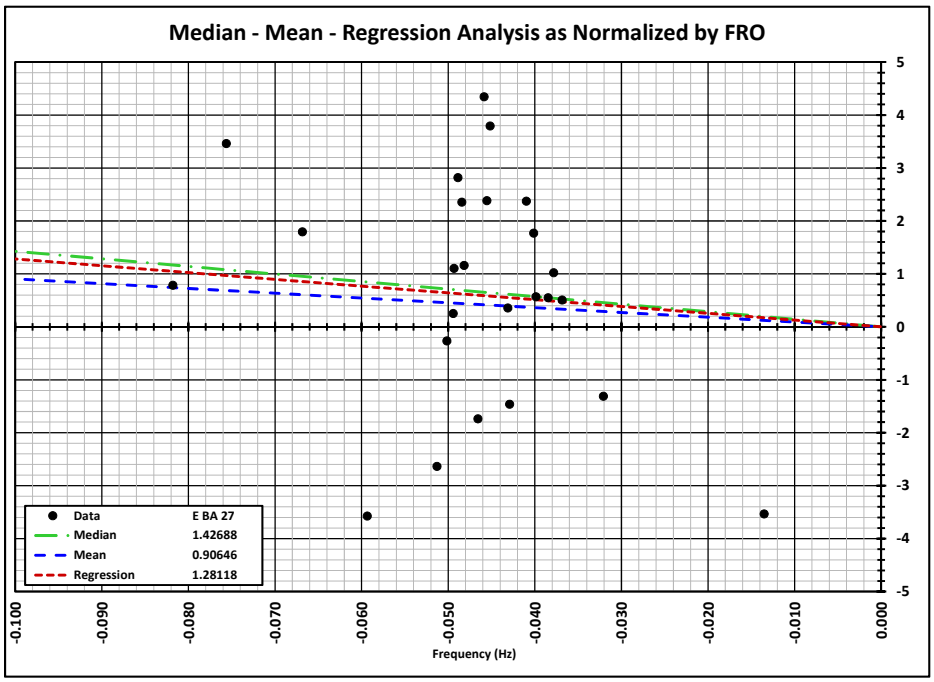

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 25
Median 2.52953
Mean 3.13603
Regression 3.07715
Frequency (Hz)

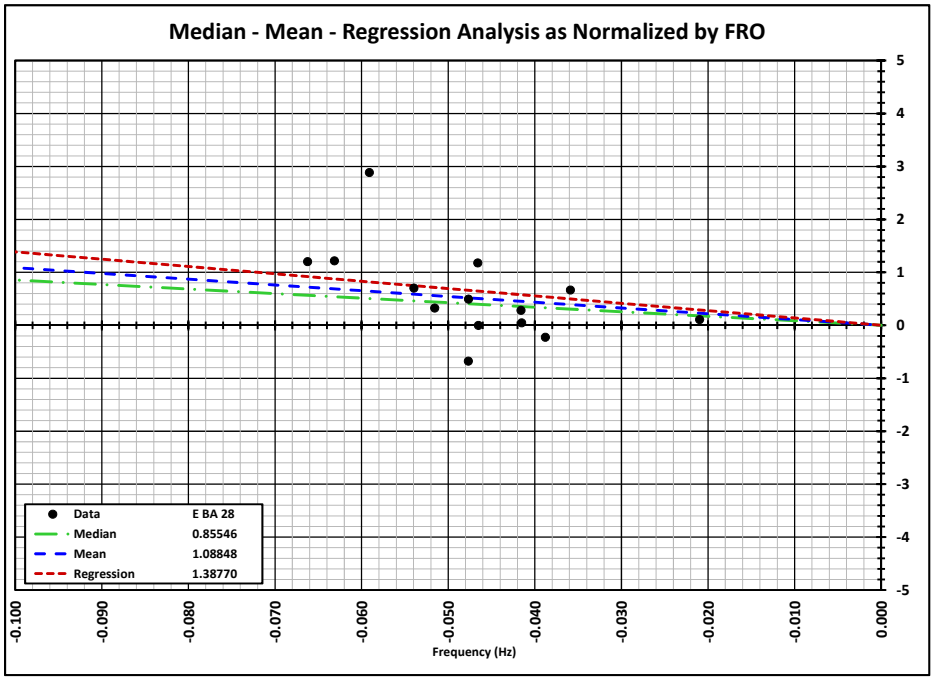

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 25
Median 2.52953
Mean 3.13603
Regression 3.07715
Frequency (Hz)

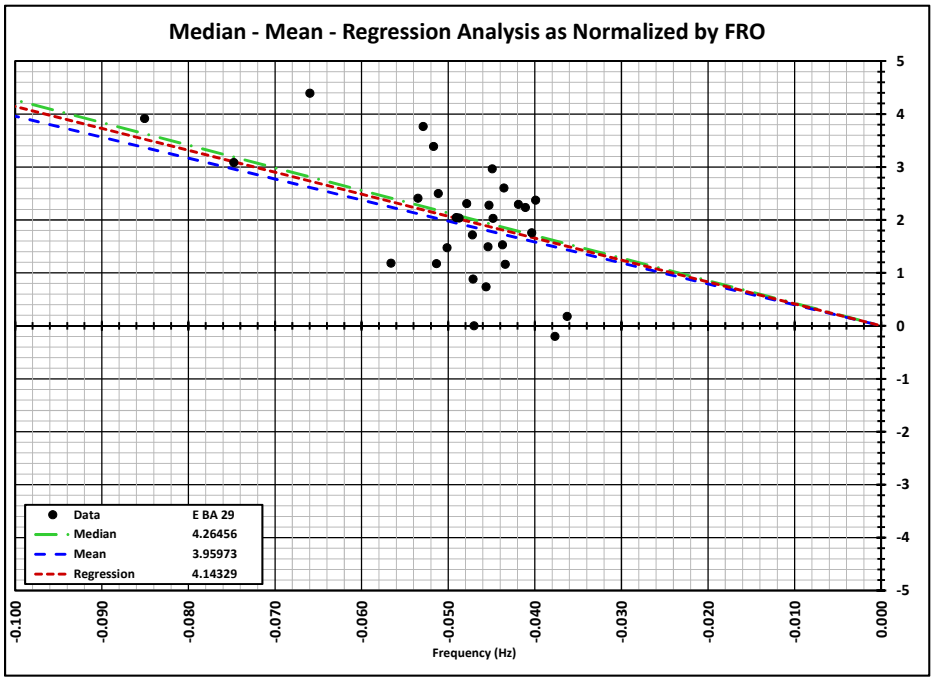

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 26
Median 1.33209
Mean 1.64291
Regression 1.19690
Frequency (Hz)

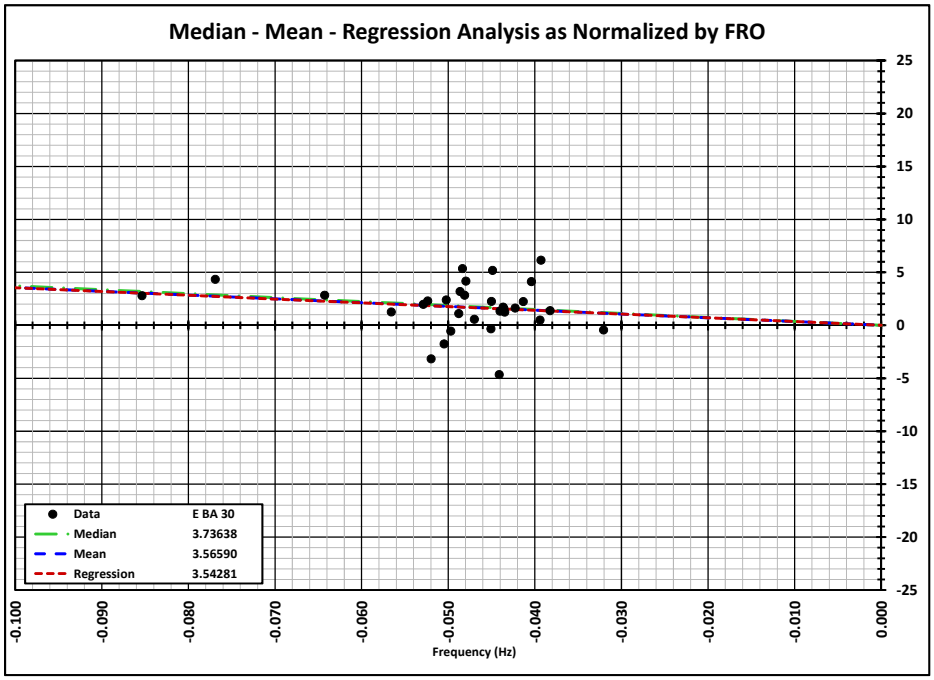

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 26
Median 1.33209
Mean 1.64291
Regression 1.19690
Frequency (Hz)

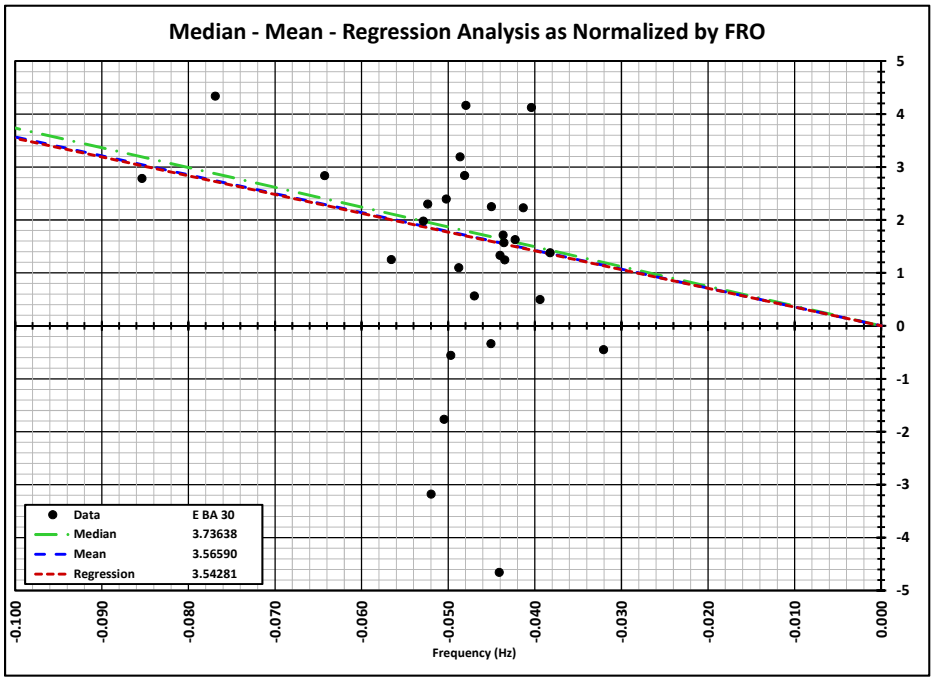

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 27
Median 1.42688
Mean 0.90646
Regression 1.28118
Frequency (Hz)

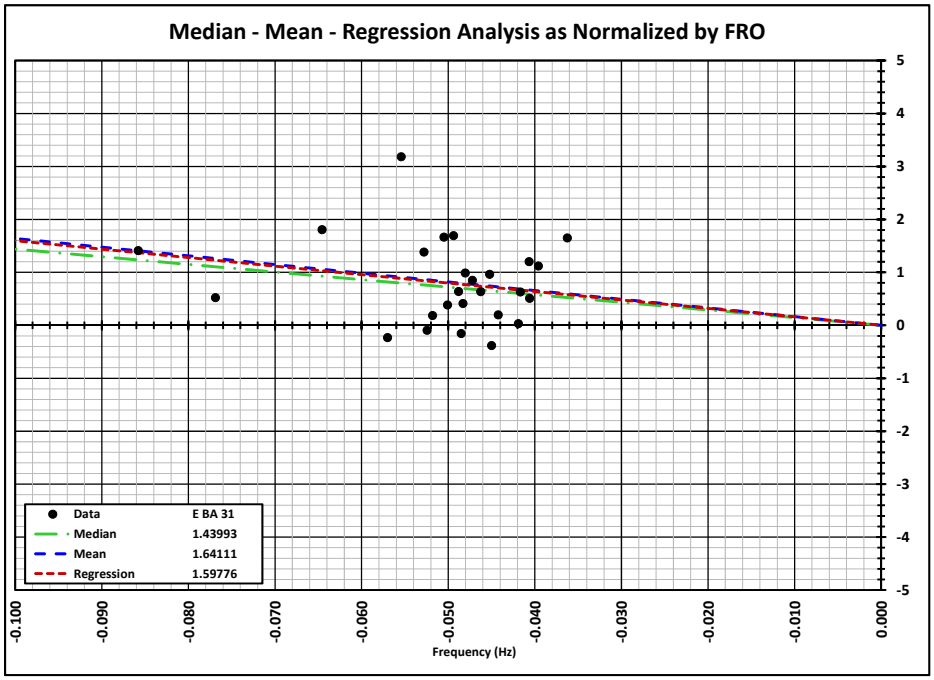

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 27
Median 1.42688
Mean 0.90646
Regression 1.28118
Frequency (Hz)

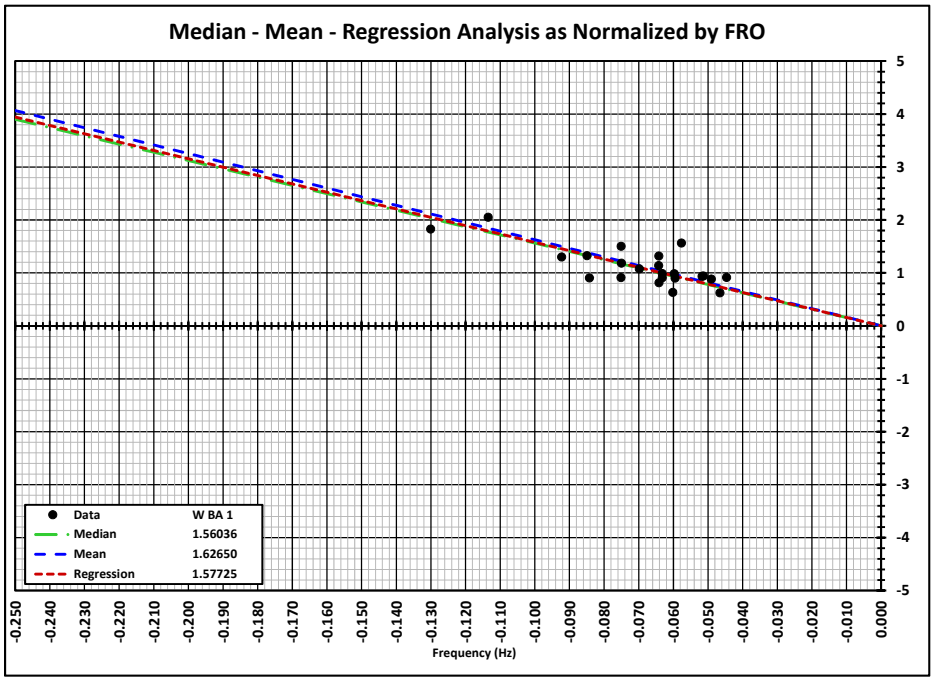

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 28
Median 0.85546
Mean 1.08848
Regression 1.38770
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

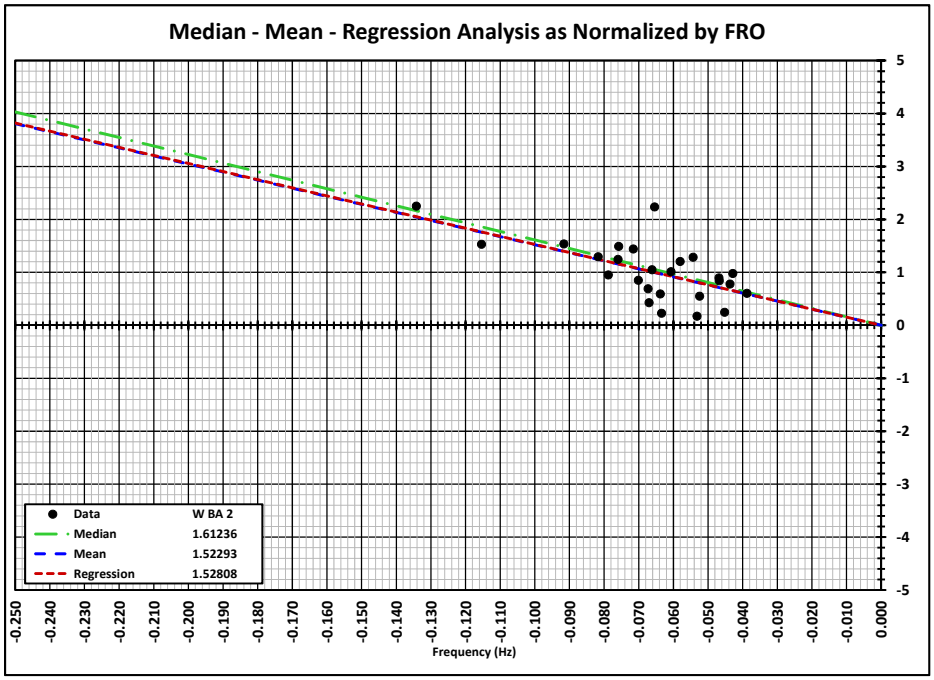

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 29
Median 4.26456
Mean 3.95973
Regression 4.14329
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

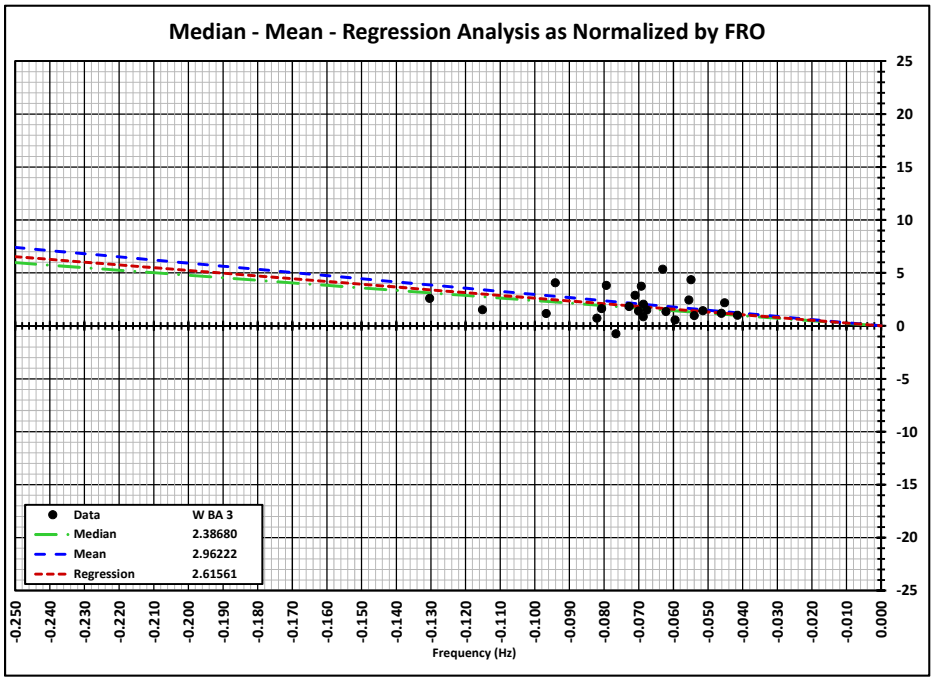

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 30
Median 3.73638
Mean 3.56590
Regression 3.54281
Frequency (Hz)

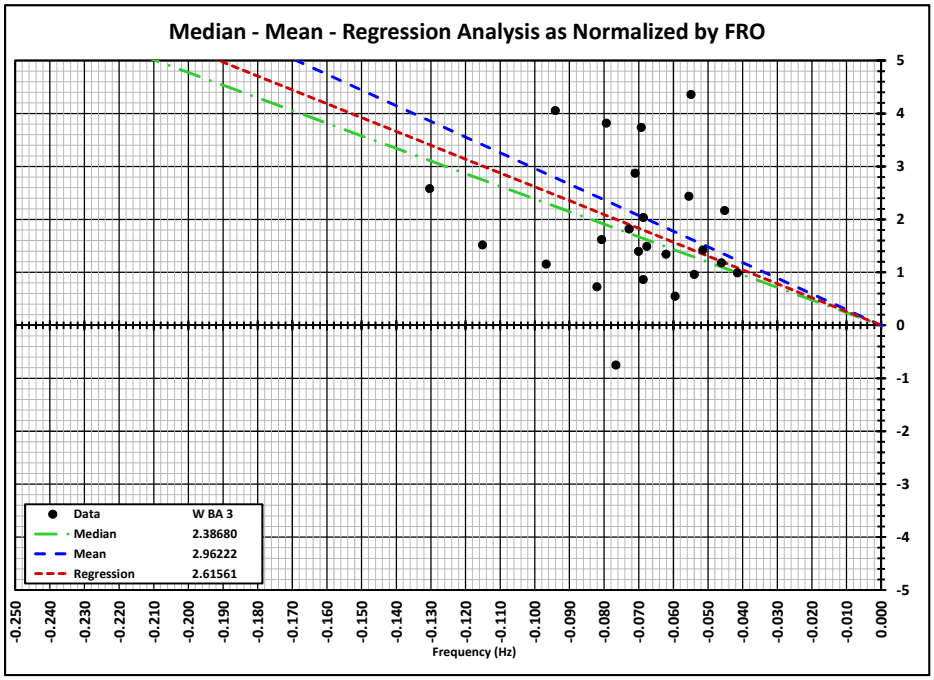

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 30
Median 3.73638
Mean 3.56590
Regression 3.54281
Frequency (Hz)

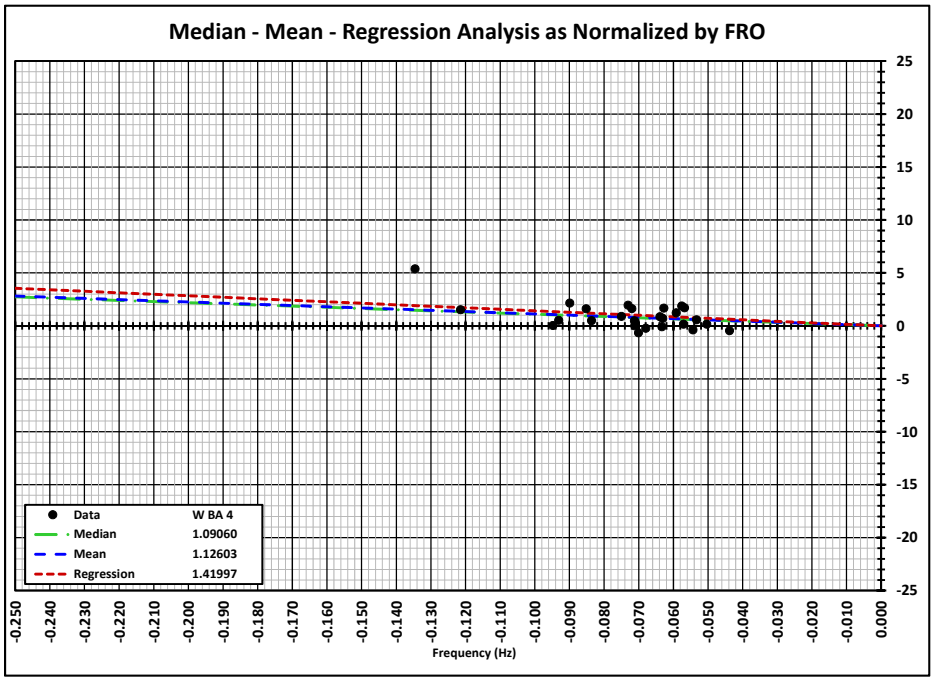

Median - Mean - Regression Analysis as Normalized by FRO
Data E BA 31
Median 1.43993
Mean 1.64111
Regression 1.59776
Frequency (Hz)

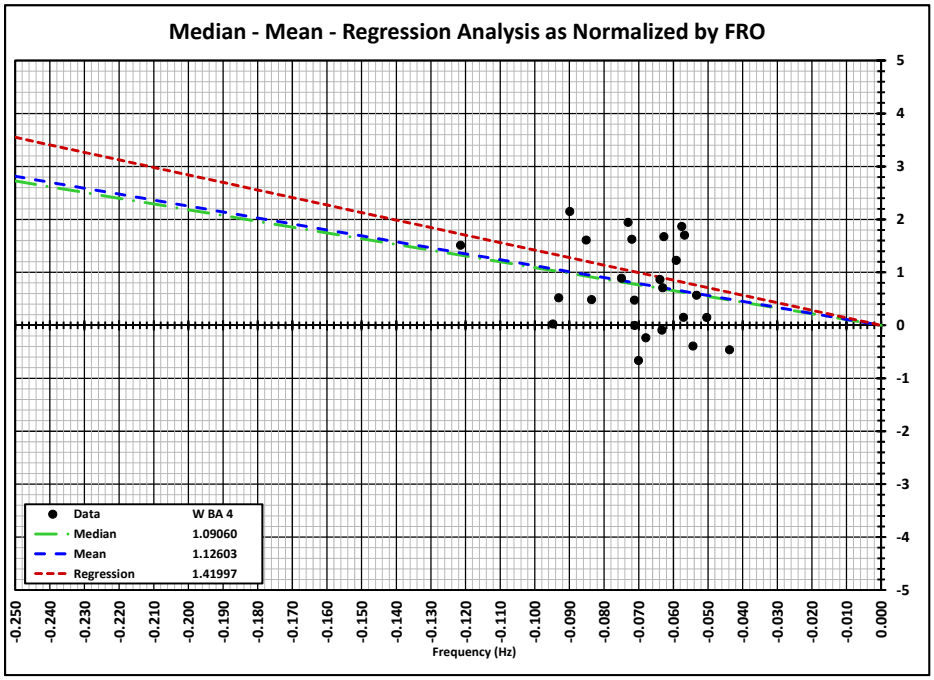

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 1
Median 1.56036
Mean 1.62650
Regression 1.57725
Frequency (Hz)

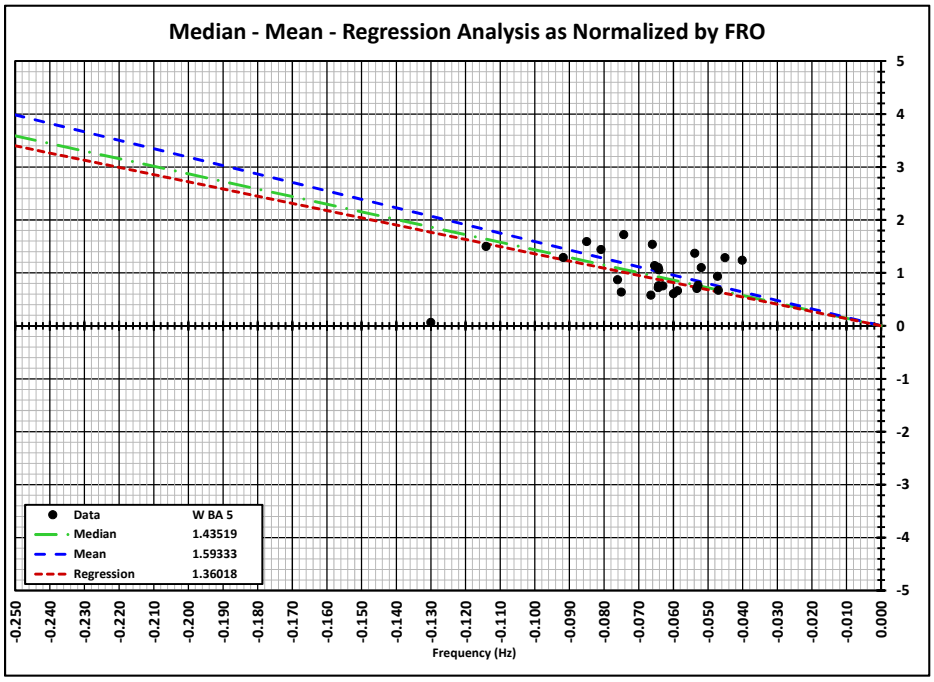

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 2
Median 1.61236
Mean 1.52293
Regression 1.52808
Frequency (Hz)

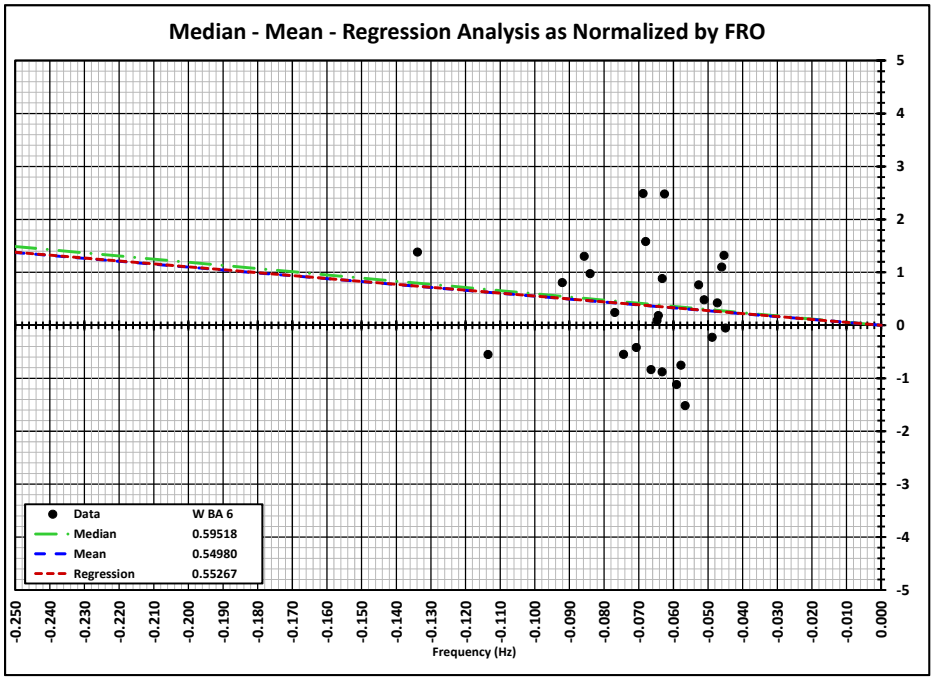

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 3
Median 2.38680
Mean 2.96222
Regression 2.61561
Frequency (Hz)

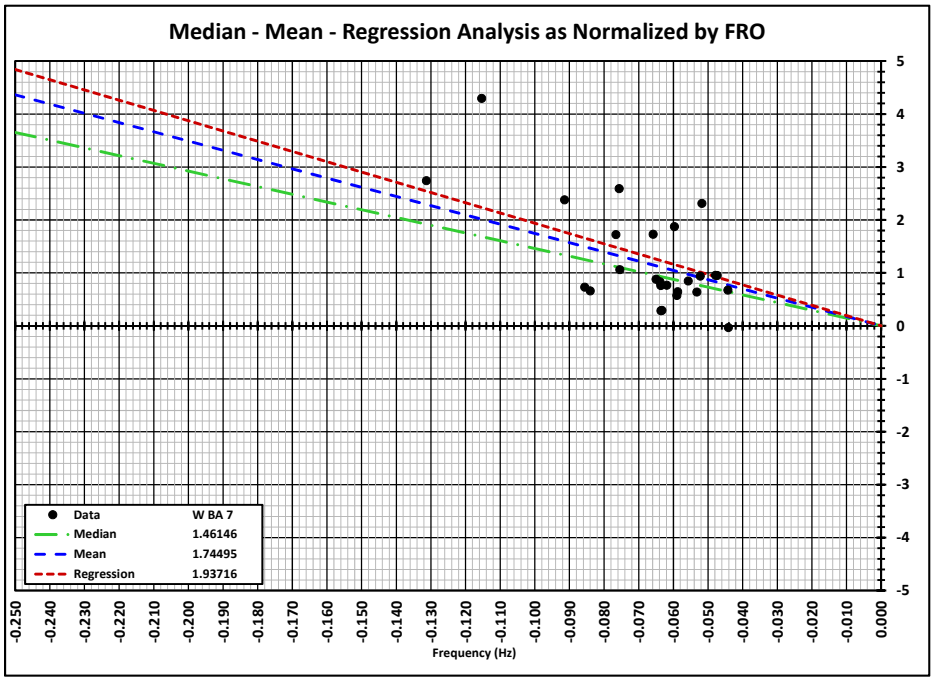

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 3
Median 2.38680
Mean 2.96222
Regression 2.61561
Frequency (Hz)

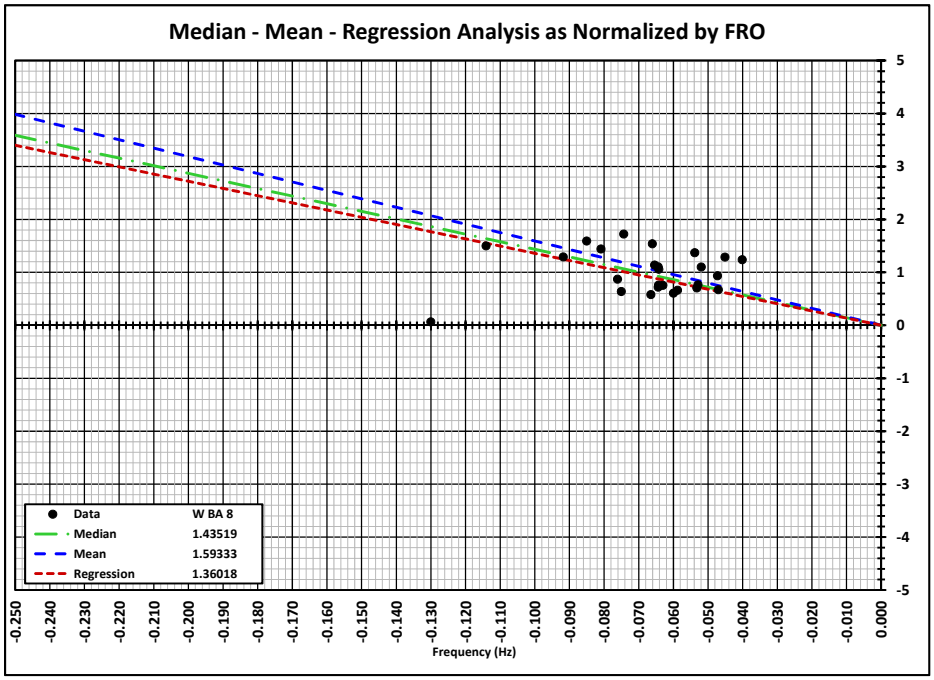

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 4
Median 1.09060
Mean 1.12603
Regression 1.41997
Frequency (Hz)

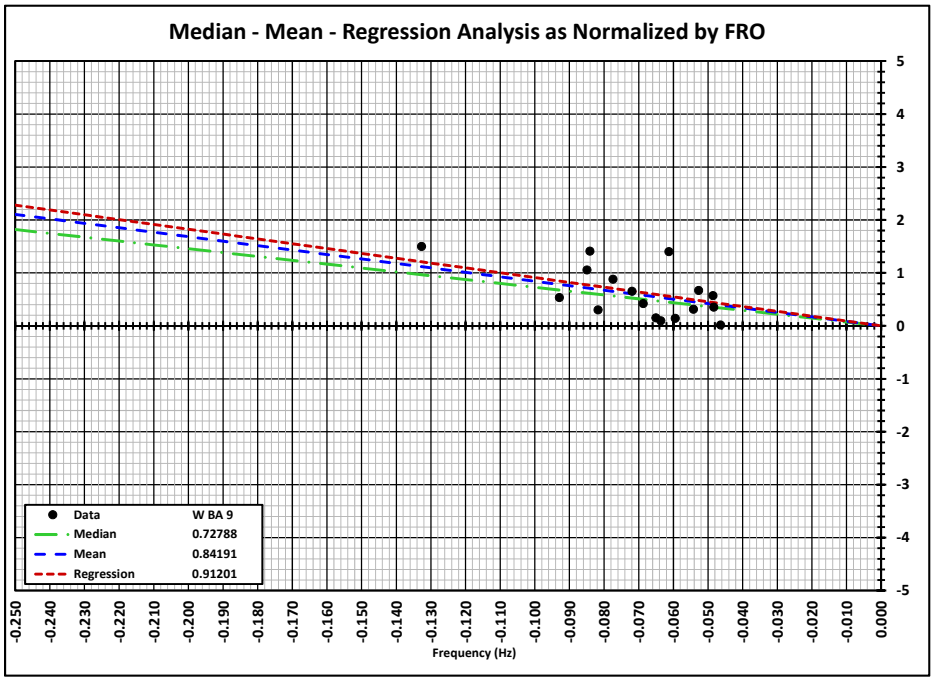

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 4
Median 1.09060
Mean 1.12603
Regression 1.41997
Frequency (Hz)

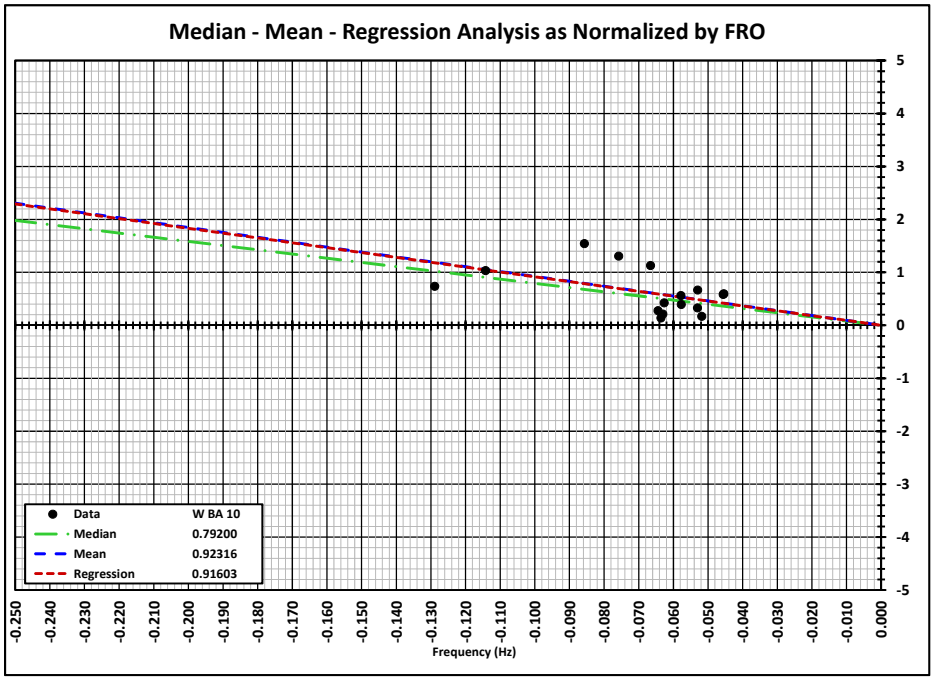

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 5
Median 1.43519
Mean 1.59333
Regression 1.36018
Frequency (Hz)

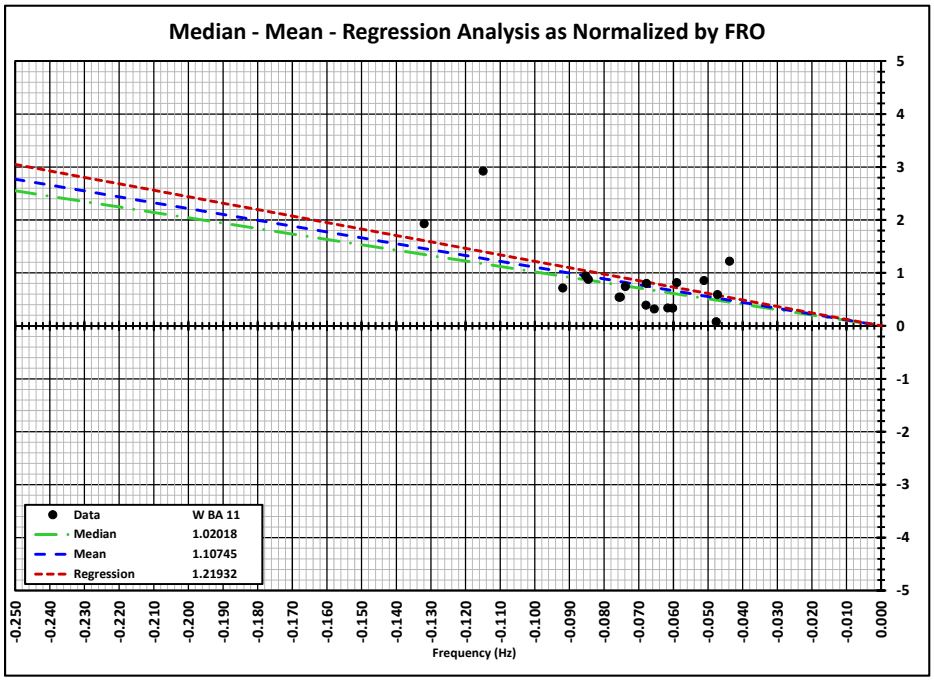

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 6
Median 0.59518
Mean 0.54980
Regression 0.55267
Frequency (Hz)

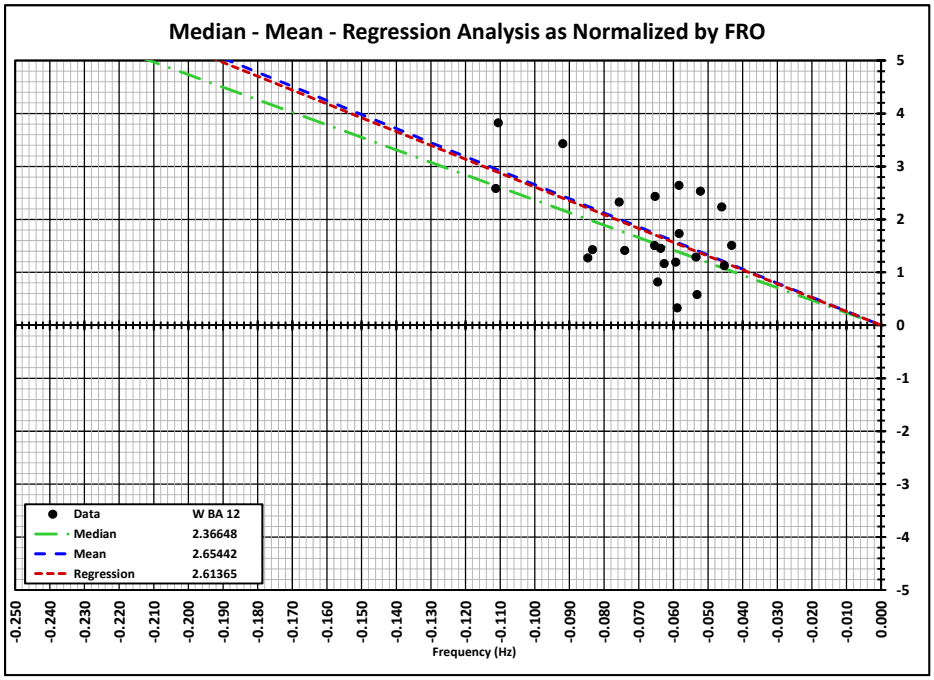

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 7
Median 1.46146
Mean 1.74495
Regression 1.93716
Frequency (Hz)

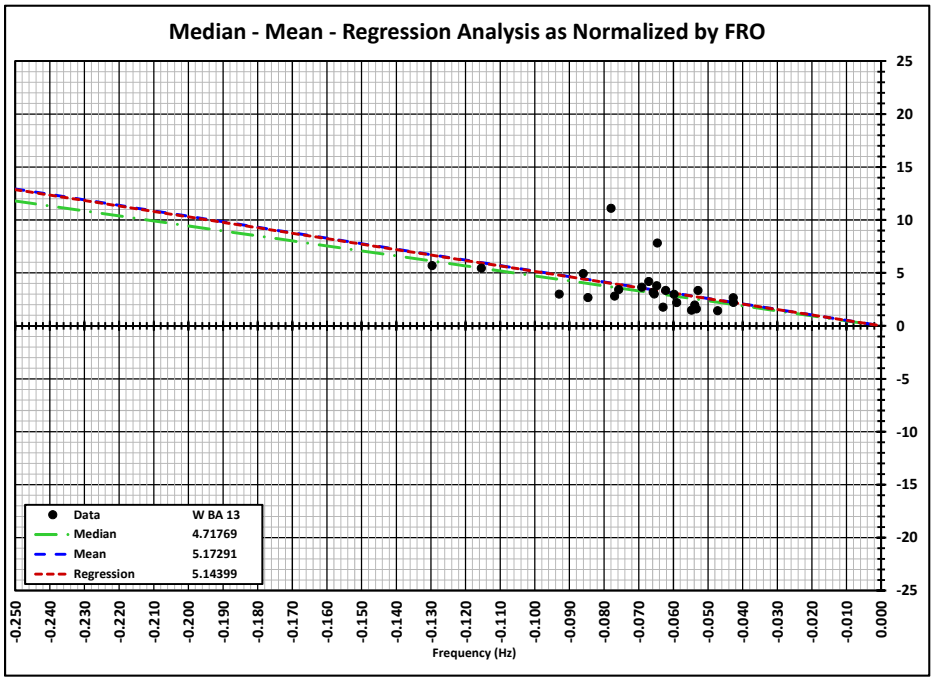

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 8
Median 1.43519
Mean 1.59333
Regression 1.36018
Frequency (Hz)

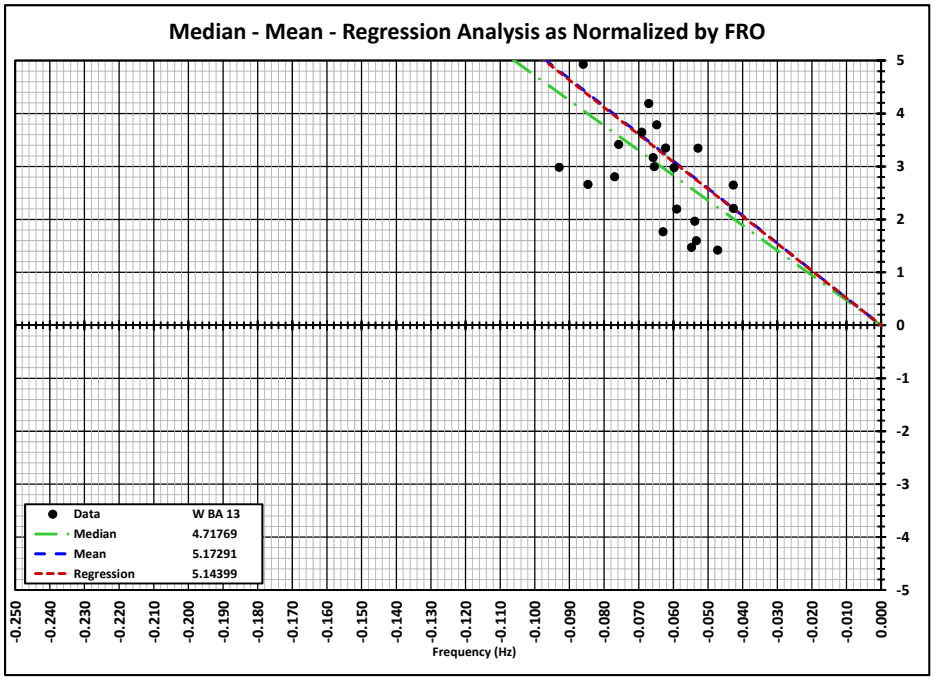

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 9
Median 0.72788
Mean 0.84191
Regression 0.91201
Frequency (Hz)

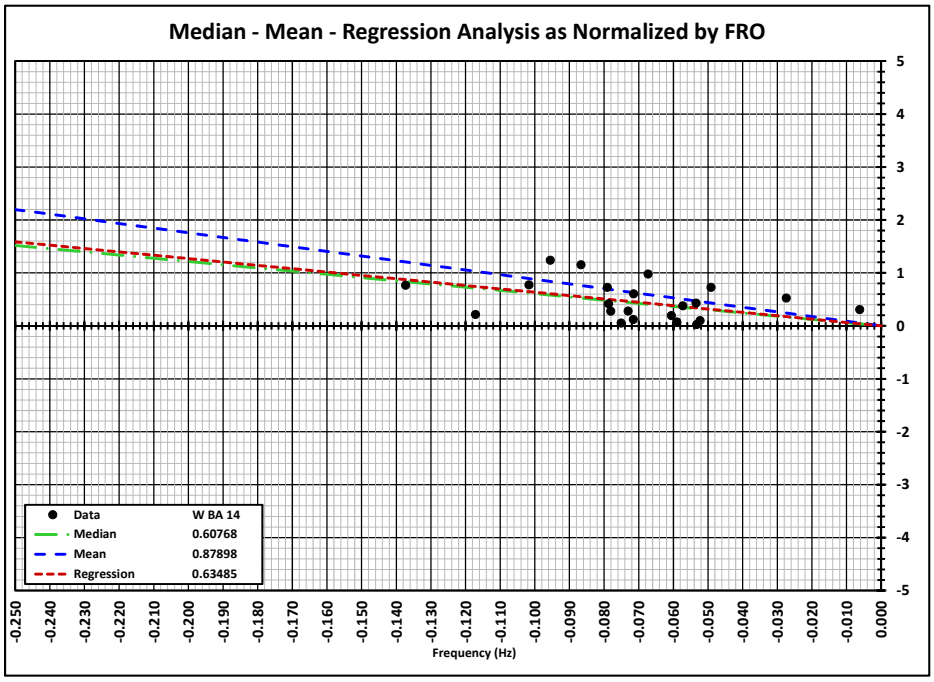

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 10
Median 0.79200
Mean 0.92316
Regression 0.91603
Frequency (Hz)

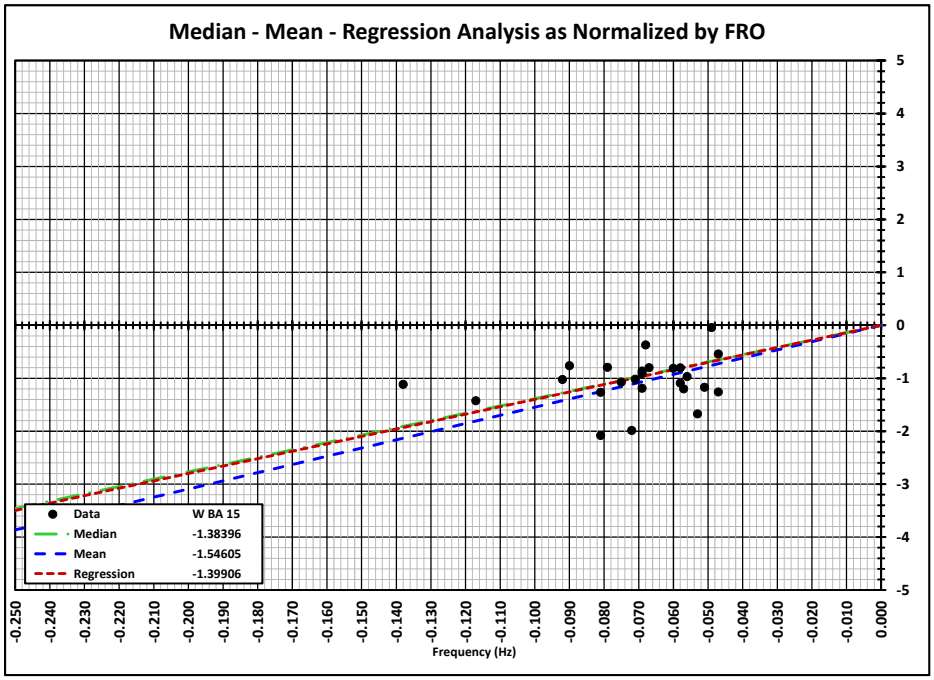

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 11
Median 1.02018
Mean 1.10745
Regression 1.21932
Frequency (Hz)

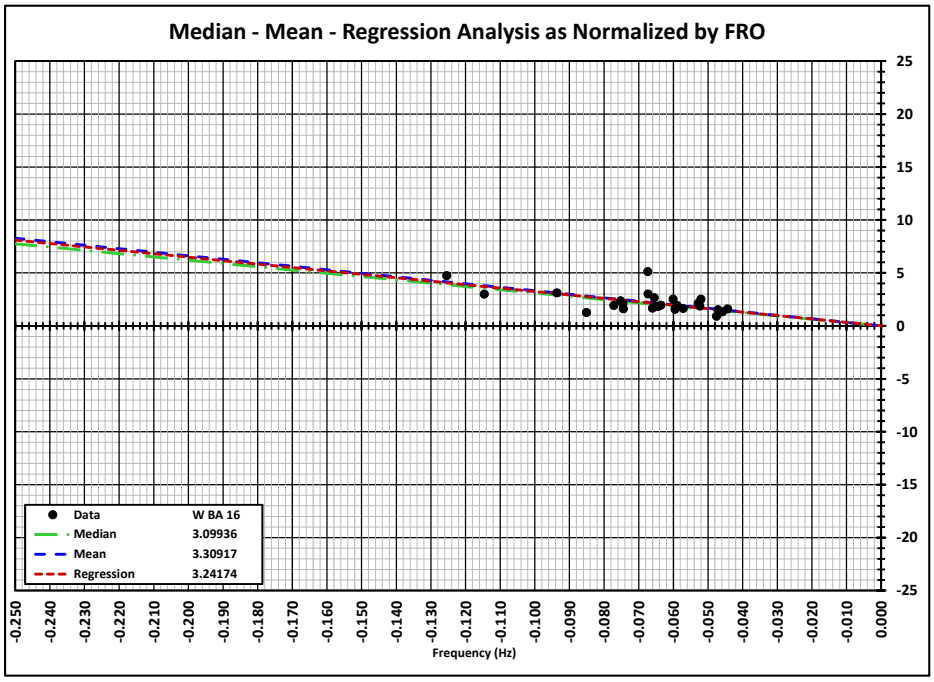

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 12
Median 2.36648
Mean 2.65442
Regression 2.61365
Frequency (Hz)

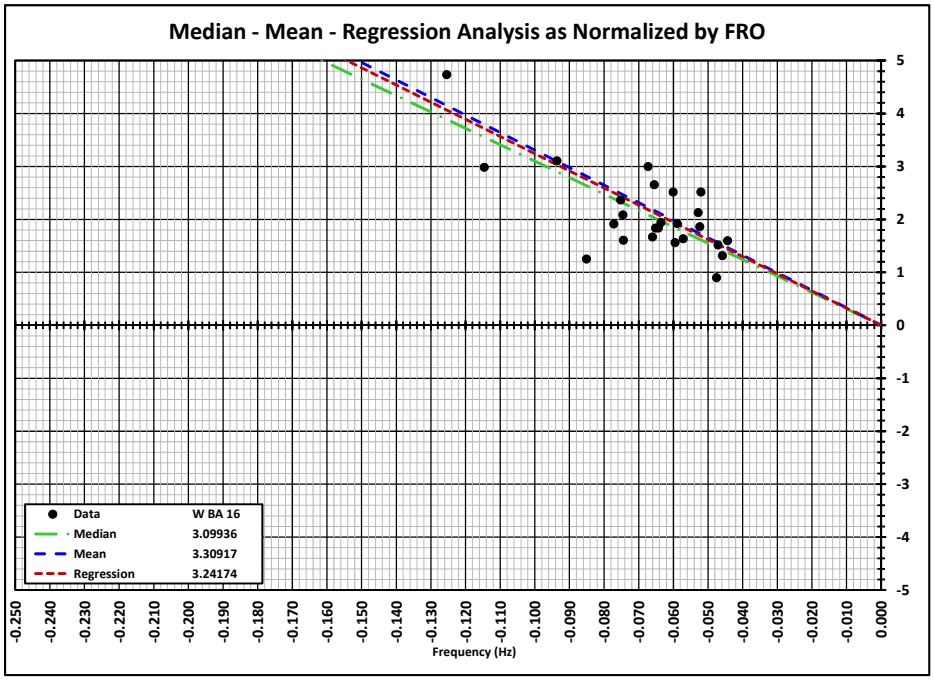

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 13
Median 4.71769
Mean 5.17291
Regression 5.14399
Frequency (Hz)

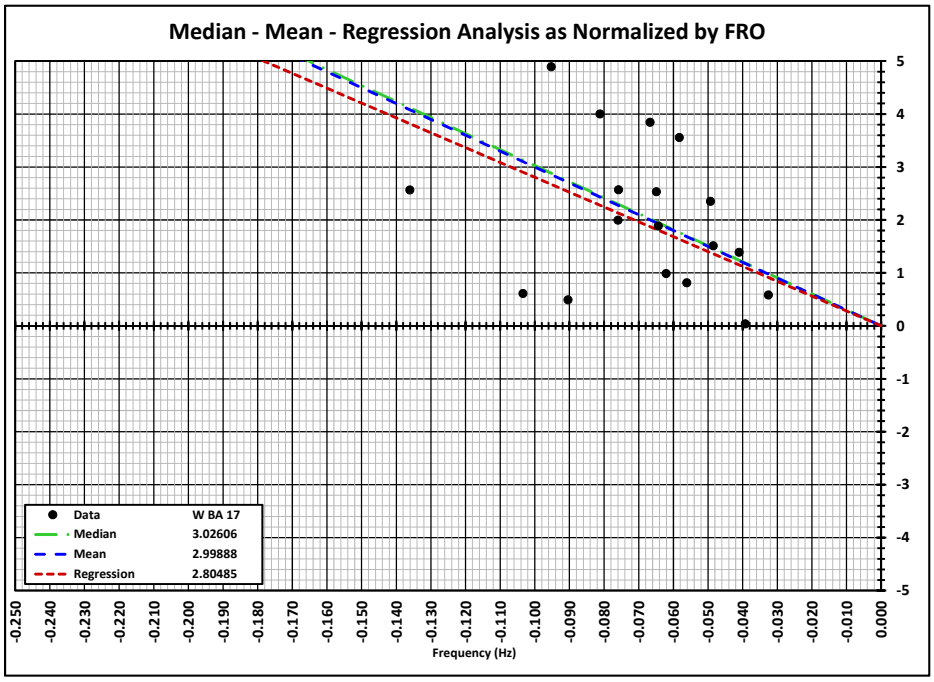

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 13
Median 4.71769
Mean 5.17291
Regression 5.14399
Frequency (Hz)

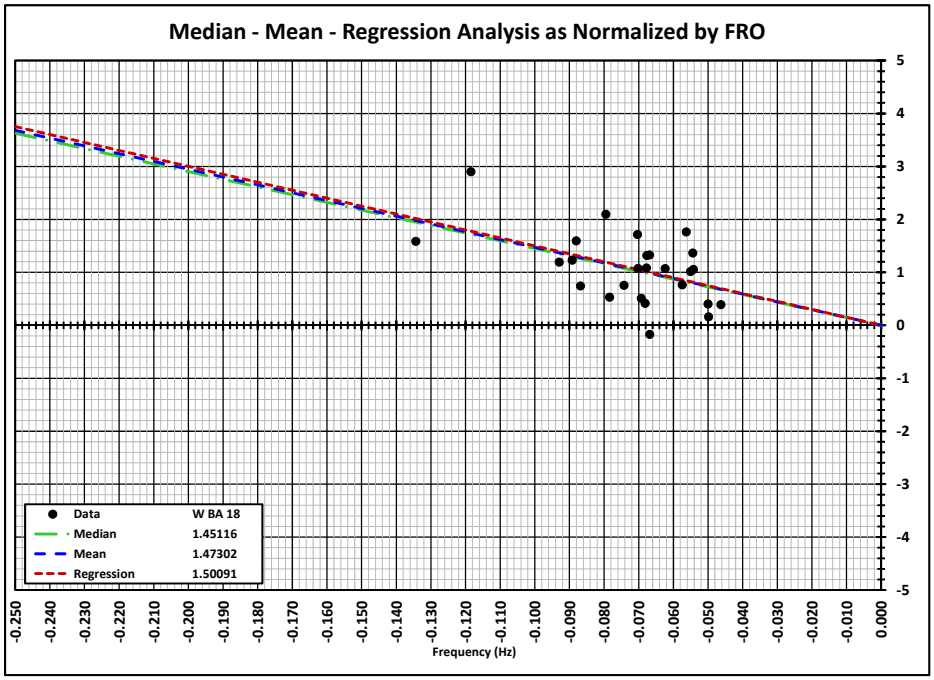

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 14
Median 0.60768
Mean 0.87898
Regression 0.63485
Frequency (Hz)

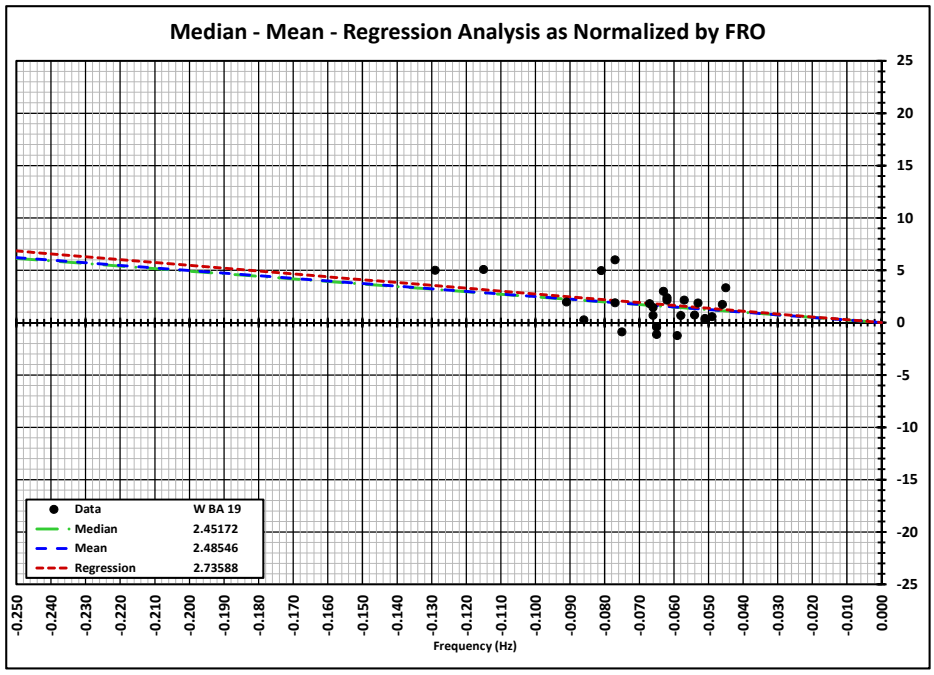

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 15
Median -1.38396
Mean -1.54605
Regression -1.39906
Frequency (Hz)

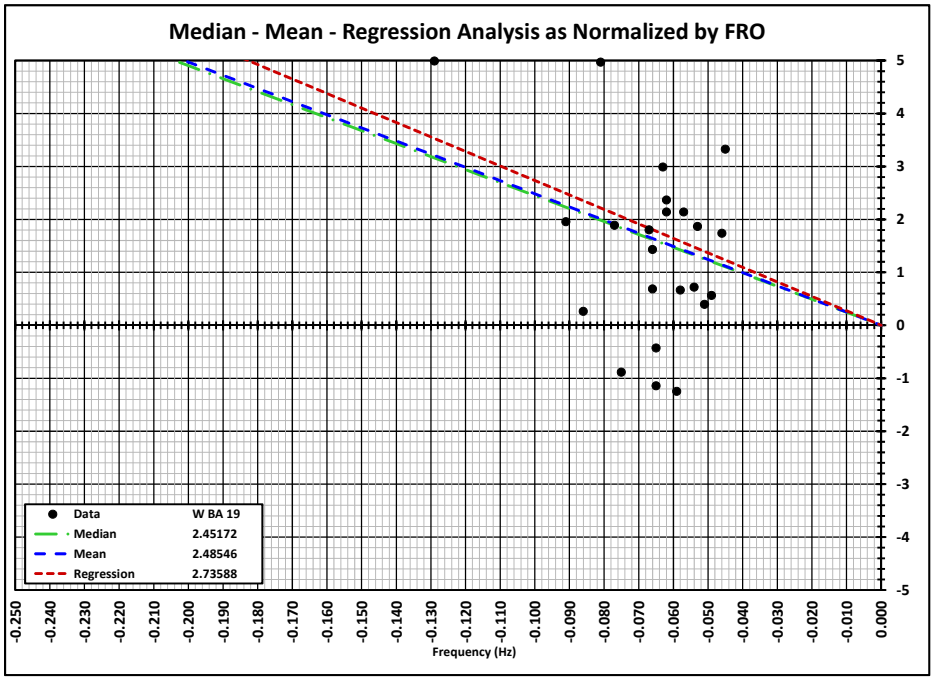

Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 16
Median 3.09936
Mean 3.30917
Regression 3.24174
Frequency (Hz)


Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 16
Median 3.09936
Mean 3.30917
Regression 3.24174
Frequency (Hz)


Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 17
Median 3.02606
Mean 2.99888
Regression 2.80485
Frequency (Hz)


Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 18
Median 1.45116
Mean 1.47302
Regression 1.50091
Frequency (Hz)


Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 19
Median 2.45172
Mean 2.48546
Regression 2.73588
Frequency (Hz)


Median - Mean - Regression Analysis as Normalized by FRO
Data W BA 19
Median 2.45172
Mean 2.48546
Regression 2.73588
5
4
3
2
1
0
-1
-2
-3
-4
-5
-0.250
-0.240
-0.230
-0.220
-0.210
-0.200
-0.190
-0.180
-0.170
-0.160
-0.150
-0.140
-0.130
-0.120
-0.110
-0.100
-0.090
-0.080
-0.070
-0.060
-0.050
-0.040
-0.030
-0.020
-0.010
0.000
Frequency (Hz)

Appendix I – Derivation of the Median, Mean, and Linear Regression

Median

The median best represents a uniform one-dimensional dataset.

Uniform Distribution

In probability theory and statistics, the continuous uniform distribution or rectangular distribution is a family of probability distributions such that for each member of the family, all intervals of the same length on the distribution's support are equally probable. The support is defined by the two parameters, a and b, which are its minimum and maximum values.

Median

We have been taught in statistics that minimizing the sum of the differences error term provides the best estimate for the value for a uniform data set. Define a data set as one dimensional with values $\{x_1, x_2, \ldots, x_n\}$. The objective is to select a single value that best represents this data set by minimizing the sum of the residuals.

$$SDE = \sum_{i=1}^{n} \left(x_i - x_m \right)$$

Where: x_m = Best single value to represent the data set.

The result is undefined using calculus. Therefore, other logic must be used.

Organize the data from smallest to largest. Then investigate the change in total difference as the candidate median value is raised from the smallest to the largest value in the data set.

When the candidate median value is raised above the smallest data value the difference between the candidate median value and the smallest value increases, but the difference between the candidate median value and all other data values decreases by an amount equal to the increase in the difference for the smallest value times the number of data values above the candidate median value. As the candidate median value increases, the total difference from all values will decrease until exactly one half of the data values are above the candidate median value and exactly one half of the data values are below the candidate median value. If there are an even number of data values in the set, any change in the candidate median value between the data value immediately below the half and the data point immediately above the half will not change the total difference because the difference change in the increasing direction and the difference change in the decreasing direction offset each other. However, if there are an odd number of data values in the data set, the candidate median value equal to the center data value will result in a minimum of the differences.

This demonstrates that the medianis the best estimate for a set of uniform data because it minimizes the sum of the error terms for the data set.

The real question is not whether the median is an appropriate estimator, but whether the median is an appropriate estimator for the data being analyzed.

Mean

The mean best represents a normal one dimensional dataset.

Normal (Gaussian) Distribution

In probability theory, the normal (or Gaussian) distribution is a continuous probability distribution that has a bell-shaped probability density function, known as the Gaussian function or informally the bell curve, where parameter μ is the mean or expectation (location of the peak) and σ^2 is the variance, the mean of the squared deviation, (a "measure" of the width of the distribution). σ is the standard deviation. The distribution with μ = 0 and $\sigma^2 = 1$ is called the standard normal. A normal distribution is often used as a first approximation to describe real-valued random variables that cluster around a single mean value.

The normal distribution is considered the most prominent probability distribution in statistics. There are several reasons for this:

- First, the normal distribution is very tractable analytically, that is, a large number of results involving this distribution can be derived in explicit form.
- Second, the normal distribution arises as the outcome of the central limit theorem, which states that under mild conditions the sum of a large number of random variables is distributed approximately normally.
- Third, the bell shape of the normal distribution makes it a convenient choice for modeling a large variety of random variables encountered in practice.

For this reason, the normal distribution is commonly encountered in practice, and is used throughout statistics, natural sciences, and social sciences as a simple model for complex phenomena. For example, the observational error in an experiment is usually assumed to follow a normal distribution, and the propagation of uncertainty is computed using this assumption. Note that a normally-distributed variable has a symmetric distribution about its mean. Quantities that grow exponentially, such as prices, incomes or populations, are often skewed to the right, and hence may be better described by other distributions, such as the log-normal distribution or Pareto distribution. In addition, the probability of seeing a normally-distributed value that is far (i.e., more than a few standard deviations) from the mean drops off extremely rapidly. As a result, statistical inference using a normal distribution is not robust to the presence of outliers (data that is unexpectedly far from the mean, due to exceptional circumstances, observational error, etc.). When outliers are expected, data may be better described using a heavy-tailed distribution such as the Student's t-distribution.

Mean

We have been taught in statistics that minimizing the sum of the squares of the error term provides the best estimate for the value for a normal data set. Let's define a data set as one dimensional with values $\{x_1, x_2, \ldots, x_n\}$. The objective is to select a single value that best represents this data set by minimizing the sum of the squares of the residuals.

$$SSE = \sum_{i=1}^{n} \left(x_i - x_m \right)^2$$

Where: x_m = Best single value to represent the data set.

$$SSE = \sum_{i=1}^{n} \left(x_i^2 - 2x_i x_m + x_m^2 \right)$$

$$SSE = \sum_{i=1}^{n} x_i^2 - \sum_{i=1}^{n} 2x_i x_m + \sum_{i=1}^{n} x_m^2$$

$$SSE = \sum_{i=1}^{n} x_i^2 - \sum_{i=1}^{n} 2x_i x_m + nx_m^2$$

Take the derivative of ***SSE*** with respect to x_m, and set that derivative equal to zero.

$$\frac{\partial}{\partial x_m} SSE = \frac{\partial}{\partial x_m} \left(\sum_{i=1}^{n} x_i^2 - \sum_{i=1}^{n} 2x_i x_m + nx_m^2 \right)$$

$$\frac{\partial}{\partial x_m} SSE = \frac{\partial}{\partial x_m} \left(\sum_{i=1}^{n} x_i^2 \right) - \frac{\partial}{\partial x_m} \left(\sum_{i=1}^{n} 2x_i x_m \right) + \frac{\partial}{\partial x_m} \left(nx_m^2 \right)$$

$$\frac{\partial}{\partial x_m} SSE = -2\sum_{i=1}^{n} x_i + 2nx_m = 0$$

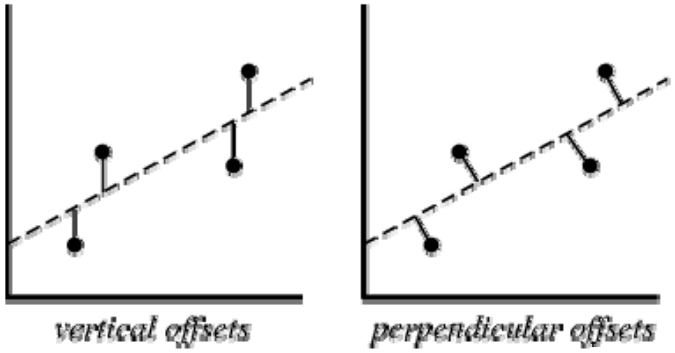
$$\frac{1}{n} \sum_{i=1}^{n} x_i = x_m = \bar{x}$$

This demonstrates that the mean is the best estimate for a set of normal data because it minimizes the sum of the squares of the error terms for the data set.

Linear Regression

A linear regression best represents a normal two dimensional dataset.

As with the one dimensional data set, the objective is to minimize the sum of the squares of the error terms. However, there may be differences that depend upon how we define the error terms.



There are three alternatives available for defining the error term. It can be defined with respect to the dependent variable alone as shown in the vertical offsets plot above. The second is to define the error in terms of the horizontal offsets (not shown). That alternative is the same as the first alternative when the independent variable is exchanged with the dependent variable. The third alternative is to define the error as the perpendicular distance from the best fit line. This is shown in the perpendicular offsets plot above. When the regression is solved using the perpendicular offsets, both variables are considered equal with respect to contribution to error, and the ranking of variables is not necessary.

Solution assuming an independent/dependent variable relationship

In the first example the error term is defined as one dimensional on the dependent variable axis. This is based on the vertical offsets shown above. The result is derived as follows:

$$SSE = \sum_{i=1}^{n} \left(y_i - \hat{y}_i \right)^2$$

Where: $\hat{y}_i$ = Best y value to represent the data set at a given x value.

Substitute a linear equation, $\hat{y}_i = ax_i + b$, for the estimated y value.

$$SSE = \sum_{i=1}^{n} \left(y_i - ax_i - b \right)^2$$

Since we now have two variables, a and b, the derivative must be taken with respect to each variable. Setting each derivative equal to zero will provide two equations that can be solved for the two unknowns, a and b.

$$\frac{\partial}{\partial b} SSE = \frac{\partial}{\partial b} \sum_{i=1}^{n} \left(y_i - a x_i - b \right)^2 = -2 \sum_{i=1}^{n} \left(y_i - a x_i - b \right) = 0$$

$$\frac{\partial}{\partial a} SSE = \frac{\partial}{\partial a} \sum_{i=1}^{n} \left(y_i - a x_i - b \right)^2 = -2 \sum_{i=1}^{n} \left(x_i y_i - a x_i^2 - b x_i \right) = 0$$

Rearrange terms and solve the two equations. Solve for b first.

$$-\sum_{i=1}^{n} y_i + a \sum_{i=1}^{n} x_i + nb = 0 \quad \Rightarrow \quad b = \frac{1}{n} \sum_{i=1}^{n} y_i - a \frac{1}{n} \sum_{i=1}^{n} x_i \quad \Rightarrow \quad b = \bar{y} - a\bar{x}$$

Substitute the result for b into the second equation and solve for a.

$$-\sum_{i=1}^{n} x_i y_i + a \sum_{i=1}^{n} x_i^2 + \left(\bar{y} - a\bar{x} \right) \sum_{i=1}^{n} x_i = 0 \quad \Rightarrow \quad a = \frac{\sum_{i=1}^{n} x_i y_i - n\bar{y}\bar{x}}{\sum_{i=1}^{n} x_i^2 - n\bar{x}^2}$$

Calculate the value of a and substitute into the first equation to get the value of b. These are the most common equations used for linear regression. However, they assume that the dependent and independent variables can be identified and that the error in the dependent variable is more important than the error in the independent variable.

Solution without the independent/dependent variable relationship assumption

In this section, the problem is solved using the perpendicular offsets to determine the error terms. This provides a solution that is not dependent upon any assumption concerning the relationship between the variables.

The first step in this solution is to determine the square of the perpendicular offset from the regression line that represents the error term.

$$SSE = \sum_{i=1}^{n} \left(\frac{\left[y_i - \left(a x_i + b \right) \right]^2}{1 + a^2} \right)$$

Since we again have two variables, a and b, the derivative must be taken with respect to each variable. Setting each derivative equal to zero will provide two equations that can be solved for the two unknowns, a and b.

$$\frac{\partial}{\partial b} SSE = \frac{\partial}{\partial b} \sum_{i=1}^{n} \left(\frac{\left[y_i - \left(a x_i + b \right) \right]^2}{1 + a^2} \right) = \frac{-2}{1 + a^2} \sum_{i=1}^{n} \left(y_i - a x_i - b \right) = 0$$

$$\frac{\partial}{\partial a} SSE = \frac{\partial}{\partial a} \sum_{i=1}^{n} \left(\frac{\left[y_i - (a x_i + b) \right]^2}{1 + a^2} \right)$$

$$\frac{\partial}{\partial a} SSE = \frac{-2}{1 + a^2} \sum_{i=1}^{n} (y_i - a x_i - b) x_i - \sum_{i=1}^{n} \frac{(y_i - a x_i - b)^2 (2a)}{(1 + a^2)^2} = 0$$

Rearrange terms and solve the two equations. Solve for b first.

$$-\sum_{i=1}^{n} y_i + a \sum_{i=1}^{n} x_i + nb = 0 \quad \Rightarrow \quad b = \frac{1}{n} \sum_{i=1}^{n} y_i - a \frac{1}{n} \sum_{i=1}^{n} x_i \quad \Rightarrow \quad b = \bar{y} - a\bar{x}$$

This is the same result as before. Substitute the result for ***b*** into the second equation and solve for ***a***. The detailed intermediate equations for this solution can be found at http://mathworld.wolfram.com/LeastSquaresFittingPerpendicularOffsets.html. After much manipulation the following equations result:

$$A = \frac{1}{2} \frac{\left(\sum_{i=1}^{n} y_i^2 - n\bar{y}^2 \right) - \left(\sum_{i=1}^{n} x_i^2 - n\bar{x}^2 \right)}{n\bar{y}\bar{x} - \sum_{i=1}^{n} x_i y_i} \quad \Rightarrow \quad a = -A \pm \sqrt{A^2 + 1}$$

This solution is somewhat more complex than the vertical offset solution. That is the reason that the vertical offset solution is commonly used. In most cases, the vertical offset solution provides an adequate answer to the problem without the added complexity of the perpendicular offset solution. However, when the vertical offset solution is used, it makes a difference which variable is considered the independent variable and the dependent variable. This can significantly affect the results when the slope is large.

Additional information requires a special case linear regression

The calculation of Frequency Response requires the use of a special case linear regression. Frequency Response is defined as to be equal to zero when the frequency error is equal to zero. This information requires the modification of the linear regression used to provide the best representation of the data. The appropriate linear regression for representing Frequency Response is a regression where the regression line crosses the origin of the axis representing the two variables, frequency and Frequency Response (MW). Therefore, the previously developed general solution to the problem requires modification. This is done by setting the variable that represents the ***y-intercept*** to zero. In the above examples, the ***b*** term must be set to zero.

Special case solution assuming an independent/dependent variable relationship

In the first example the error term is defined as one dimensional on the dependent variable axis. This is based on the vertical offsets but in this case the variable representing the intercept is eliminated. The result is derived as follows:

$$SSE = \sum_{i=1}^{n} \left(y_i - \hat{y}_i \right)^2$$

Where: $\hat{y}_i$ = Best ***y*** value to represent the data set at a given ***x*** value.

Substitute a linear equation, $\hat{y}_i = ax_i$, for the estimated ***y*** value.

$$SSE = \sum_{i=1}^{n} \left(y_i - ax_i \right)^2$$

Since we now have a single variables, ***a***, the derivative must be taken with respect to that variable. Setting the derivative equal to zero will provide an equation that can be solved for the unknown, ***a***.

$$\frac{\partial}{\partial a} SSE = \frac{\partial}{\partial a} \sum_{i=1}^{n} \left(y_i - ax_i \right)^2 = -2 \sum_{i=1}^{n} \left(x_i y_i - ax_i^2 \right) = 0$$

Rearrange terms and solve the equation.

$$-\sum_{i=1}^{n} x_i y_i + a \sum_{i=1}^{n} x_i^2 = 0 \qquad \Rightarrow \qquad a = \frac{\sum_{i=1}^{n} x_i y_i}{\sum_{i=1}^{n} x_i^2}$$

This equation is somewhat simpler than the equation using a non-zero intercept. In the specific case that we are considering, the estimate of Frequency Response, the slope of the regression line is not expected to be large, near vertical. Therefore, the assumption of dependent and independent variables is not important to the solution. In this case, the additional complexity added by considering the horizontal offsets is not significant to the solution and has been eliminated from consideration.

Appendix J – Generator Governor Survey Instructions

NOTE: These were the instructions for the Generators Governor Survey conducted in September 2010.

Frequency Response Initiative

Generator Governor Survey

For the purposes of this survey, governors are defined as any device that implements Primary Frequency Response (speed regulation) for generators.

The survey will be sent to Generator Owners and Generator Operators.

- The survey includes all generators rated 20 MVA or higher, or plants that aggregate to a total of 75 MVA or greater net rating at the point of interconnection (i.e., wind farms, PV farms, etc.), accordance with the Statement of Compliance Registry Criteria, Rev. 5.0.
- Jointly-owned units should be reported by the operating entity.
- For combined-cycle plants, the combustion turbines and heat-recovery (steam turbine) units should be reported separately.
- Wind farms should report on a point-of-interconnection basis.
- If the unit is operable in more than one interconnection, complete the survey for operation in each of the interconnections.

NOTE: The 256-character limitation noted on the spreadsheet is a Microsoft Excel limitation on characters in a cell. If additional space is needed, please supply supplemental documentation as necessary.

When responding, please upload your response and any supporting documentation through the NERC Secure Alerts System

General Questions

1. Does your organization have a formal policy on the installation and operation of generator governors?
2. Does your organization have a testing procedure for governors? If so, how often are they tested?

Unit-Specific Questions

The following questions will all apply to each generator:

1. Unit name and number.

2. Balancing Authority (BA) in which the generator is operated (pull-down).
   a. If operable in more than one, please note all applicable BAs.
   b. If operable in more than one interconnection, complete the survey for operation in each of the interconnections.
3. Unit seasonal Net MW ratings normally reported to NERC for resource adequacy analyses:
   a. Summer Net MW rating
   b. Winter Net MW rating
4. Prime mover (steam turbine, combustion turbine, wind turbine, etc. — pull-down)
5. Fuel type (coal, oil, nuclear, etc. — pull-down)
6. Unit inertia constant (H) as modeled in dynamics analyses – the combined kinetic energy of the generator and prime-mover in watt-seconds at rated speed divided by the VA (Volt-Ampere) base.
7. What are the annual run hours for the unit (data for each of the last 3 years)?
8. What is the continuous MW rating (Pmax) of the unit?
9. What percent of time does the unit run at Pmax or valves wide-open?
   a. 0 to 30%
   b. 31% to 60%
   c. 61% to 100%
10. Equipped with a Governor? (Y/N) If not, no further answers are necessary.
11. If yes, is the governor operational? (Y/N with a comment box) If not, please explain.
   a. Is the governor normally in operation? (Y/N with a comment box) (even if not normally operated, the data on the governor is still needed)
   b. What is the normal governor mode of operation? (pull-down)
   c. Is the governor response sustainable for more than one minute if conditions remain outside of the deadband? (Y/N)
   d. Are there any regulatory restrictions regarding the operation of the governor? This should cover nuclear regulation, environmental restrictions (water temperature, emissions), water flow, etc.
   e. Does the governor respond beyond the high/low operating limit (boiler blocks)? (Y/N)
   f. Is the governor response limited by the rate of change? (Y/N)
   g. Are there any other unit-level or plant-level control schemes that would override or limit governor performance? If yes, please explain.
12. Governor Type?
   - Electronic (analog electro-hydraulic);
   - DEH (digital electro hydraulic);
   - Mechanical;
   - Other — please specify.
13. Governor manufacturer and model?
   a. If mixed vendor equipment is installed, please explain.
14. Governor Deadband setting?
   a. Deadband in(+/-) mHz

i. If in mHz is the deadband centered around a frequency reference (60 Hz or current frequency)?

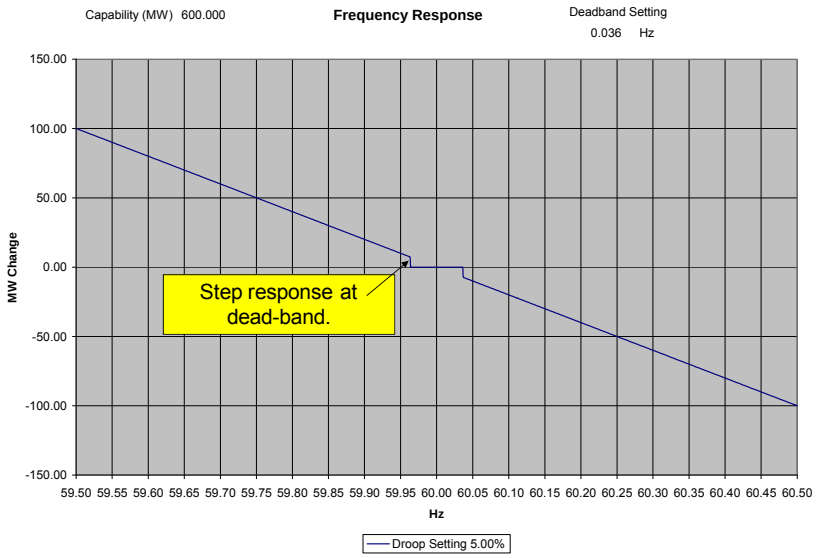
b. Deadband in (+/-) RPM
   i. For RPM specify number of machine poles
   ii. If in RPM, is the RPM reference nominal or current RPM?

c. What is the basis for this setting?

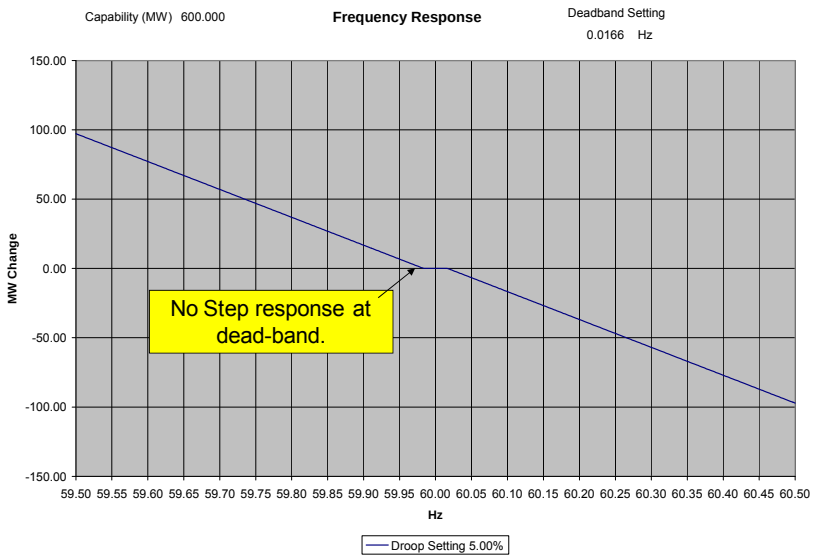
d. Once activated, what are the conditions for which the governor action is reset?

15. What is the percentage (%) droop setting on the governor?
    a. What is the basis for the droop setting?

16. Does the unit Frequency Response step into the droop curve or is it linear from the deadband?



Step Implementation (step): When frequency crosses the governor dead-band setting the output of the governor “steps” into the 5% droop curve as if the dead-band did not exist.



Without Step Implementation (linear): When frequency crosses the governor dead-band setting the output of the governor adds proportional output toward the droop curve end point.

17. Prime mover control mode – What is the normally used Turbine Control mode(s)? If more than one is prevalently used, select a primary and explain.
    - Turbine manual
    - Thermally-limited
    - Turbine following
    - Boiler following
    - Part-load
    - Pre-select
    - MW set point
    - Coordinated control
    - Other (please explain) If more than one is prevalently used, select a primary and explain.

18. Do market rules restrict or override governor speed controls? (Y/N) If yes, please explain.

For steam generator controls (boiler controls) or combined cycle central station controls:

19. Does the boiler control or combined cycle central station control have a frequency input? (Y/N) If yes, answer the following questions:
    a. Deadband in(+/-) mHz
        i. If in mHz is the deadband centered around a frequency reference (60 Hz or current frequency)?

b. Deadband in (+/-) RPM
    i. For RPM specify number of machine Poles
    ii. If in RPM, is the RPM reference nominal or current RPM?
c. What is the basis for this setting?

20. Does the control's Frequency Response step into the droop curve or is it linear from the deadband?
21. What is the steam turbine control mode? (boiler following, turbine following, coordinated control)
22. Do the unit or plant controls over-ride governor speed control or are the control parameters supportive? (Y/N)
23. Does the boiler operate under variable/sliding pressure? (Y/N)
    a. What is the control/governor valve position percentage (%) during variable pressure operation?
24. Do unit or plant economic controls over-ride governor speed control? (Y/N)

Event Performance Data

The following five questions are to be answered for each generator to ascertain its performance during the specified frequency events (one per interconnection). The frequency events data to be reported are:

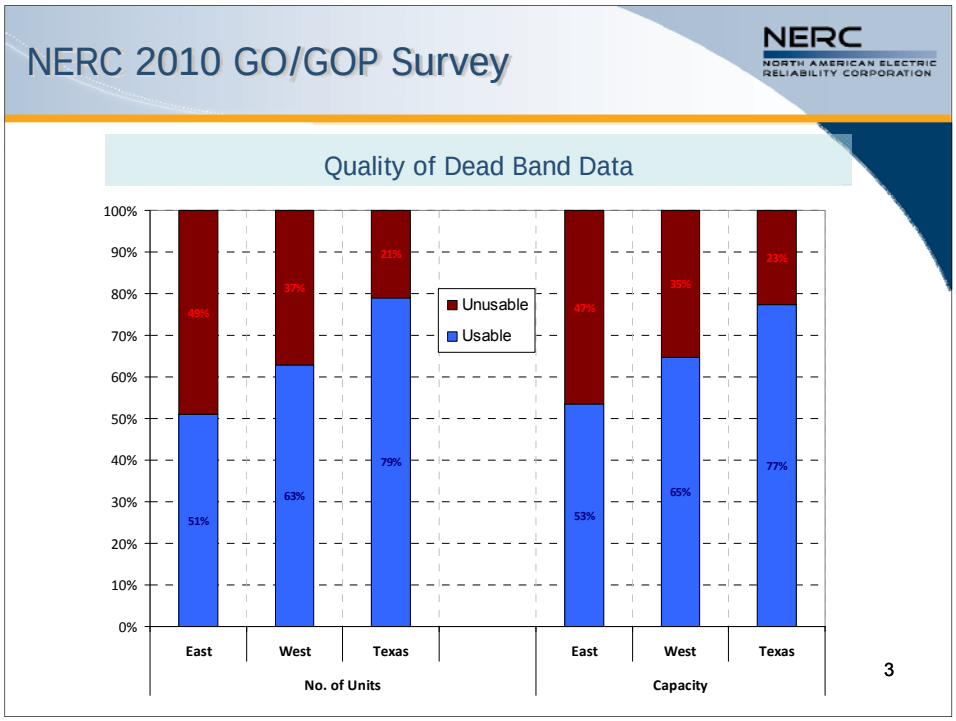
Interconnection	Date	Time	Time Zone
Eastern	8/16/2010	14:25:29	CST
Western	8/12/2010	1:06:15	CST
Texas	8/20/2010	14:44:03	CST
Québec	12/10/2009	15:09:31	EST

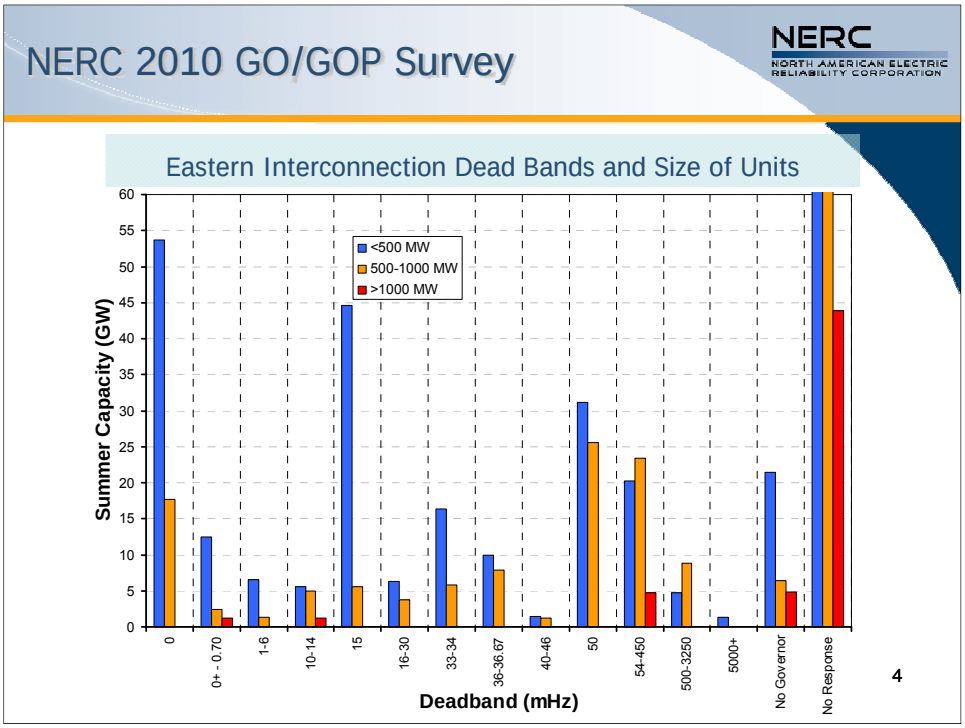
25. Was the unit on-line during the event? (Y/N)
26. Pre-event generation (MW) – Enter the MW output of the generator at the time just before the event began.
27. Post-event generation (MW) – Enter the MW output of the generator after the event that was reflects the response by the governor to the frequency deviation.
28. Time to achieve post-event response (seconds) – Enter the time (in seconds) it took to achieve the MW response noted in question 27.
29. Comments (256 characters) – Enter any comments necessary. If no data is available for the event, note that here.

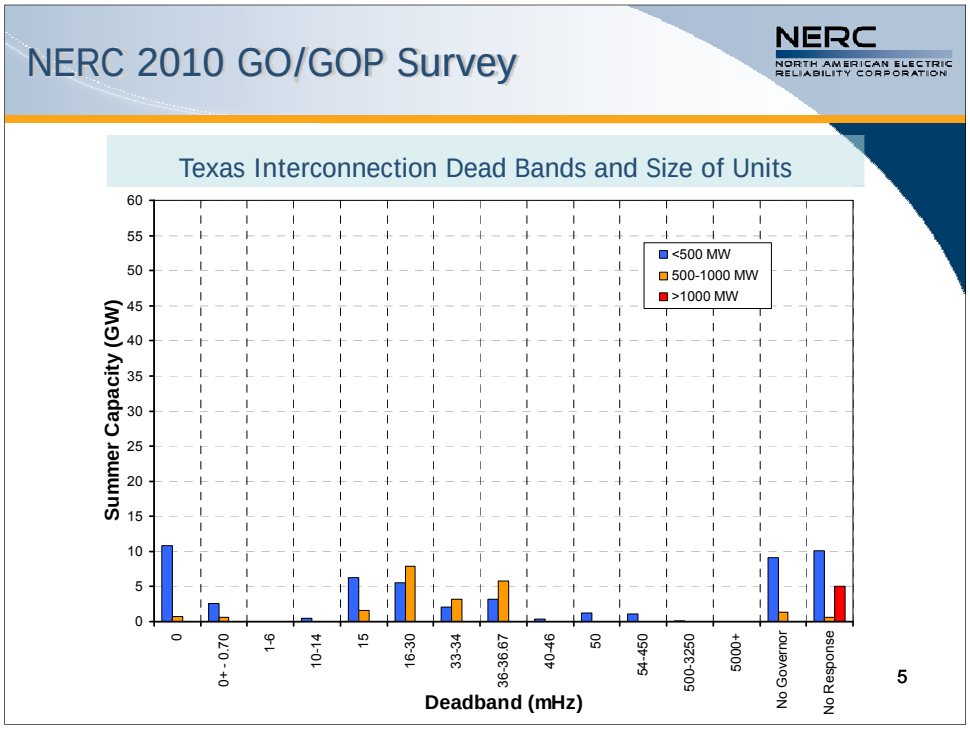
Appendix K – Generator Governor Survey Summary

The following are slides that summarize the responses of the 2010 Generator Governor Survey.

Deadband Settings



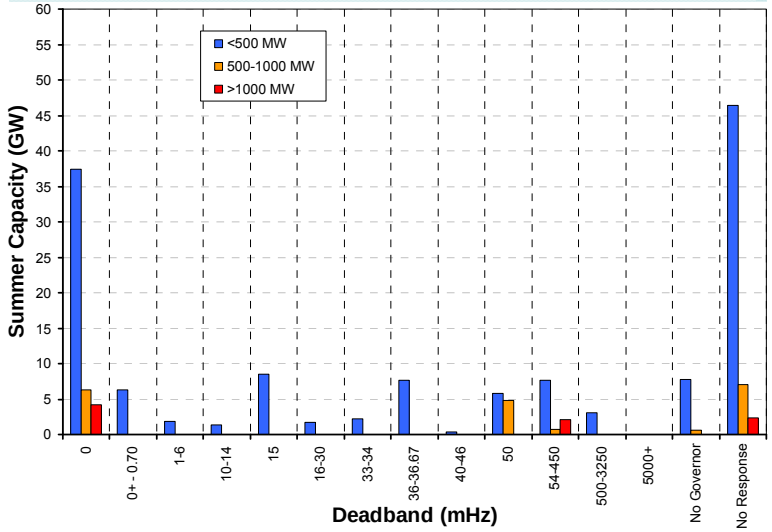

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Eastern Interconnection Dead Bands and Size of Units
Summer Capacity (GW)
<500 MW
500-1000 MW
>1000 MW
0
0+ - 0.70
1-6
10-14
15
16-30
33-34
36-36.67
40-46
50
54-450
500-3250
5000+
No Governor
No Response
Deadband (mHz)
4


NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Texas Interconnection Dead Bands and Size of Units
Summer Capacity (GW)
<500 MW
500-1000 MW
>1000 MW
0
0+ - 0.70
1-6
10-14
15
16-30
33-34
36-36.67
40-46
50
54-450
500-3250
5000+
No Governor
No Response
Deadband (mHz)
5

NERC 2010 GO/GOP Survey

NERC NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Western Interconnection Dead Bands and Size of Units

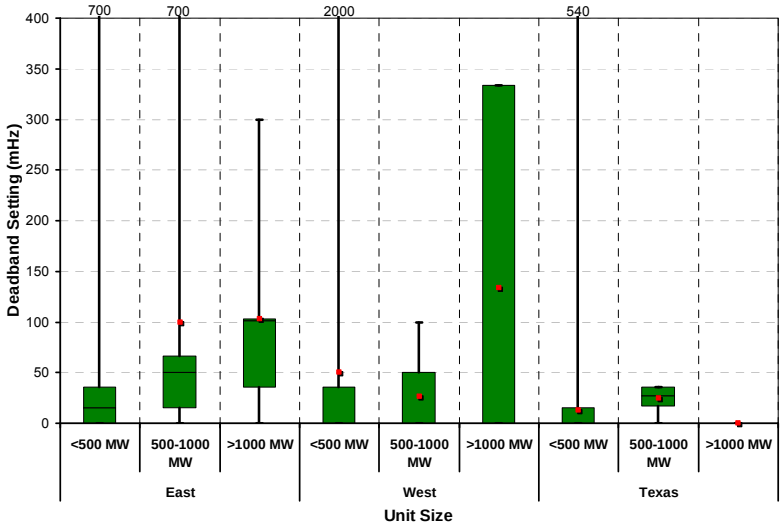


6

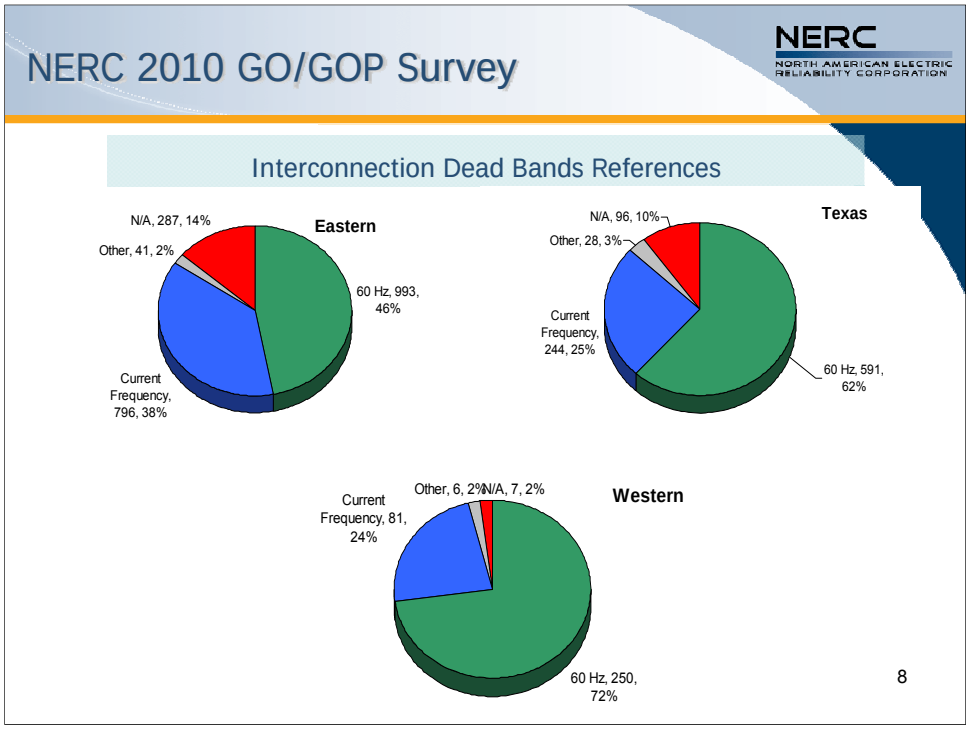
NERC 2010 GO/GOP Survey

NERC NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

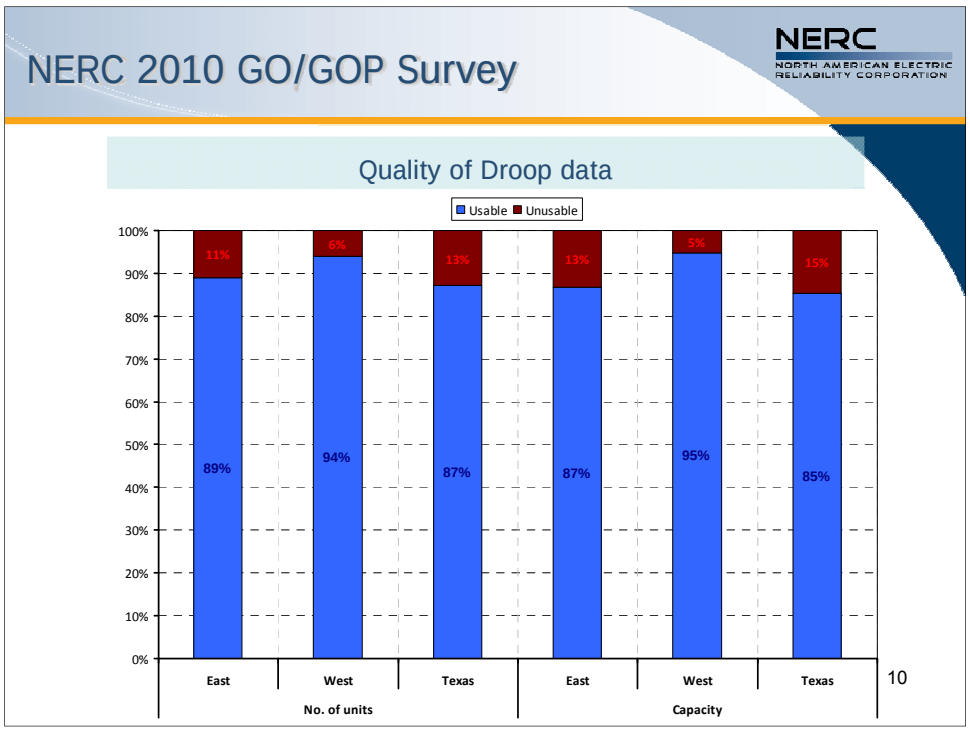
Interconnection Dead Bands Range and Size of Units

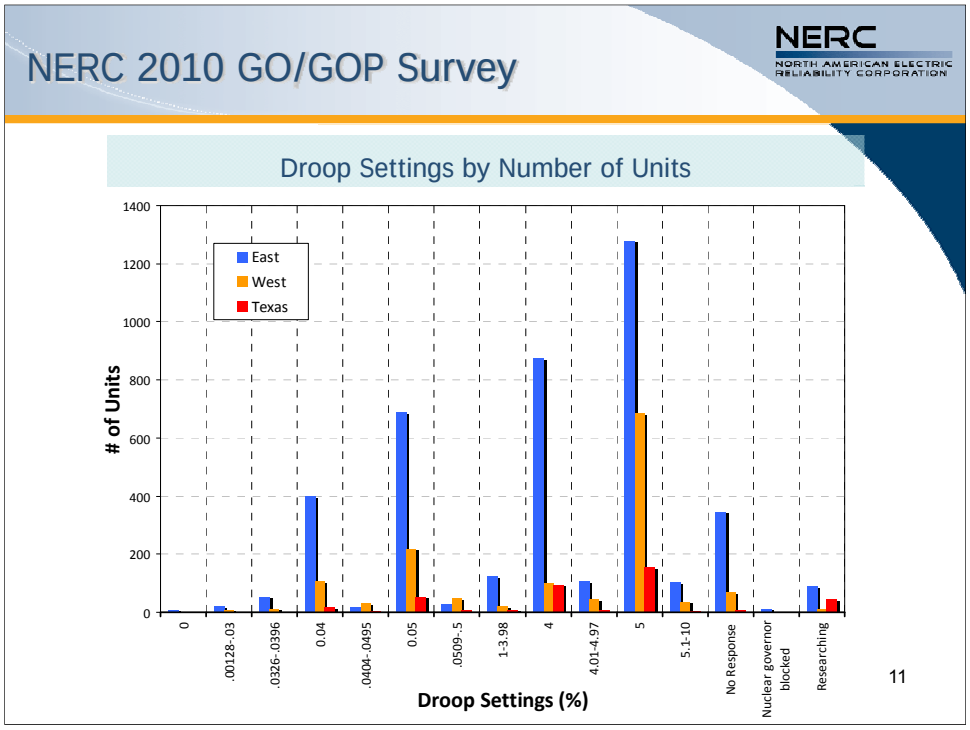


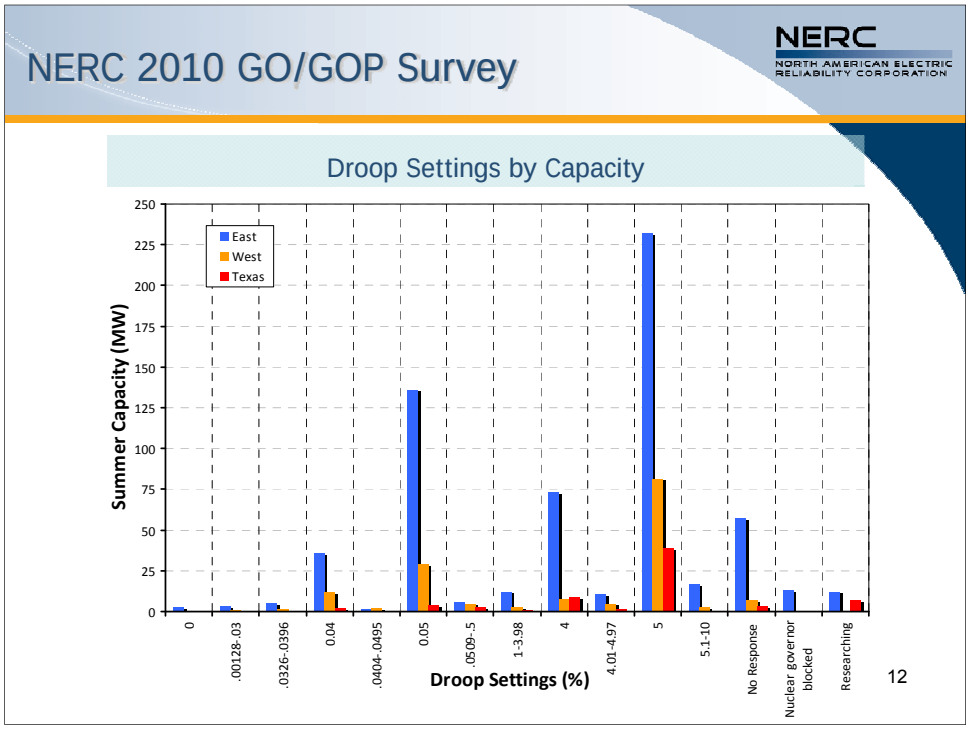
7

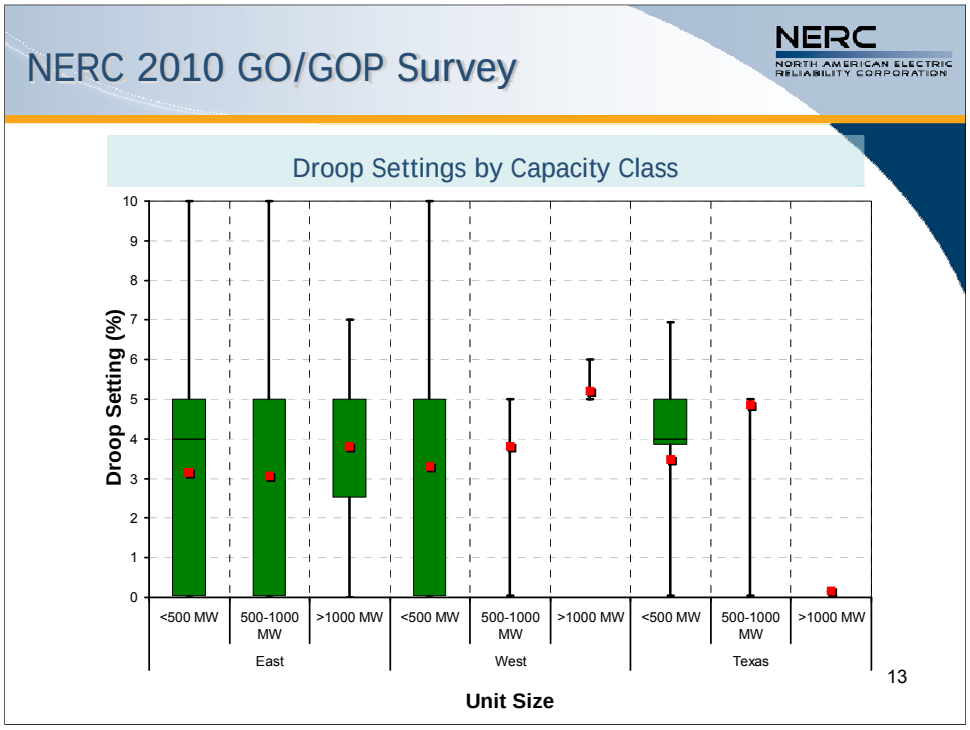


Droop Settings

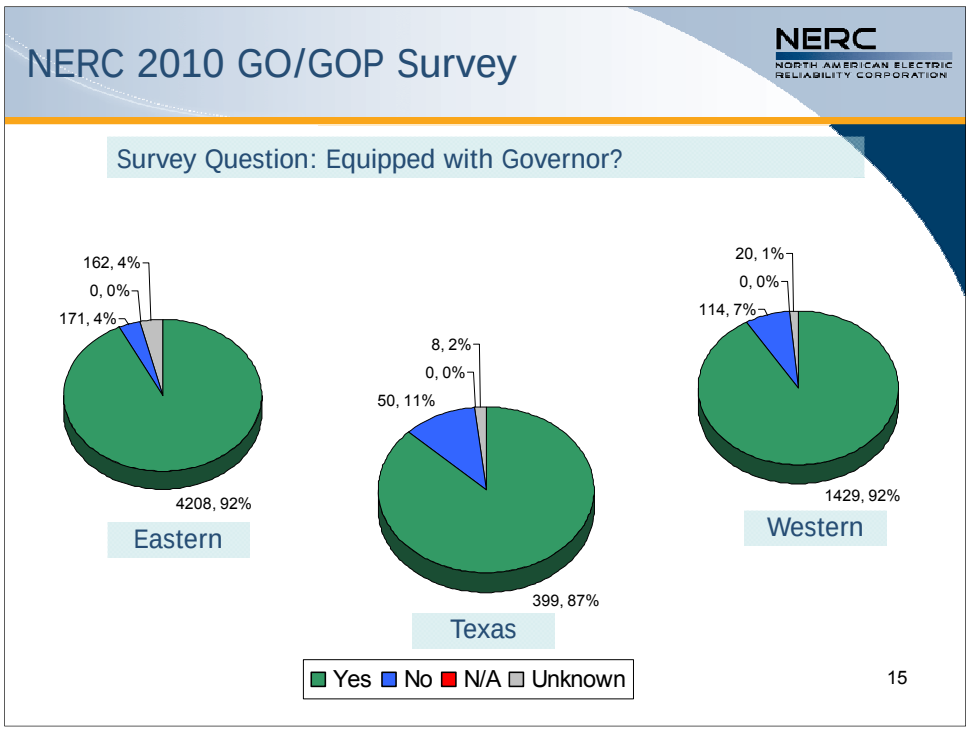


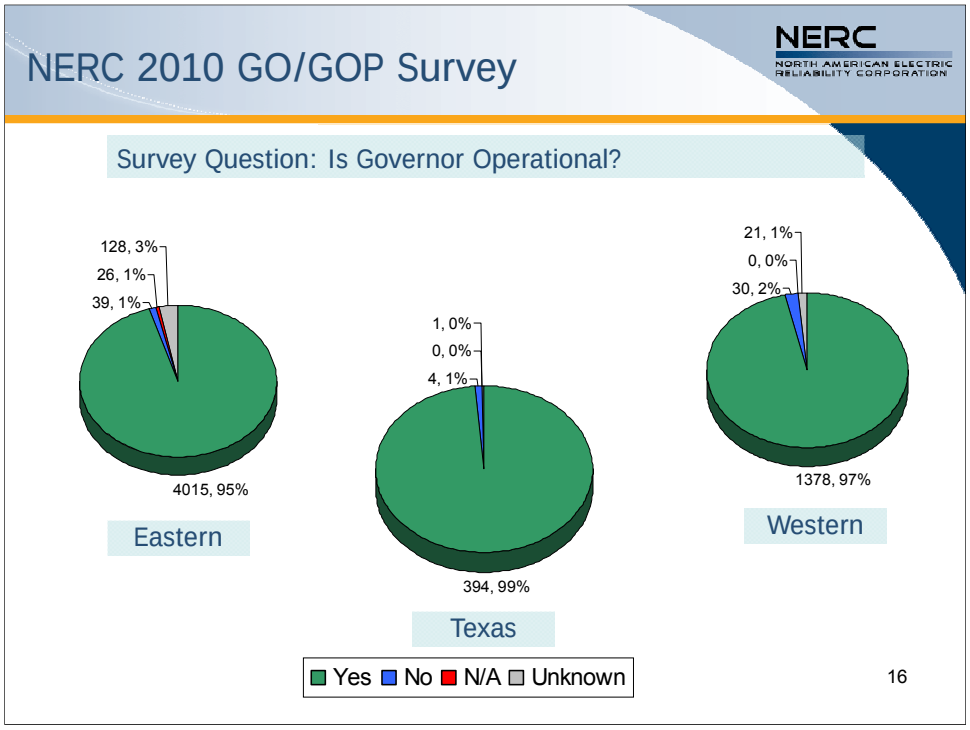

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Droop Settings by Number of Units
East
West
Texas
# of Units
1400
1200
1000
800
600
400
200
0
0
.00128-.03
.0326-.0396
0.04
.0404-.0495
0.05
.0509-.5
1-3.98
4
4.01-4.97
5
5.1-10
No Response
Nuclear governor blocked
Researching
Droop Settings (%)
11

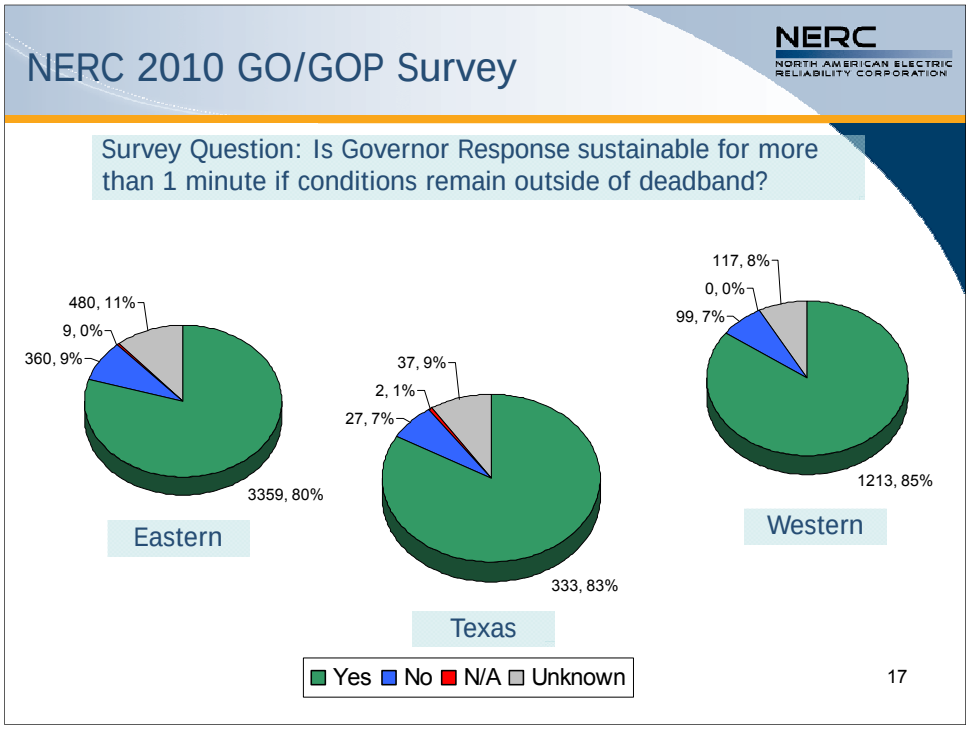

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Droop Settings by Capacity
East
West
Texas
Summer Capacity (MW)
250
225
200
175
150
125
100
75
50
25
0
0
.00128-.03
.0326-.0396
0.04
.0404-.0495
0.05
.0509-.5
1-3.98
4
4.01-4.97
5
5.1-10
No Response
Nuclear governor blocked
Researching
Droop Settings (%)
12

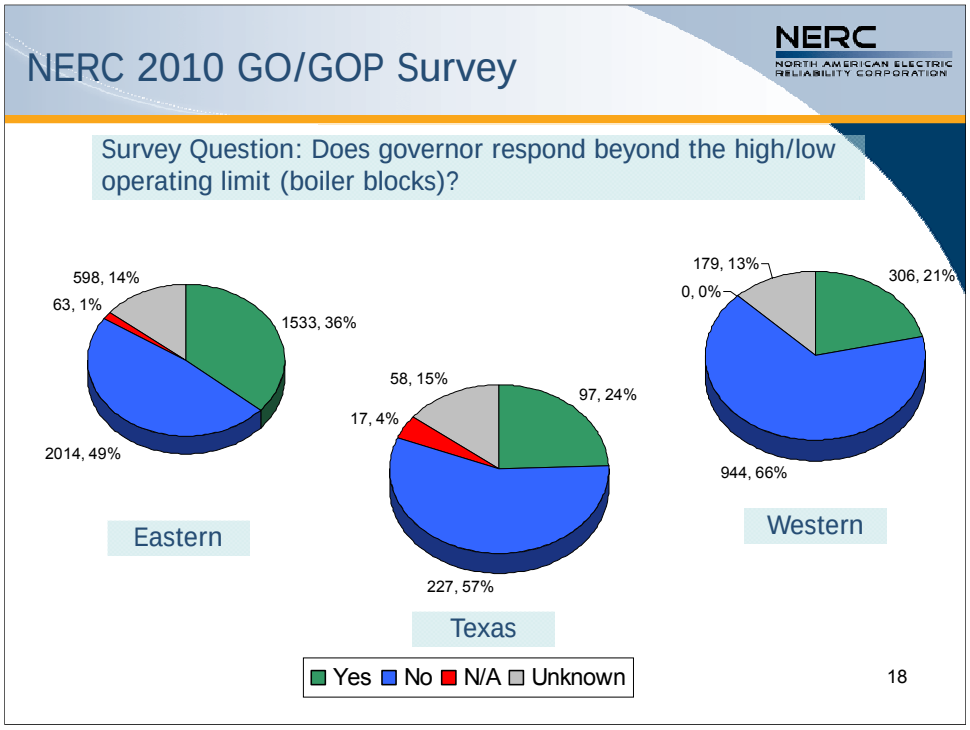


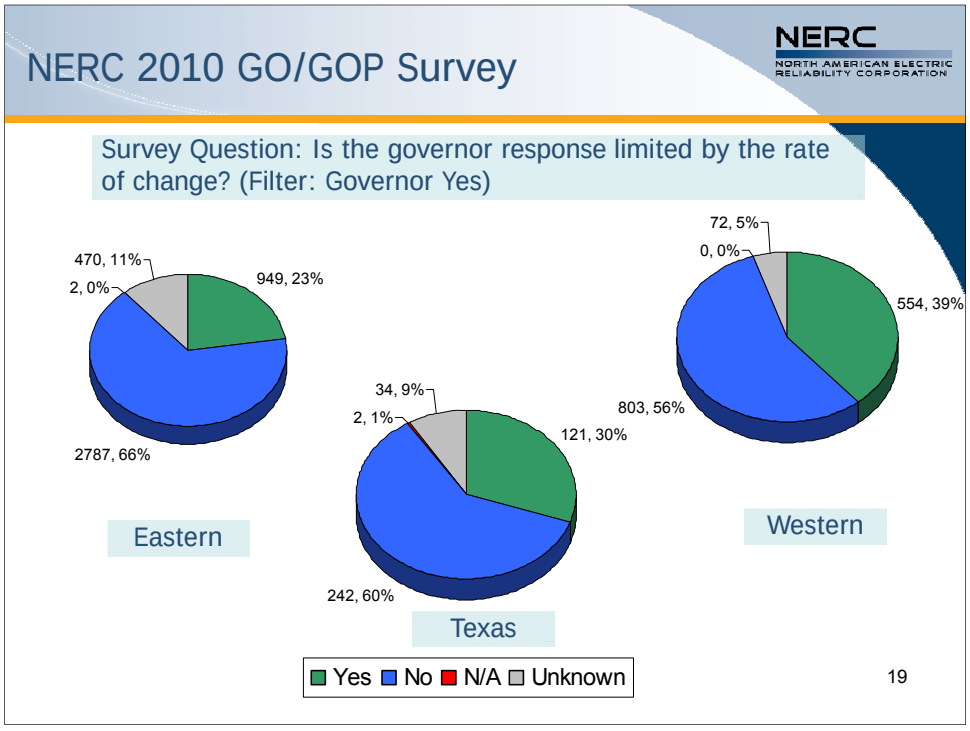
Results of Other Survey Questions

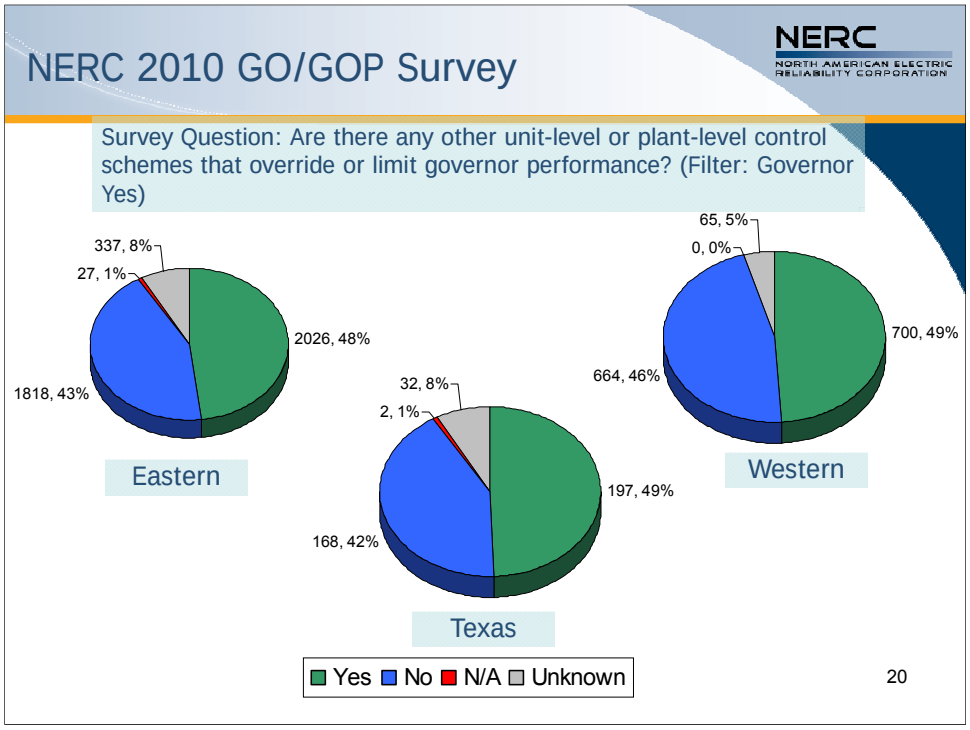


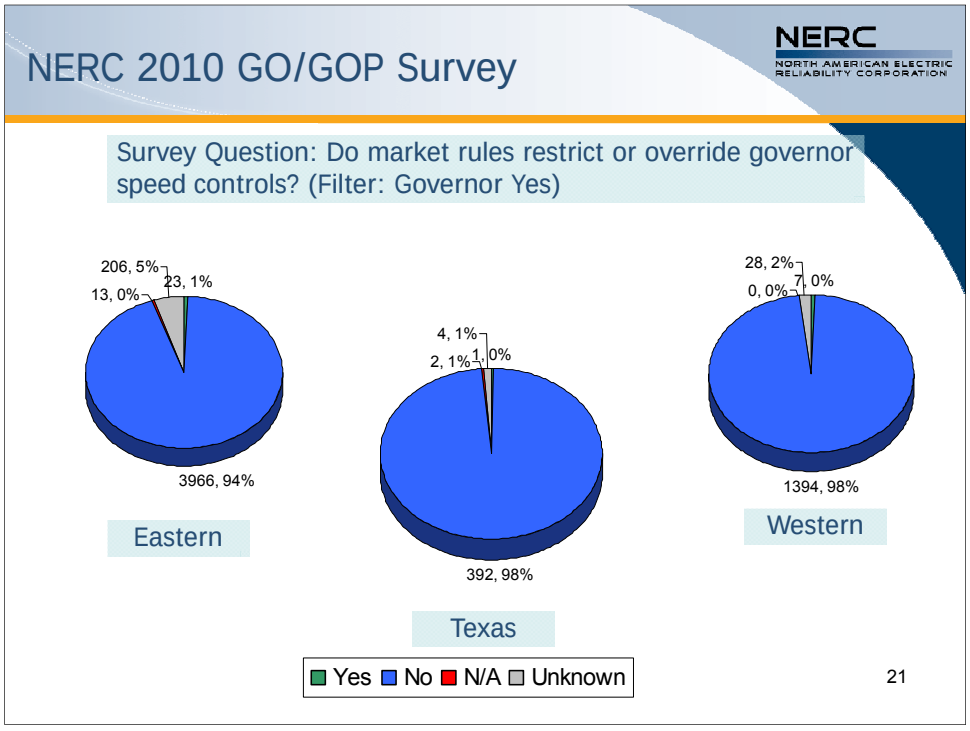

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Survey Question: Is Governor Operational?
128, 3%
26, 1%
39, 1%
4015, 95%
Eastern
1, 0%
0, 0%
4, 1%
394, 99%
Texas
21, 1%
0, 0%
30, 2%
1378, 97%
Western
Yes No N/A Unknown
16

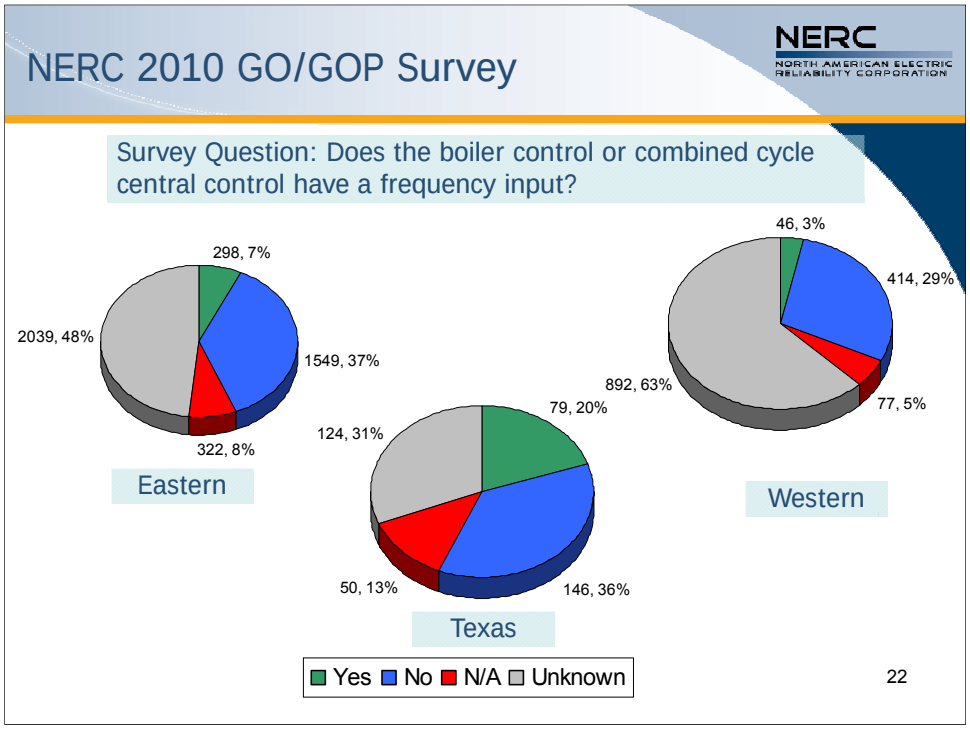

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Survey Question: Is Governor Response sustainable for more than 1 minute if conditions remain outside of deadband?
480, 11%
9, 0%
360, 9%
3359, 80%
Eastern
37, 9%
2, 1%
27, 7%
333, 83%
Texas
117, 8%
0, 0%
99, 7%
1213, 85%
Western
Yes No N/A Unknown
17

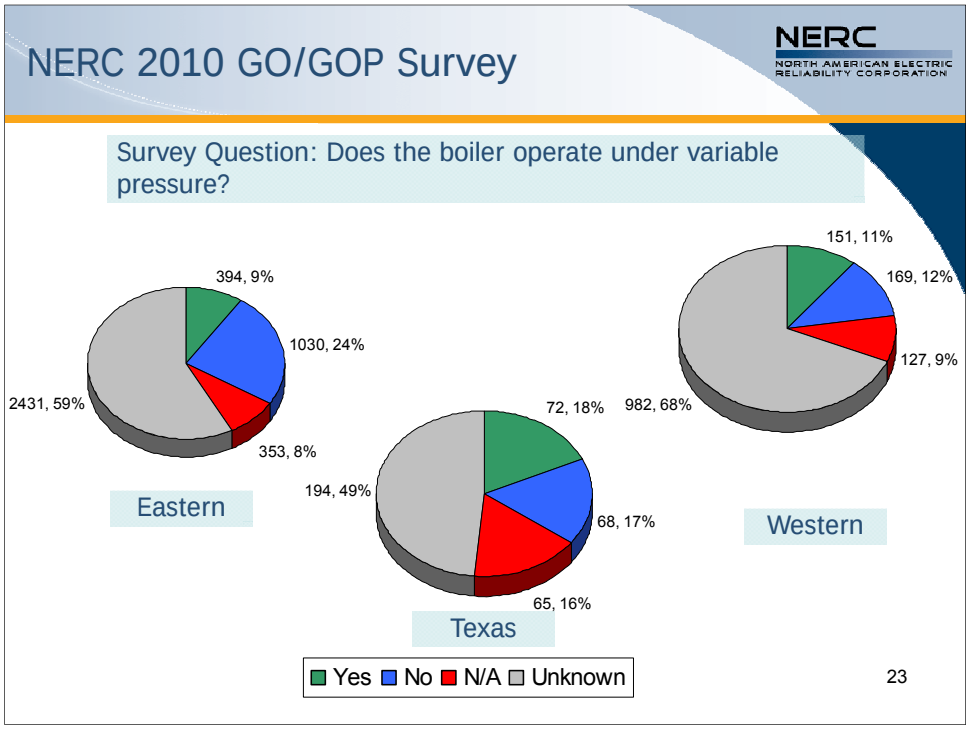

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Survey Question: Does governor respond beyond the high/low operating limit (boiler blocks)?
598, 14%
63, 1%
1533, 36%
2014, 49%
Eastern
58, 15%
17, 4%
97, 24%
227, 57%
Texas
179, 13%
0, 0%
306, 21%
944, 66%
Western
Yes No N/A Unknown
18

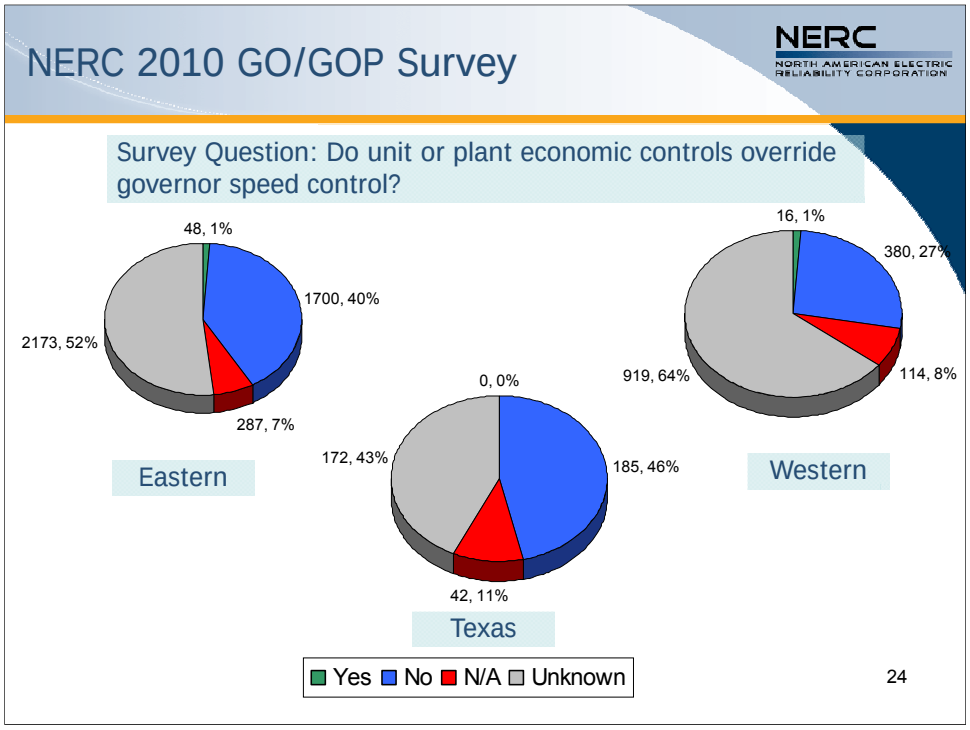

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Survey Question: Is the governor response limited by the rate of change? (Filter: Governor Yes)
470, 11%
2, 0%
949, 23%
2787, 66%
Eastern
34, 9%
2, 1%
121, 30%
242, 60%
Texas
72, 5%
0, 0%
554, 39%
803, 56%
Western
Yes No N/A Unknown
19


NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Survey Question: Are there any other unit-level or plant-level control schemes that override or limit governor performance? (Filter: Governor Yes)
337, 8%
27, 1%
2026, 48%
1818, 43%
Eastern
32, 8%
2, 1%
197, 49%
168, 42%
Texas
65, 5%
0, 0%
700, 49%
664, 46%
Western
Yes No N/A Unknown
20

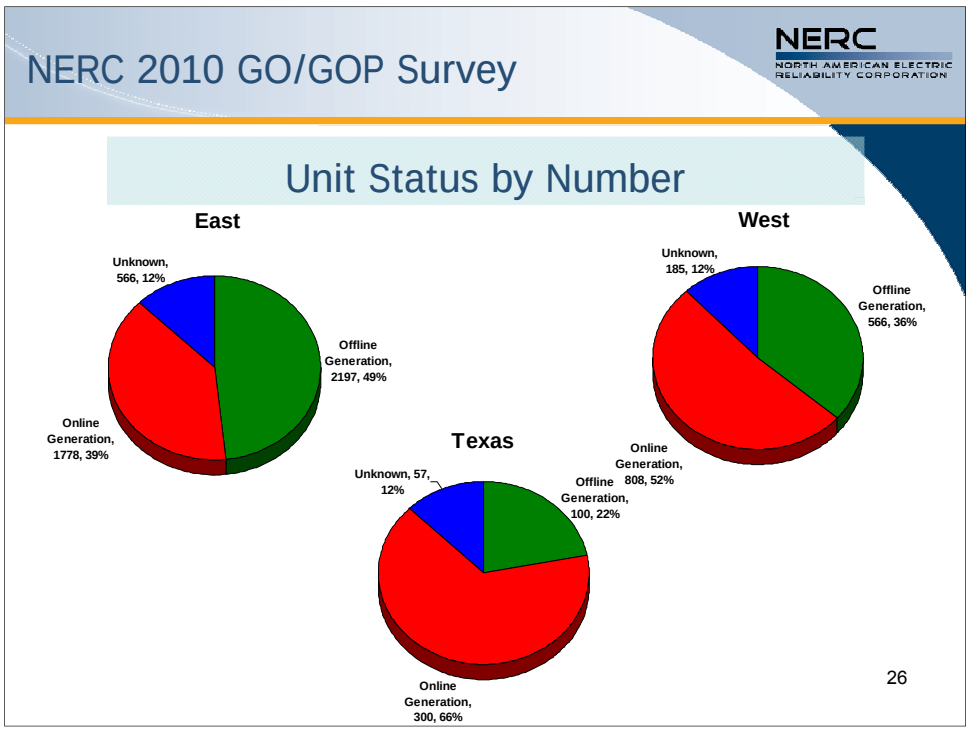

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Survey Question: Do market rules restrict or override governor speed controls? (Filter: Governor Yes)
206, 5%
23, 1%
13, 0%
3966, 94%
Eastern
4, 1%
2, 1%
1, 0%
392, 98%
Texas
28, 2%
7, 0%
0, 0%
1394, 98%
Western
Yes No N/A Unknown
21

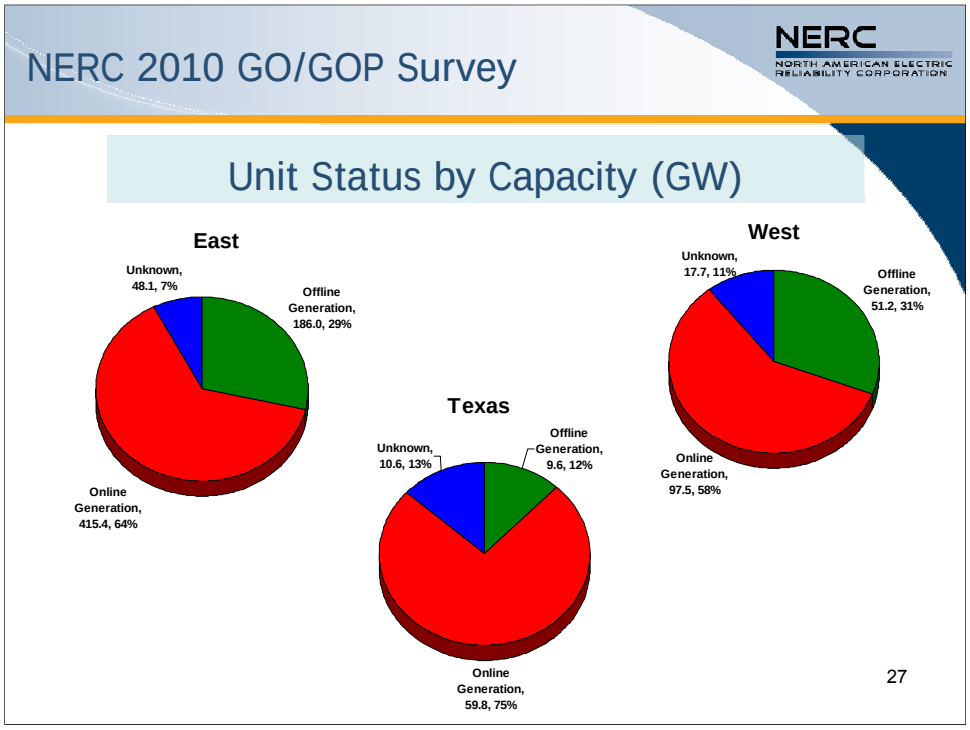

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Survey Question: Does the boiler control or combined cycle central control have a frequency input?
298, 7%
2039, 48%
1549, 37%
322, 8%
Eastern
46, 3%
414, 29%
892, 63%
77, 5%
Western
79, 20%
124, 31%
50, 13%
146, 36%
Texas
Yes No N/A Unknown
22

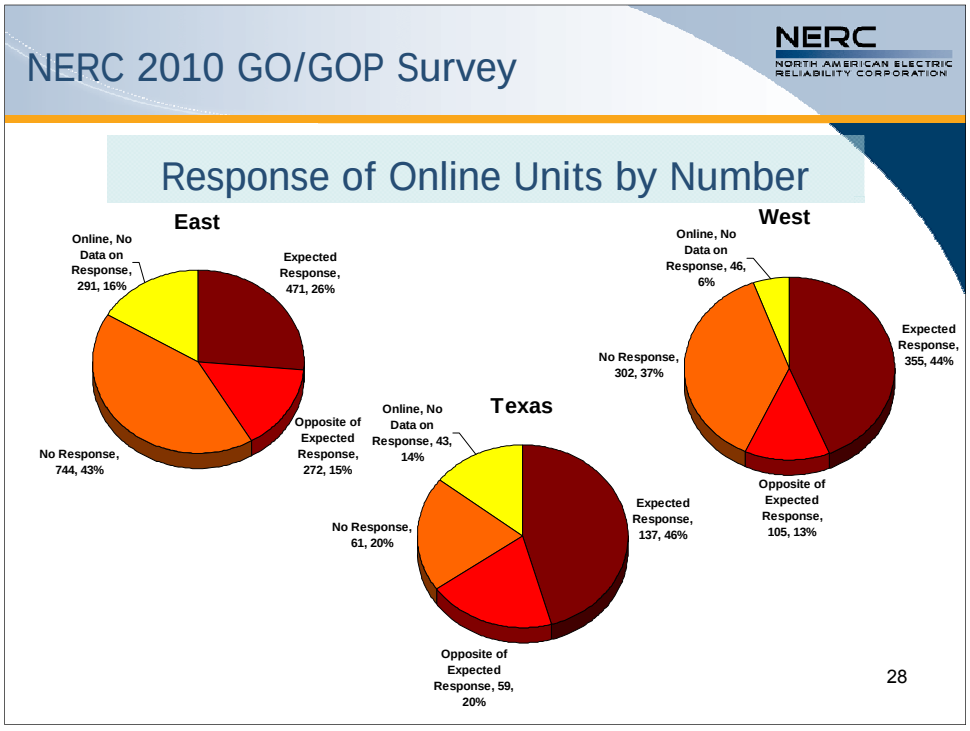

NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Survey Question: Does the boiler operate under variable pressure?
394, 9%
1030, 24%
2431, 59%
353, 8%
Eastern
151, 11%
169, 12%
127, 9%
982, 68%
Western
72, 18%
194, 49%
68, 17%
65, 16%
Texas
Yes No N/A Unknown
23



Survey Event Data

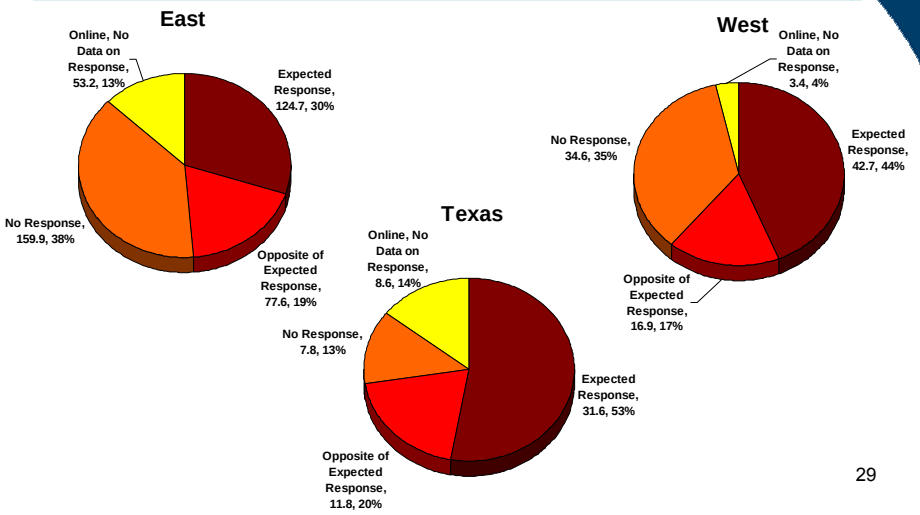



NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Unit Status by Capacity (GW)
East
Unknown, 48.1, 7%
Offline Generation, 186.0, 29%
Online Generation, 415.4, 64%
West
Unknown, 17.7, 11%
Offline Generation, 51.2, 31%
Online Generation, 97.5, 58%
Texas
Unknown, 10.6, 13%
Offline Generation, 9.6, 12%
Online Generation, 59.8, 75%
27


NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Response of Online Units by Number
East
Online, No Data on Response, 291, 16%
Expected Response, 471, 26%
Opposite of Expected Response, 272, 15%
No Response, 744, 43%
West
Online, No Data on Response, 46, 6%
Expected Response, 355, 44%
No Response, 302, 37%
Opposite of Expected Response, 105, 13%
Texas
Online, No Data on Response, 43, 14%
Expected Response, 137, 46%
No Response, 61, 20%
Opposite of Expected Response, 59, 20%
28

NERC 2010 GO/GOP Survey

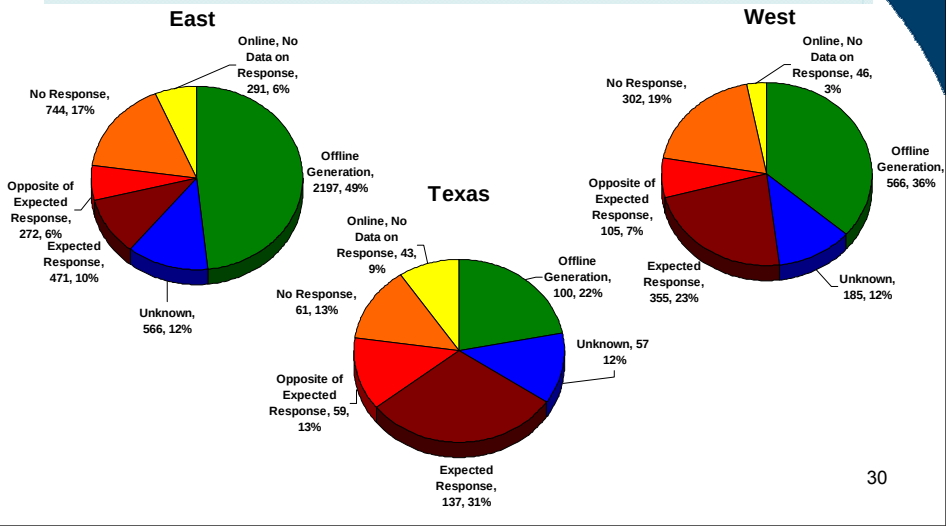
Response of Online Units by Capacity (GW)



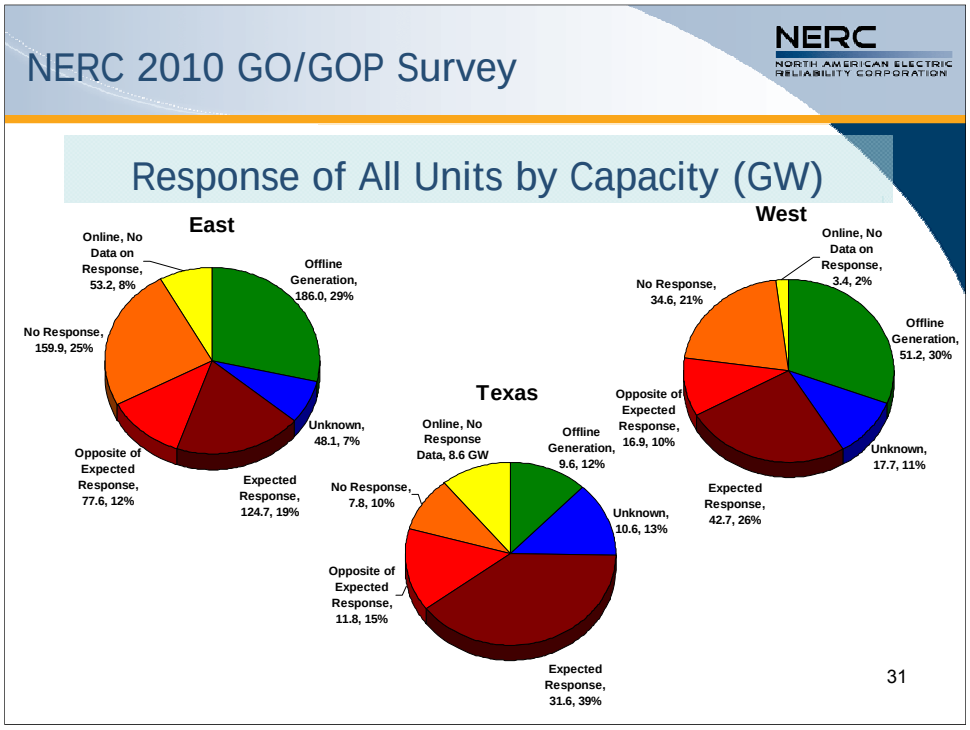
29

NERC 2010 GO/GOP Survey

Response of All Units by Number



30


NERC 2010 GO/GOP Survey
NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
Response of All Units by Capacity (GW)
East
Online, No Data on Response, 53.2, 8%
Offline Generation, 186.0, 29%
No Response, 159.9, 25%
Unknown, 48.1, 7%
Opposite of Expected Response, 77.6, 12%
Expected Response, 124.7, 19%
Texas
Online, No Response Data, 8.6 GW
Offline Generation, 9.6, 12%
No Response, 7.8, 10%
Unknown, 10.6, 13%
Opposite of Expected Response, 11.8, 15%
Expected Response, 31.6, 39%
West
Online, No Data on Response, 3.4, 2%
No Response, 34.6, 21%
Offline Generation, 51.2, 30%
Opposite of Expected Response, 16.9, 10%
Unknown, 17.7, 11%
Expected Response, 42.7, 26%
31

Appendix L – References

Training Document - Policy 1 Generation Control and Performance, February 24, 2003. NERC

Niemeyer, S. *Frequency Regulation—Is Your Plant Compliant?*
Ibrahim Abdur-Rahman, Sydney & Ricardo Vera, PE

Eto, J.H. et al. 2010. *Use of Frequency Response Metrics to Assess the Planning and Operating Requirements for Reliable Integration of Variable Renewable Generation*. LBNL-4143E. Berkeley: Lawrence Berkeley National Laboratory

Analysis of Eastern Interconnection Frequency Response, February 2011. NERC

Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

Balancing Authority: MyBA

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lm R1 DelFreq	Value "A" Information NAI	Value "A" Information Adjustment	Value "B" Information NAI	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Select Reason(s) for adjustment Reason(s)
1	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
2	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
8	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
9	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
10	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

1901	Bias Calculation Form 1 for Year
Eastern	Interconnection
MyBA	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
	MWh Annual Gen$_{BA}$ is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
	MWh Annual Load$_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
	MWh Annual Gen$_{INT}$ is the Sum of all Annual Gen$_{BA}$ values in this interconnection
	MWh Annual Load$_{INT}$ is the Sum of all Annual Load$_{BA}$ values in this interconnection
-964	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz Determined by ERO
1900	Current data year (December thru November)
#DIV/0!	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
	1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.
Calculate Regression	
	BA Bias Type and Bias Setting
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
621018	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-20.87	Balancing Authority desired Bias Setting: May be set to a value between 100% to 125% of its FRM if this value is more negative than the minimum Bias based on Peak Demand. If not more negative, then the Bias must be the minimum Bias based on Peak Demand. If variable Bias is used, enter "Variable".
#DIV/0!	**1901 Frequency Bias Setting - (minimum of 100% to 125% of FRM, or 0.9% of Historical Peak Demand if not Variable)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Instructions

Step 1 Enter data in all green cells on this "Data Entry" worksheet.

Step 2 For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

Step 3 PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

MyBA_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.8976	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.9068	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
	N	NL & PH & ID & CBA
	Y	NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq	10 X BA DelFreq	SEFRDB (MW/0.1Hz	SEFRDR (MW/0.1Hz	Regression Statistics	
	For Bias	For R1			For Bias	
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0	0	#N/A
0	0	595	#DIV/0!	0	1	0
0	0	595	#DIV/0!	0	#NUM!	12
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0		
0	0	595	#DIV/0!	0	For R1	
0	0	595	#DIV/0!	0	0	0
0	0	595	#DIV/0!	0	0	#N/A
0	0	595	#DIV/0!	0	1	0
0	0	595	#DIV/0!	0	#NUM!	11
0	0	595	#DIV/0!	0	0	0

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Event Number	Balancing Authority	MyBA	JOU Dynamic Schedules		Non conforming Load		Pumped Hydro		Not Used		Transferred Frequency Response		Contingent BA Adjustment		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
   Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
   (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

*** Frequency Bias Setting (FBS)**

**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

Balancing Authority: MyBA

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

PasteSpecial/Values the data copied from FRS Form 2 for each event.

Value A Data — BA Performance

Value B — 20 to 52 second Average Period Evaluation

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

Event Number	Date/Time (Central Prevailing	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Ramping Units Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
																											Average P.U. Performance	#DIV/0!	#DIV/0!	#DIV/0!					#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!		
1	1/0/1900 0:00	0.000																																												
2	1/0/1900 0:00	0.000																																												
3	1/0/1900 0:00	0.000																																												
4	1/0/1900 0:00	0.000																																												
5	1/0/1900 0:00	0.000																																												
6	1/0/1900 0:00	0.000																																												
7	1/0/1900 0:00	0.000																																												
8	1/0/1900 0:00	0.000																																												
9	1/0/1900 0:00	0.000																																												
10	1/0/1900 0:00	0.000																																												
11	1/0/1900 0:00	0.000																																												
12	1/0/1900 0:00	0.000																																												
13	1/0/1900 0:00	0.000																																												
14	1/0/1900 0:00	0.000																																												
15	1/0/1900 0:00	0.000																																												
16	1/0/1900 0:00	0.000																																												
17	1/0/1900 0:00	0.000																																												
18	1/0/1900 0:00	0.000																																												
19	1/0/1900 0:00	0.000																																												
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27	1/0/1900 0:00	0.000																																												
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30	1/0/1900 0:00	0.000																																												
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33	1/0/1900 0:00	0.000																																												
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35	1/0/1900 0:00	0.000																																												
36	1/0/1900 0:00	0.000																																												
37	1/0/1900 0:00	0.000																																												
38	1/0/1900 0:00	0.000																																												
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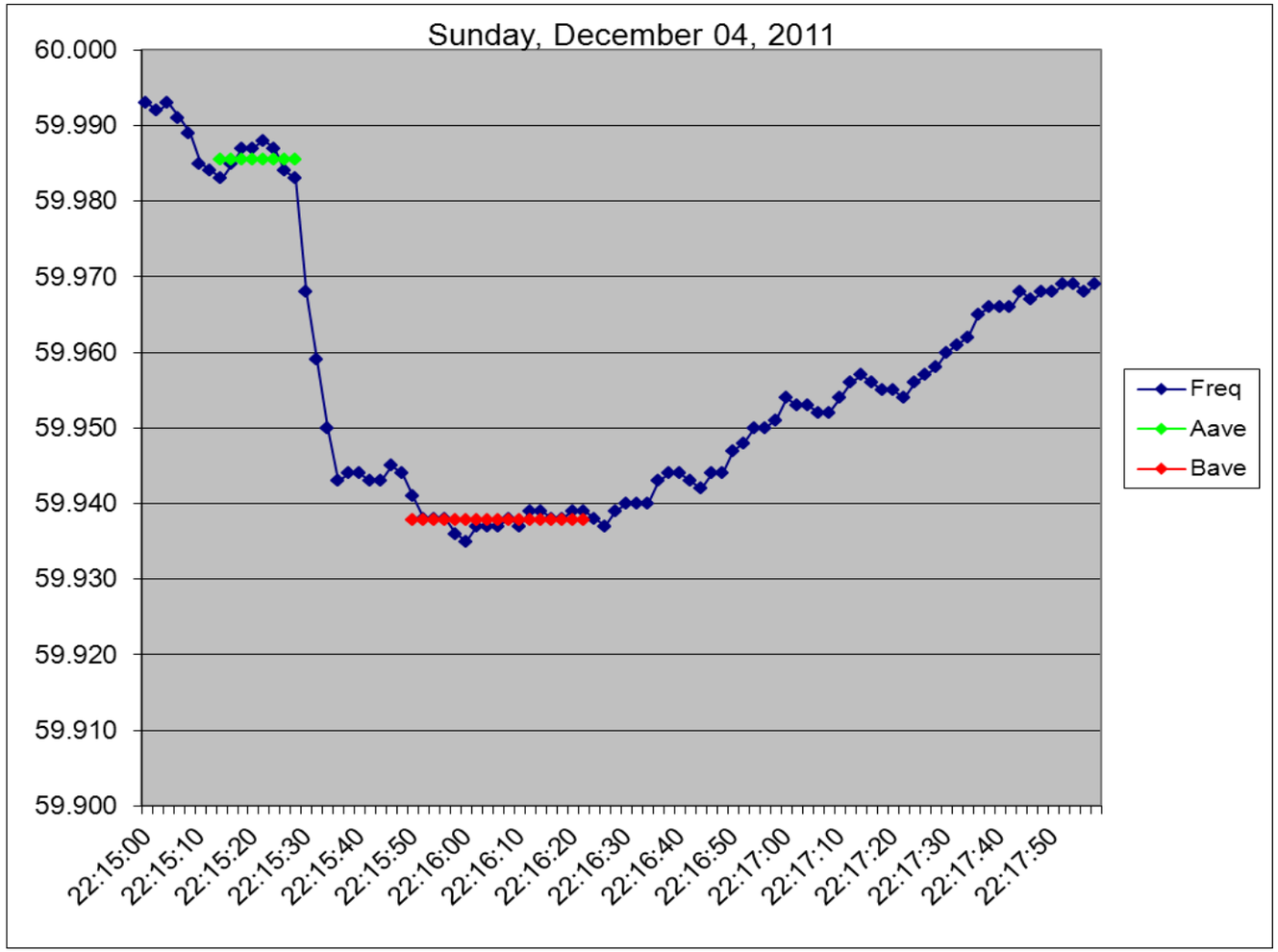
40	1/0/1900 0:00	0.000																																												
41	1/0/1900 0:00	0.000																																												
42	1/0/1900 0:00	0.000																																												

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours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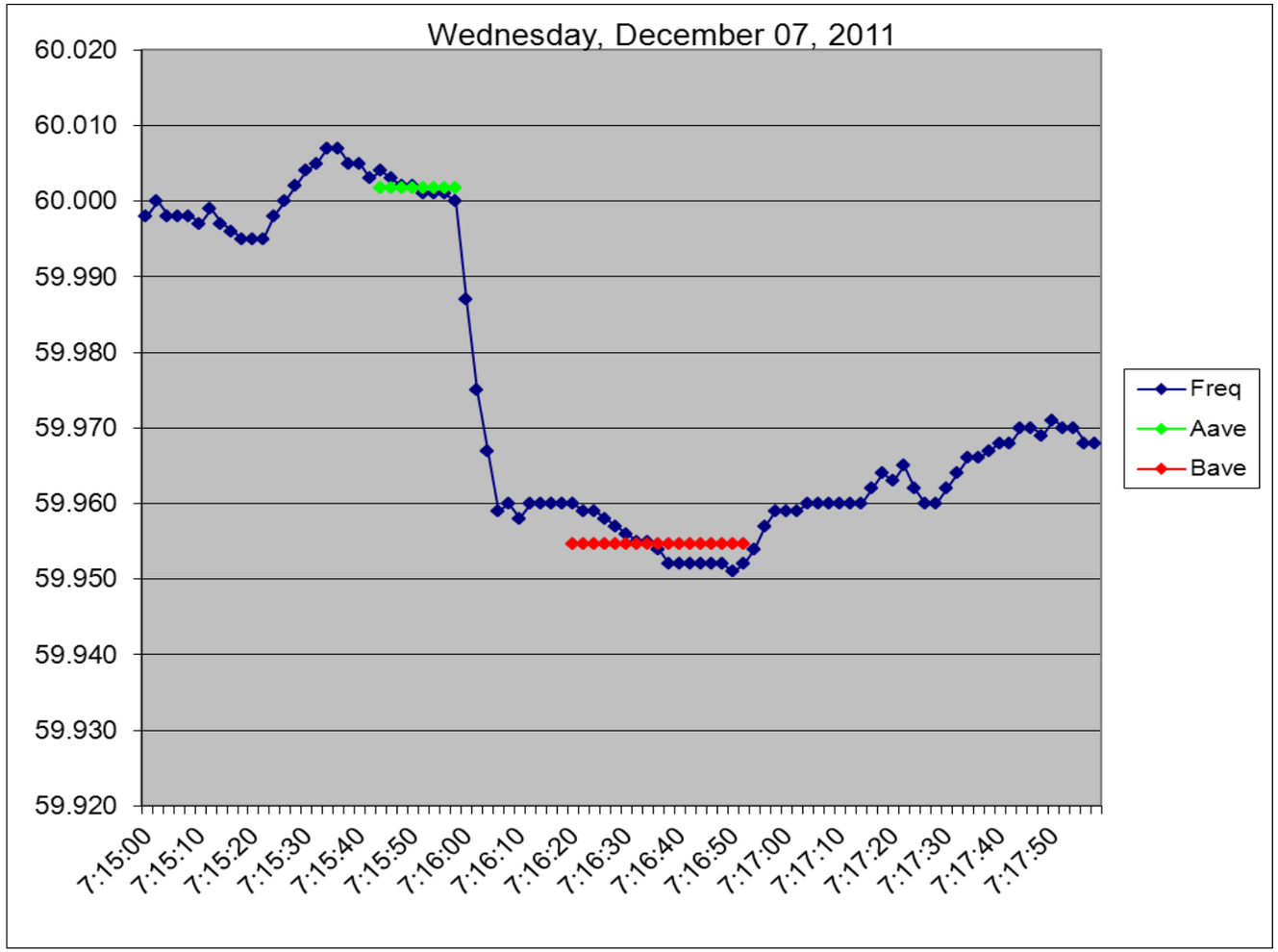
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7:16:20
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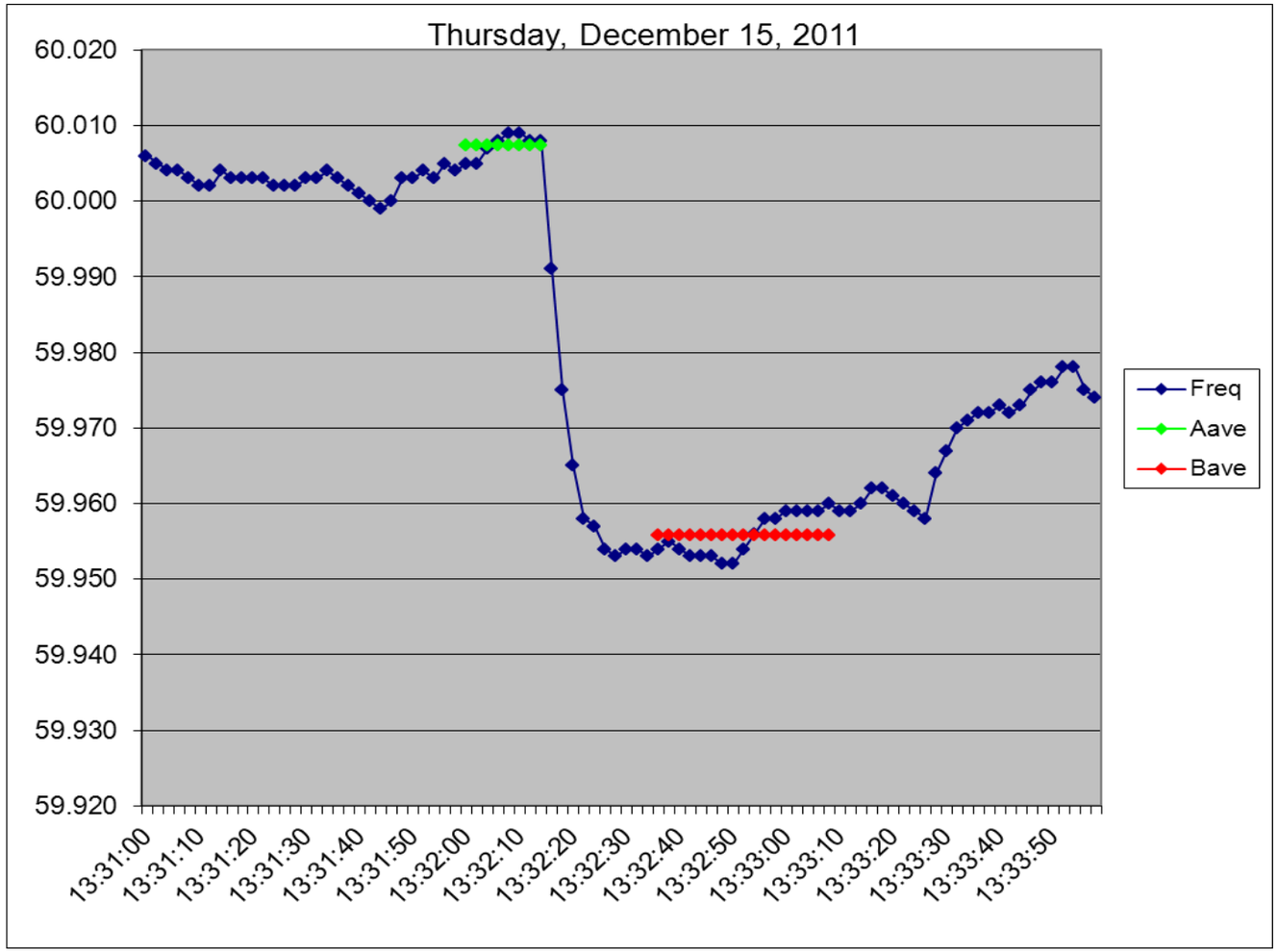
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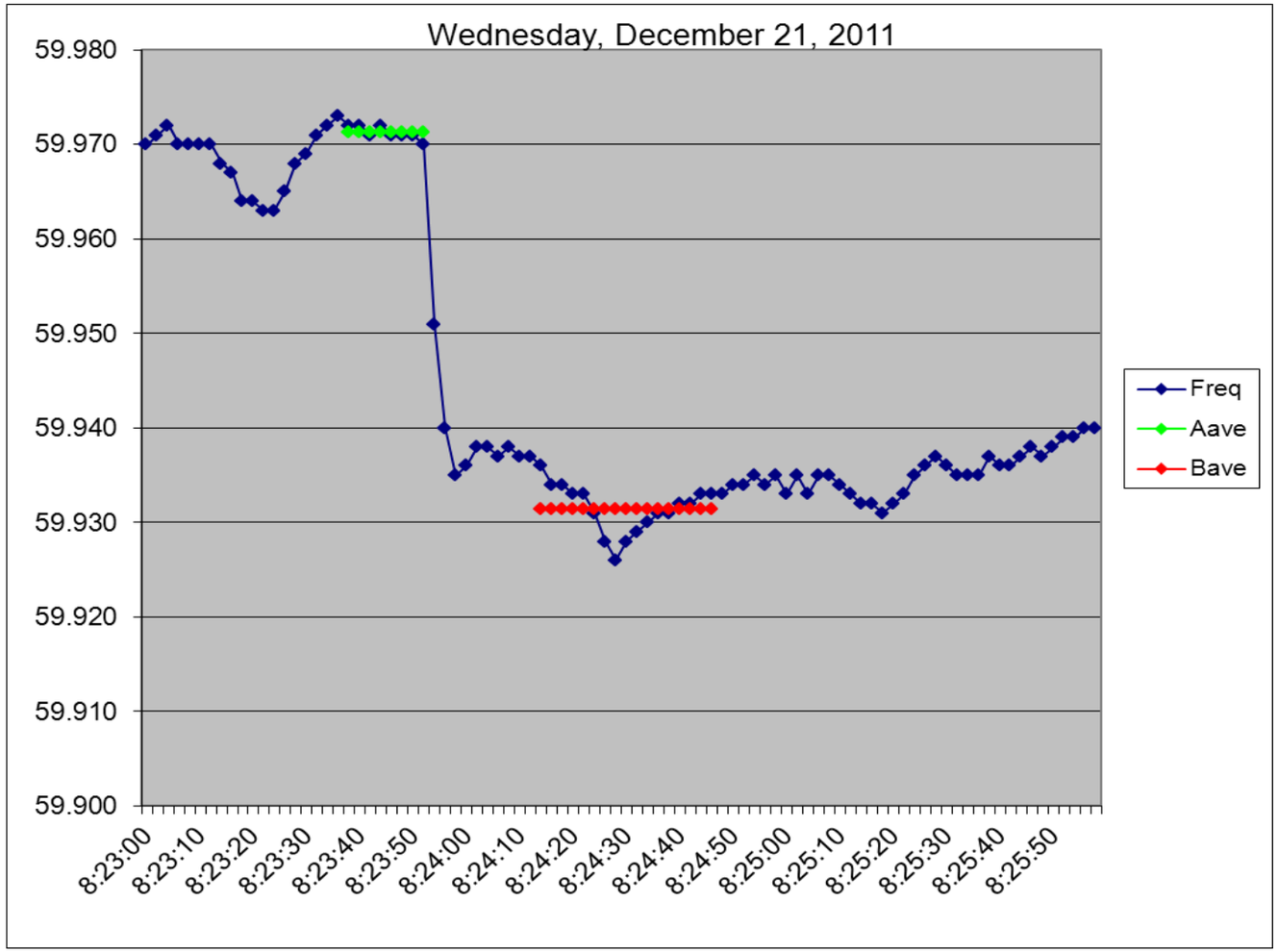
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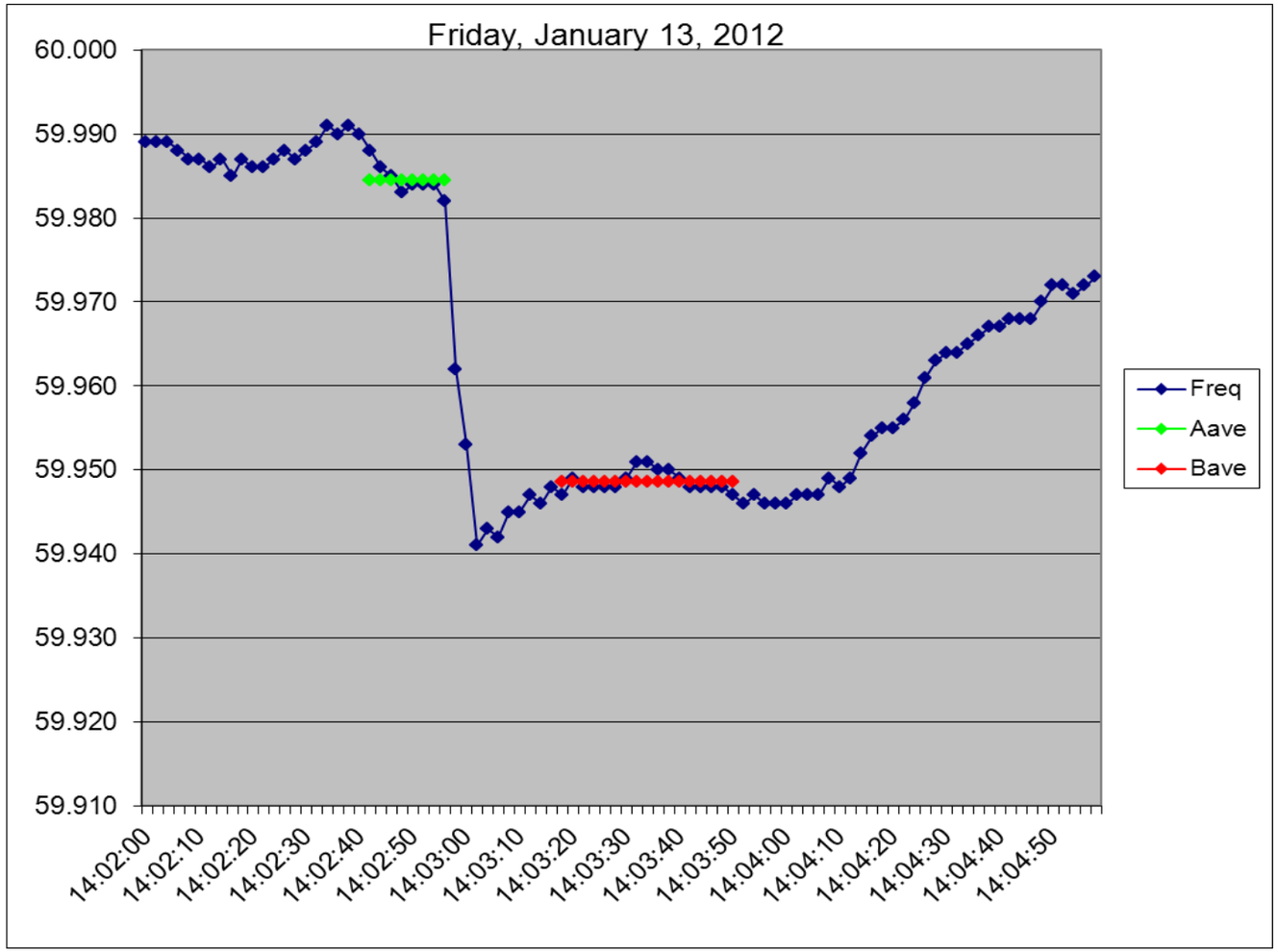
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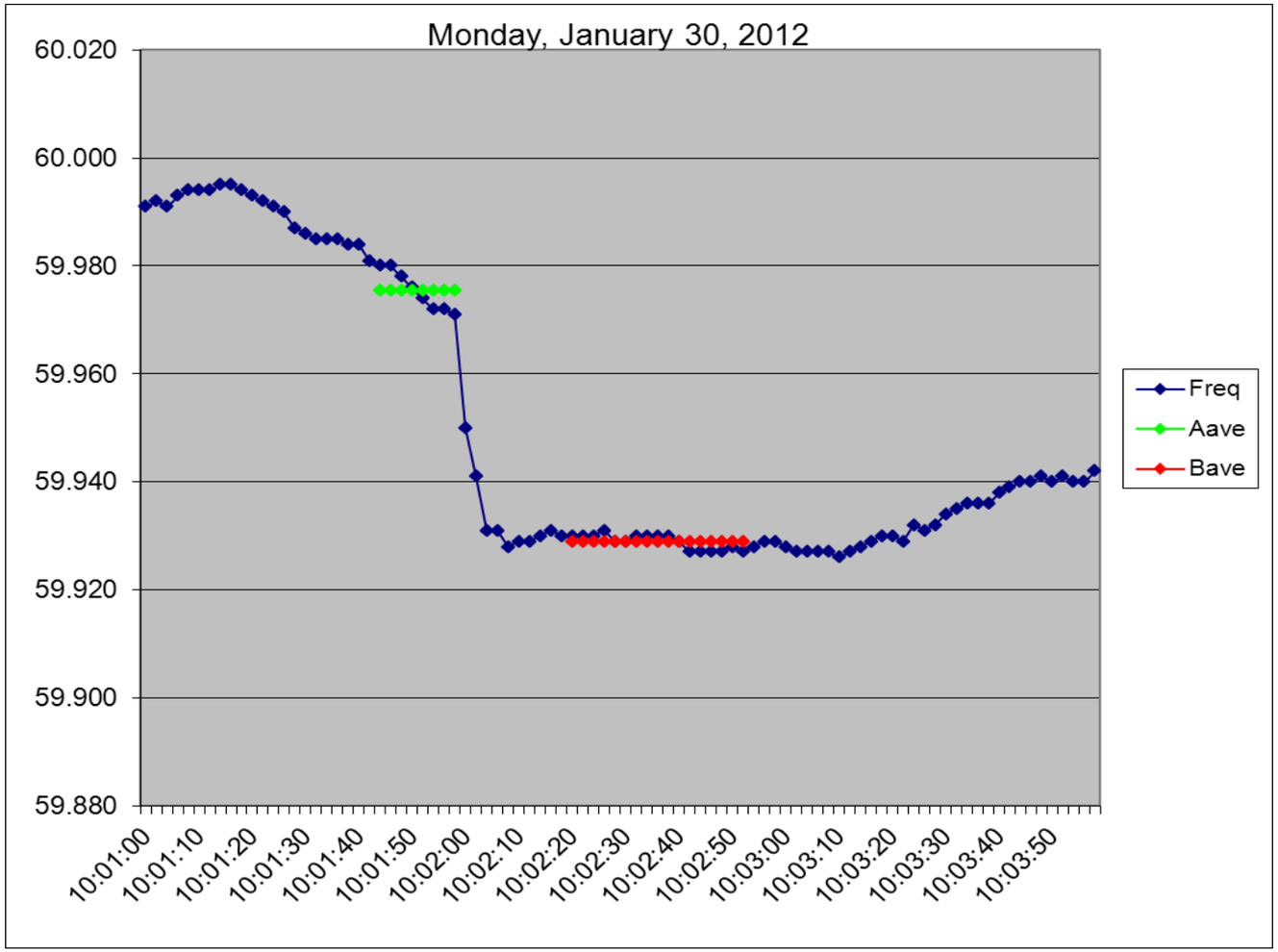
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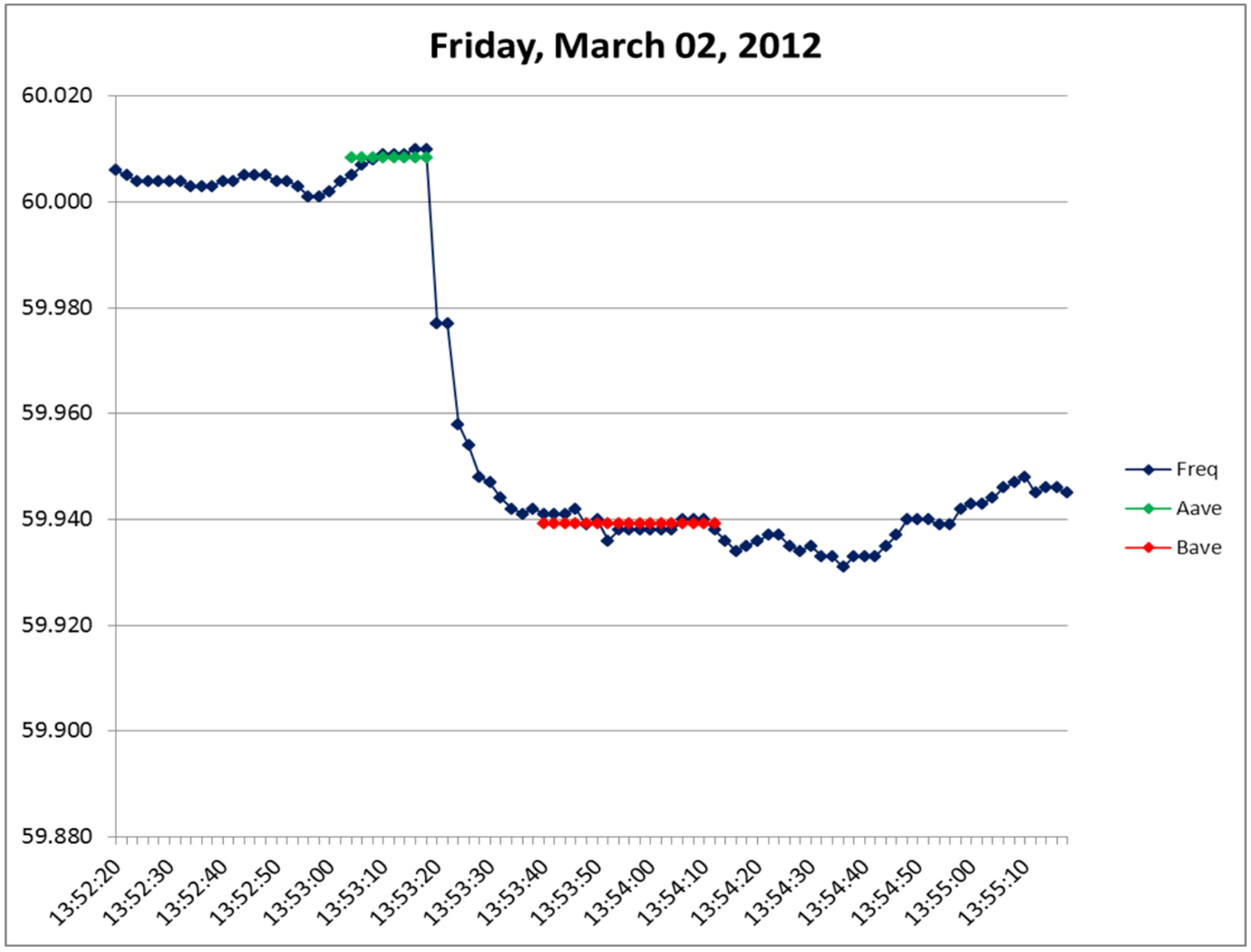
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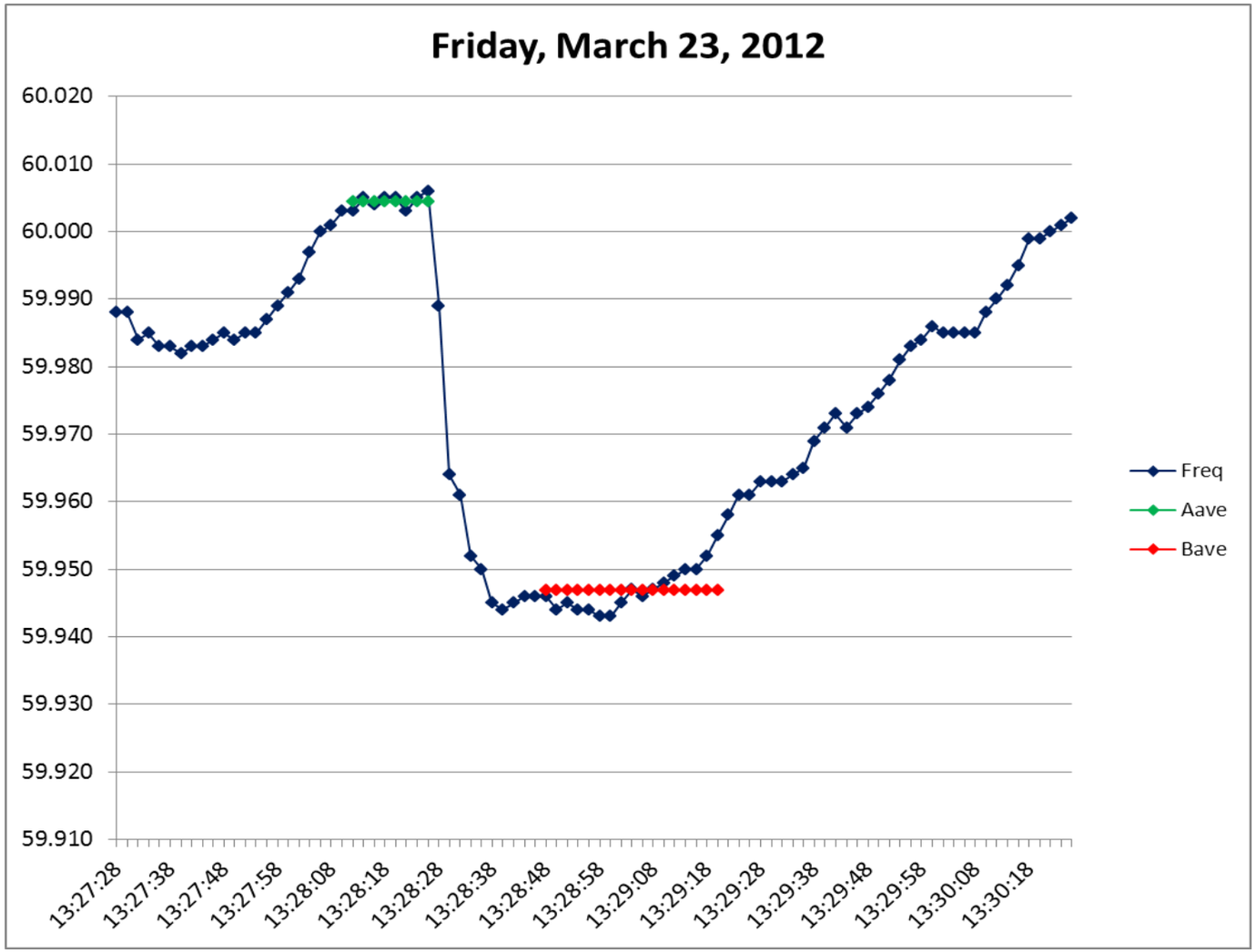
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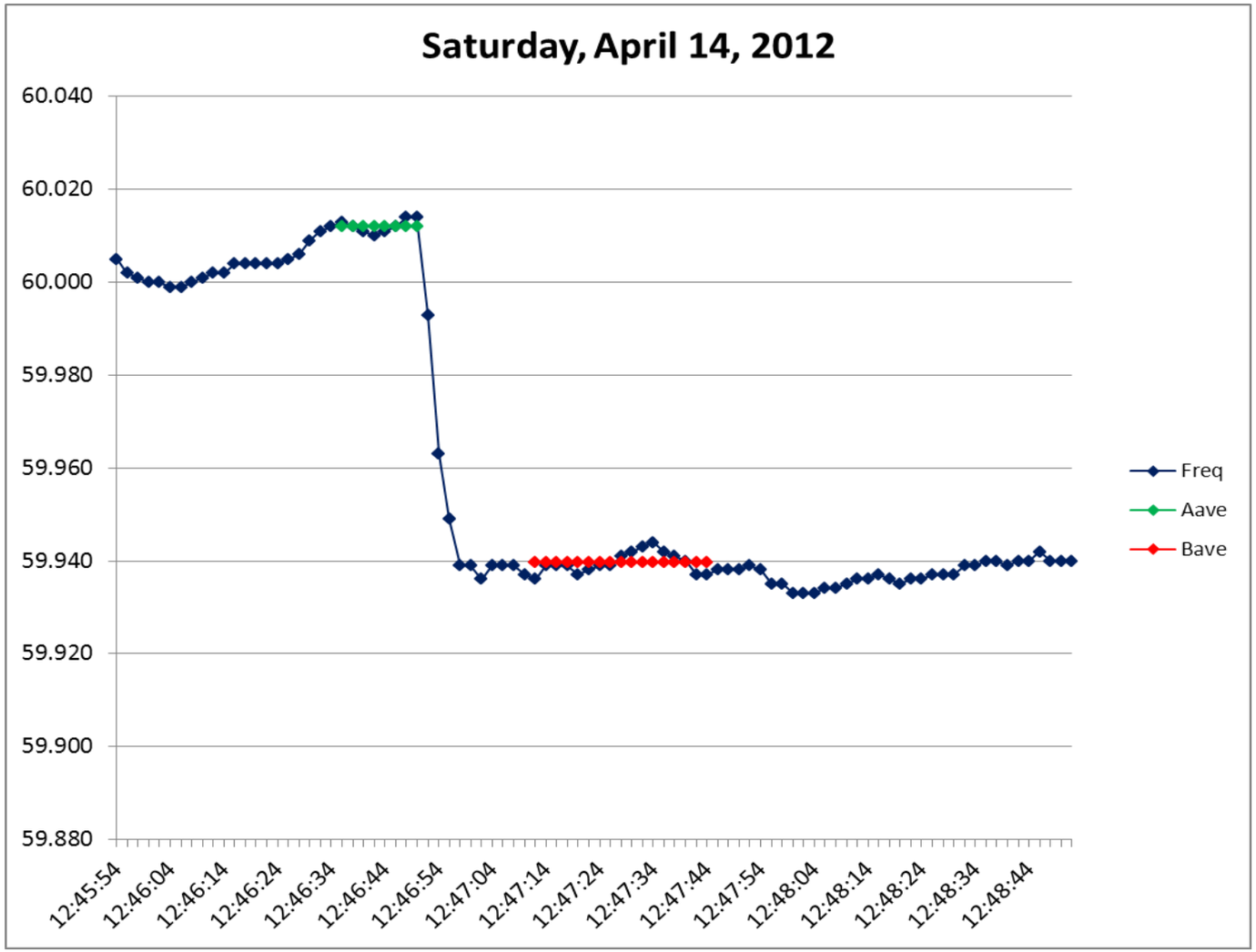
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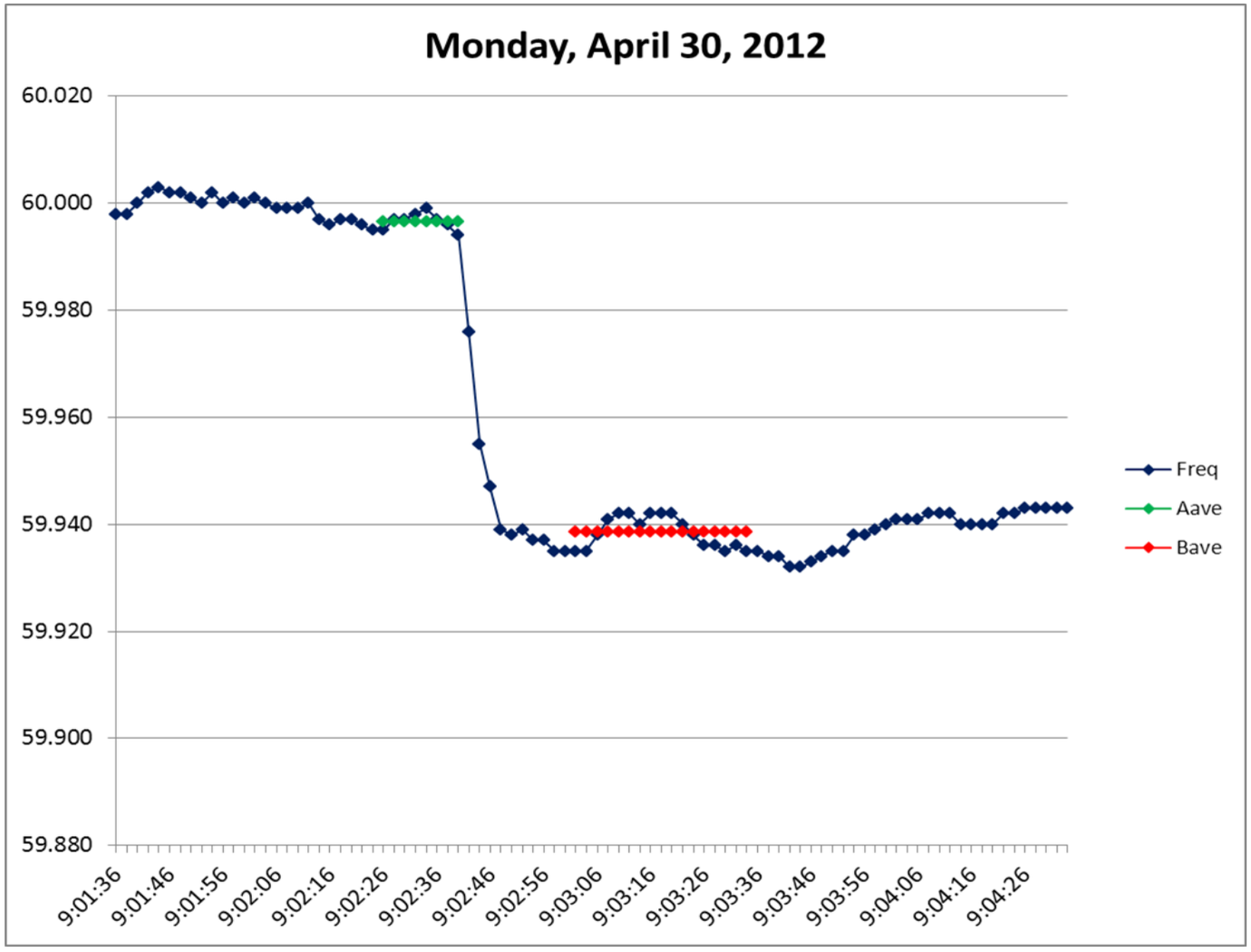
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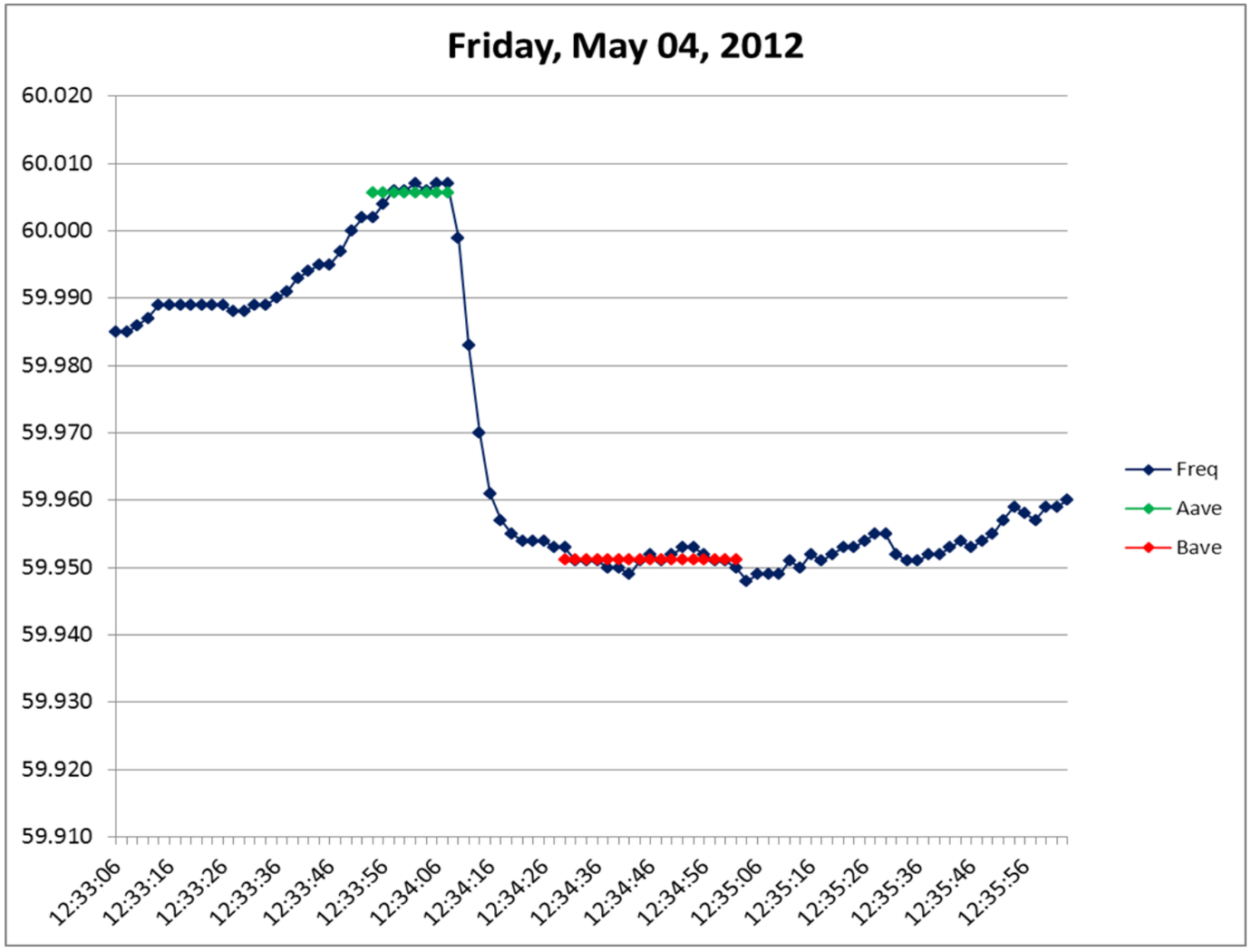
Freq
Aave
Bave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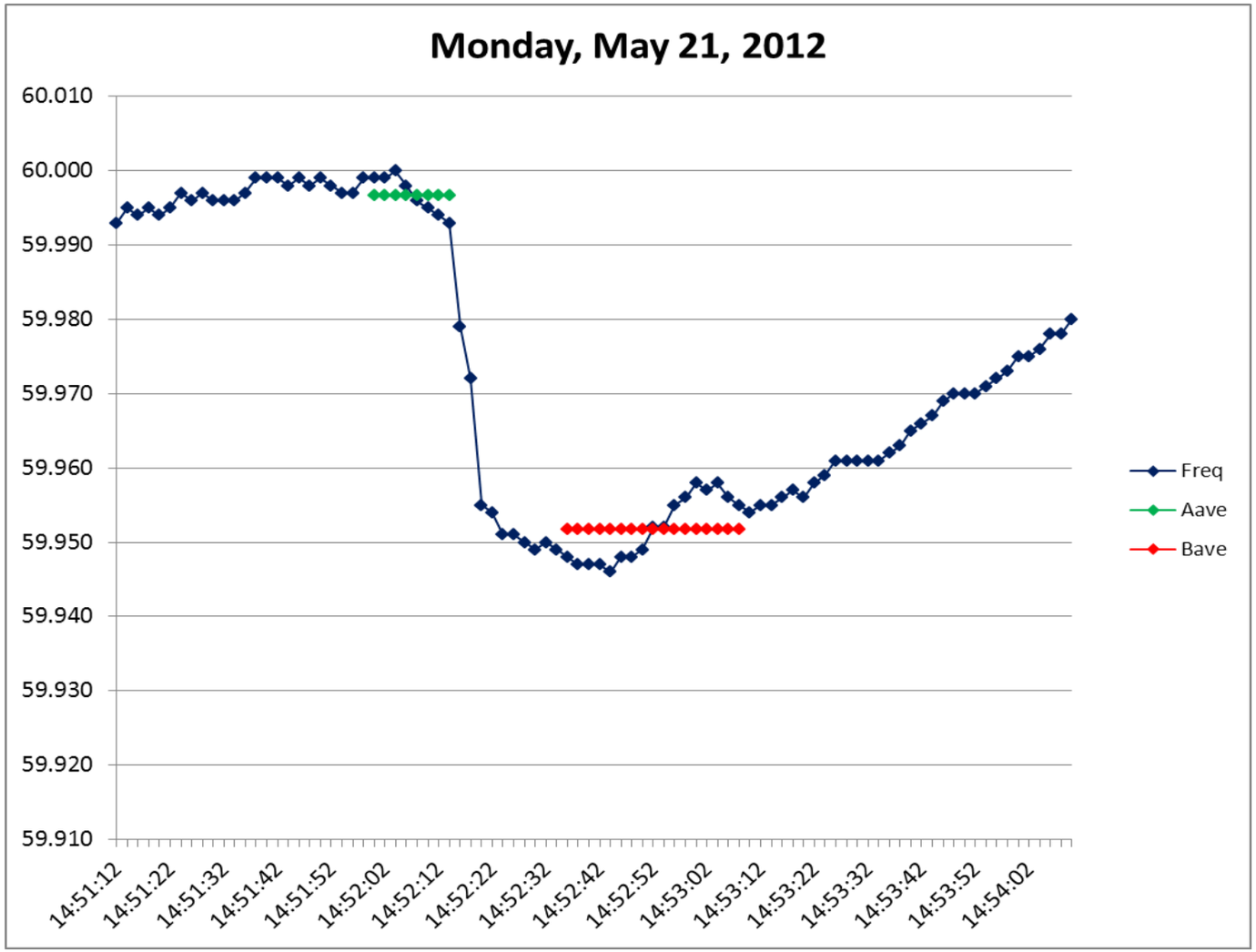
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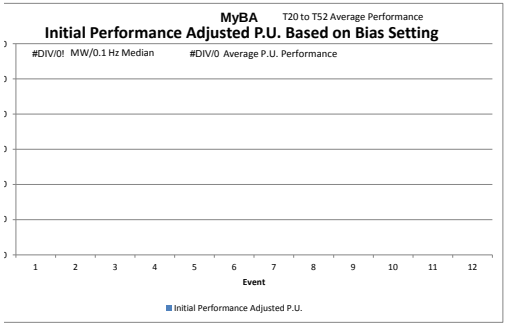
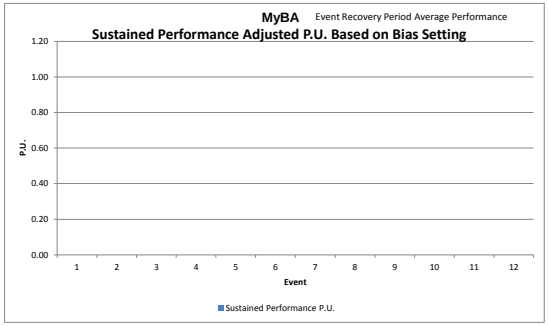




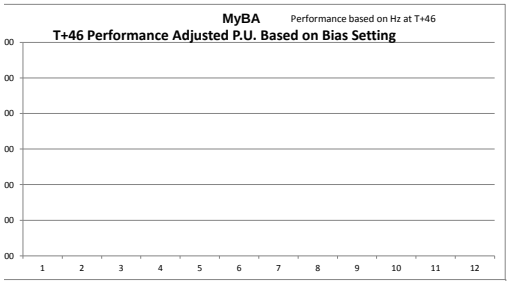
FRI - NERC Frequency Response Initiative

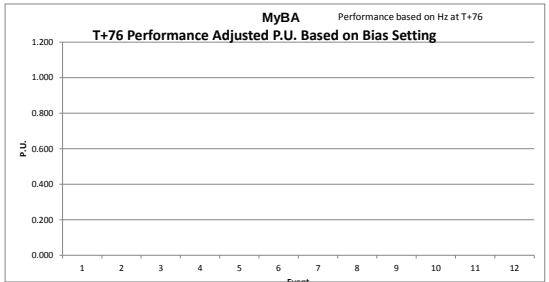
The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

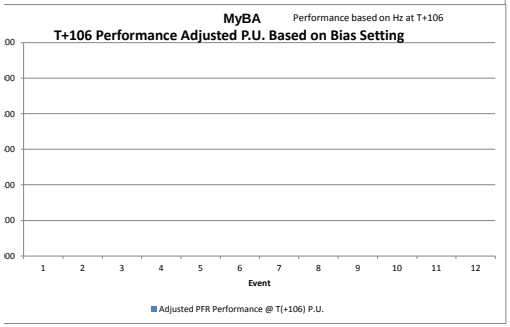
Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

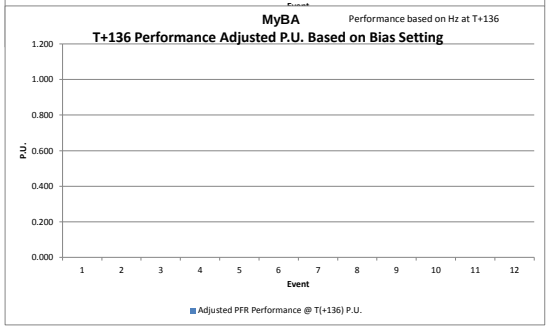
Some basic observations from this data:

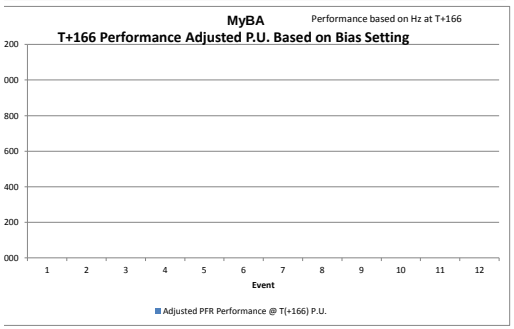
1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.











Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

thority ERCOT

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information MW/Load Lost	Value "A" Information Adjustment	Value "B" Information MW/Load Lost	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Select Reason(s) for adjustment Reason(s)
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

1901	Bias Calculation Form 1 for Year
ERCOT	Interconnection
ERCOT	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
1	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
1	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
1	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
1	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-286	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
-286.00	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
-286.00	**1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.**
Calculate Regression	
	BA Bias Type and Bias Setting
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
65300	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
-587.70	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-653.00	Balancing Authority desired Bias Setting: Single BA Interconnections have no minimum or maximum Bias Setting requirement. If variable Bias is used, enter "Variable".
-653.00	**1901 Frequency Bias Setting - (Single BA Interconnections have no minimum or maximum Bias Setting requirement)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
-529.36	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
-529.36	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Enter data in all green cells on this "Data Entry" worksheet.

For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

ERCOT_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.89761	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.90685	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR

N	NL & PH & ID & CBA
Y	NL & PH & ID & TFR & CBA
	PH & ID
	PH & TFR
	PH & CBA
	PH & ID & TFR
	PH & ID & CBA
	PH & TFR
	PH & CBA
	PH & ID & TFR
	PH & ID & CBA
	PH & TFR
	PH & CBA
	PH & ID & TFR & CBA
	RU & TFR
	RU & CBA
	RU & TFR & CBA
	TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq	10 X BA DelFreq	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics	
	For Bias	For R1			For Bias	
421.08749	-1.014658	-1.014658	-415.00442	-415.00442	-529.362	0
726.02426	-1.212405	-1.212405	-598.8298	-598.8298	18.25749	#N/A
518.4755	-0.89661	-0.89661	-578.26195	-578.26195	0.987084	75.02074
785.54117	-1.445673	-1.445673	-543.37416	-543.37416	840.664	11
691.80448	-1.32911	-1.32911	-520.50213	-520.50213	4731351	61909.23
-226.24	0.3558911	0.3558911	-635.70015	-635.70015		
661.23172	-1.311035	-1.311035	-504.3586	-504.3586	For R1	
995.08267	-1.97183	-1.97183	-504.6492	-504.6492	-529.362	0
533.32526	-0.920725	-0.920725	-579.24498	-579.24498	18.25749	#N/A
762.32339	-1.179408	-1.179408	-646.3608	-646.3608	0.987084	75.02074
480.61002	-0.929121	-0.929121	-517.2738	-517.2738	840.664	11
386.25	-0.942728	-0.942728	-409.71529	-409.71529	4731351	61909.23

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

	Balancing Authority	ERCOT	Load Resources Tripped		Non conforming Load		Not Used		Not Used		Not Used		Not Used		Net Total Adjustments
Event Number	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
   Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced. (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: ERCOT

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**

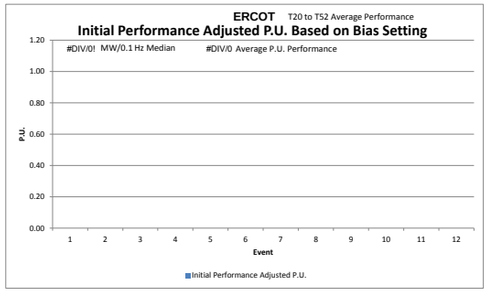
**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

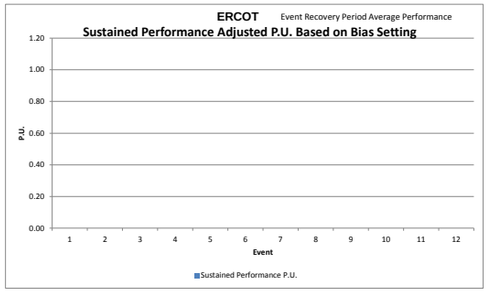
PasteSpecial/Values the data copied from FRS Form 2 for each event.

									Value A Data	BA Performance											Value B	20 to 52 second Average Period Evaluatic				
Event Number	Date/Time (Central Prevailing)	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW
1	1/0/1900 0:00	0.000																						
2	1/0/1900 0:00	0.000																						
3	1/0/1900 0:00	0.000																						
4	1/0/1900 0:00	0.000																						
5	1/0/1900 0:00	0.000																						
6	1/0/1900 0:00	0.000																						
7	1/0/1900 0:00	0.000																						
8	1/0/1900 0:00	0.000																						
9	1/0/1900 0:00	0.000																						
10	1/0/1900 0:00	0.000																						
11	1/0/1900 0:00	0.000																						
12	1/0/1900 0:00	0.000																						
13	1/0/1900 0:00	0.000																						
14	1/0/1900 0:00	0.000																						
15	1/0/1900 0:00	0.000																						
16	1/0/1900 0:00	0.000																						
17	1/0/1900 0:00	0.000																						
18	1/0/1900 0:00	0.000																						
19	1/0/1900 0:00	0.000																						
20	1/0/1900 0:00	0.000																						
21	1/0/1900 0:00	0.000																						
22	1/0/1900 0:00	0.000																						
23	1/0/1900 0:00	0.000																						
24	1/0/1900 0:00	0.000																						
25	1/0/1900 0:00	0.000																						
26	1/0/1900 0:00	0.000																						
27	1/0/1900 0:00	0.000																						
28	1/0/1900 0:00	0.000																						
29	1/0/1900 0:00	0.000																						
30	1/0/1900 0:00	0.000																						
31	1/0/1900 0:00	0.000																						
32	1/0/1900 0:00	0.000																						
33	1/0/1900 0:00	0.000																						
34	1/0/1900 0:00	0.000																						
35	1/0/1900 0:00	0.000																						
36	1/0/1900 0:00	0.000																						
37	1/0/1900 0:00	0.000																						
38	1/0/1900 0:00	0.000																						
39	1/0/1900 0:00	0.000																						
40	1/0/1900 0:00	0.000																						
41	1/0/1900 0:00	0.000																						
42	1/0/1900 0:00	0.000																						

	Average P.U. Performance	#DIV/0!	#DIV/0!	#DIV/0!						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			
on										Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points												
Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz	

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours





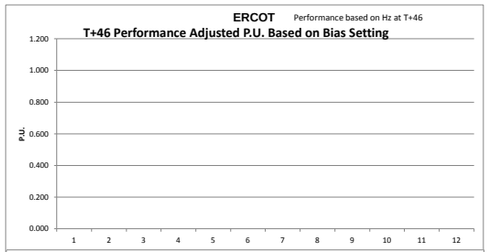
FRI - NERC Frequency Response Initiative

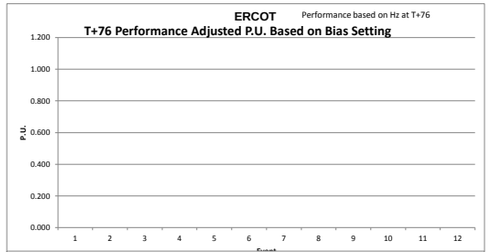
The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

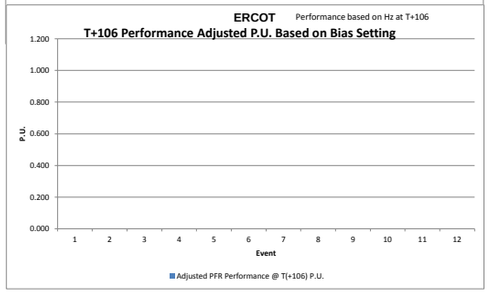
Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

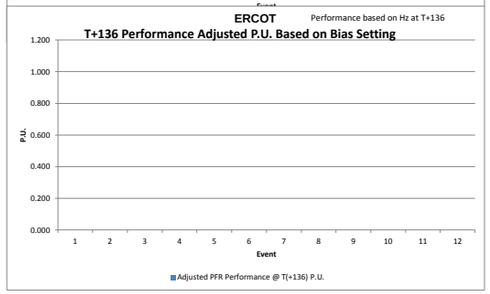
Some basic observations from this data:

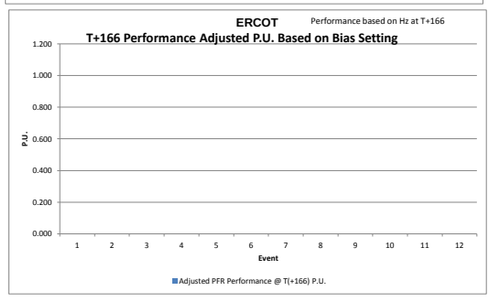
1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.











Instructions

004332

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

NERC FRS FORM 1 20 to 52 second Value B

Balancing Authority HQT

Enter Addition Data in column W ==>

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information MW/Load Lost	Value "A" Information Adjustment	Value "B" Information MW/Load Lost	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Value "A" Load
1	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
2	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
3	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
4	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
5	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
6	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
7	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
8	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
9	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
10	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net 004333

1901	Bias Calculation Form 1 for Year
HQ	Interconnection
HQT	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
1	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
1	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
1	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
1	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-179	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
-179.00	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
-179.00	**1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.**
Calculate Regression	**BA Bias Type and Bias Setting**
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
37153	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
-334.38	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-442.00	Balancing Authority desired Bias Setting: Single BA Interconnections have no minimum or maximum Bias Setting requirement. If variable Bias is used, enter "Variable".
-442.00	**1901 Frequency Bias Setting - (Single BA Interconnections have no minimum or maximum Bias Setting requirement)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Instructions

Step 1 Enter data in all green cells on this "Data Entry" worksheet.

Step 2 For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

Step 3 PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

HQT_1901_FRS_Form_1.9.xlsm

nation

Select Reason(s) for adjustment

Value "B" Load	Reason(s)
0.0	
0.0	
0.0	
0.0	
0.0	
0.0	
0.0	
0.0	
0.0	
0.0	
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0.0	

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.660891	Invalid Data (ID)
-0.07090523	-26.89761	Transfered Frequency Response (TFR)
-0.05190677	9.9554492	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.334427	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.7580369	DS & TFR
-0.0517609	13.643417	DS & CBA
-0.04999924	11.100746	DS & NL & PH
-0.052	-19.90685	DS & NL & ID
-0.05599976	12.325464	JOU DS & NL & TFR
-0.05849838	0.7501918	DS & NL & CBA
-0.04850006	2.2300578	DS & NL & PH & ID
-0.04500008	9.4778593	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.1707019	DS & NL & PH & ID & TFR
-0.05550003	29.382074	DS & NL & PH & ID & CBA
-0.047	4.6013813	DS & NL & PH & ID & TFR & CBA
-0.06	1.5935149	NL & PH
-0.06	52.370908	NL & ID
-0.051	33.947874	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
N		NL & PH & ID & CBA
Y		NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

004334

BA Delta NAI	10 X BA DelFreq	10 X BA DelFreq	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics	
	For Bias	For R1			For Bias	
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0	0	#N/A
0	0	0	#DIV/0!	0	1	0
0	0	0	#DIV/0!	0	#NUM!	12
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0		
0	0	0	#DIV/0!	0	For R1	
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0	0	#N/A
0	0	0	#DIV/0!	0	1	0
0	0	0	#DIV/0!	0	#NUM!	12
0	0	0	#DIV/0!	0	0	0

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

Event Number	Balancing Authority	HQT	Load Resources Tripped		Non conforming Load		Not Used		Not Used		Not Used		Not Used		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
     Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
     (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: HQT

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**
**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecial/Values the data copied from FRS Form 2 for each event.

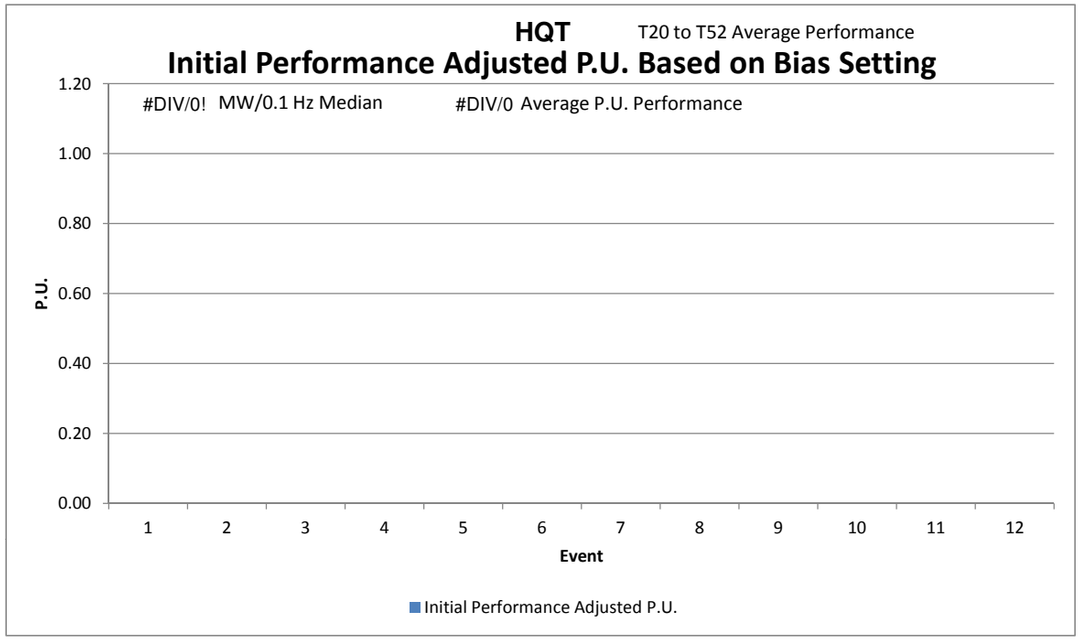
Value A Data BA Performance

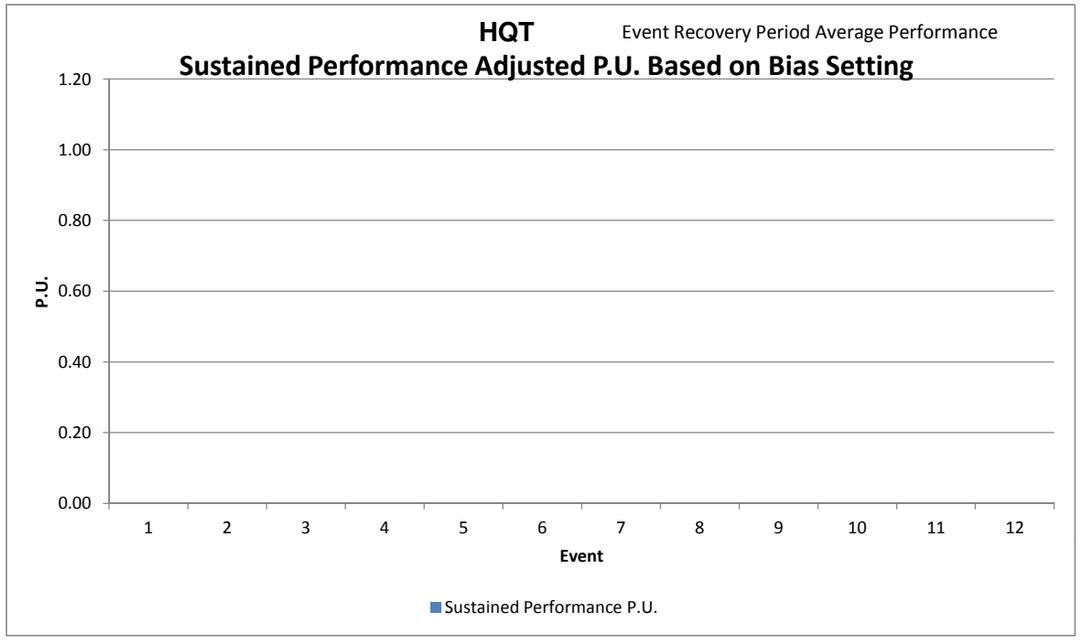
Value B 20 to 52 second Average Period Evaluatic

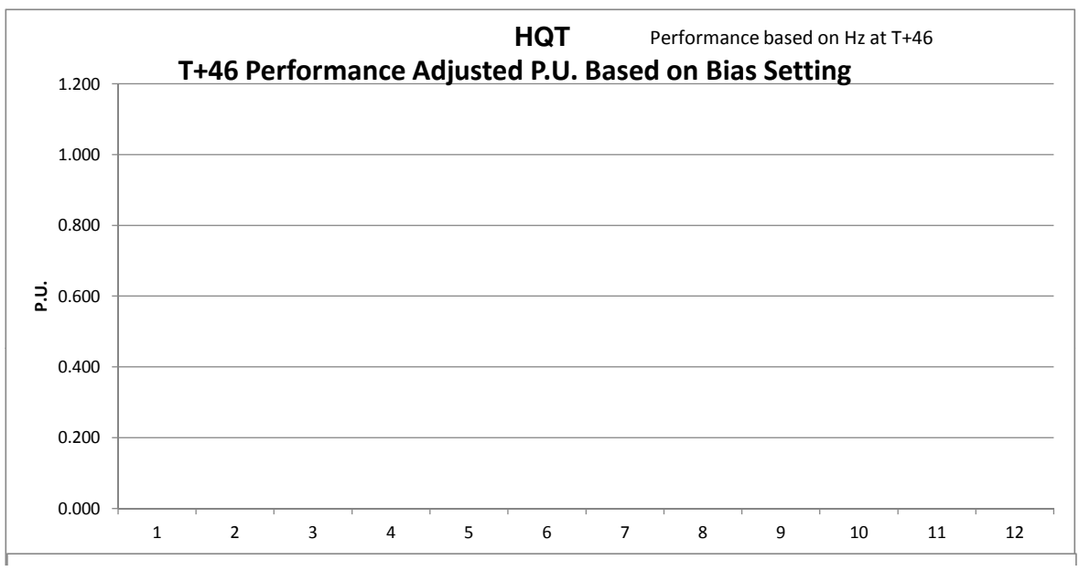
Event Number	Date/Time (Central Prevailing)	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW
1	1/0/1900 0:00	0.000																						
2	1/0/1900 0:00	0.000																						
3	1/0/1900 0:00	0.000																						
4	1/0/1900 0:00	0.000																						
5	1/0/1900 0:00	0.000																						
6	1/0/1900 0:00	0.000																						
7	1/0/1900 0:00	0.000																						
8	1/0/1900 0:00	0.000																						
9	1/0/1900 0:00	0.000																						
10	1/0/1900 0:00	0.000																						
11	1/0/1900 0:00	0.000																						
12	1/0/1900 0:00	0.000																						
13	1/0/1900 0:00	0.000																						
14	1/0/1900 0:00	0.000																						
15	1/0/1900 0:00	0.000																						
16	1/0/1900 0:00	0.000																						
17	1/0/1900 0:00	0.000																						
18	1/0/1900 0:00	0.000																						
19	1/0/1900 0:00	0.000																						
20	1/0/1900 0:00	0.000																						
21	1/0/1900 0:00	0.000																						
22	1/0/1900 0:00	0.000																						
23	1/0/1900 0:00	0.000																						
24	1/0/1900 0:00	0.000																						
25	1/0/1900 0:00	0.000																						
26	1/0/1900 0:00	0.000																						
27	1/0/1900 0:00	0.000																						
28	1/0/1900 0:00	0.000																						
29	1/0/1900 0:00	0.000																						
30	1/0/1900 0:00	0.000																						
31	1/0/1900 0:00	0.000																						
32	1/0/1900 0:00	0.000																						
33	1/0/1900 0:00	0.000																						
34	1/0/1900 0:00	0.000																						
35	1/0/1900 0:00	0.000																						
36	1/0/1900 0:00	0.000																						
37	1/0/1900 0:00	0.000																						
38	1/0/1900 0:00	0.000																						
39	1/0/1900 0:00	0.000																						
40	1/0/1900 0:00	0.000																						
41	1/0/1900 0:00	0.000																						
42	1/0/1900 0:00	0.000																						

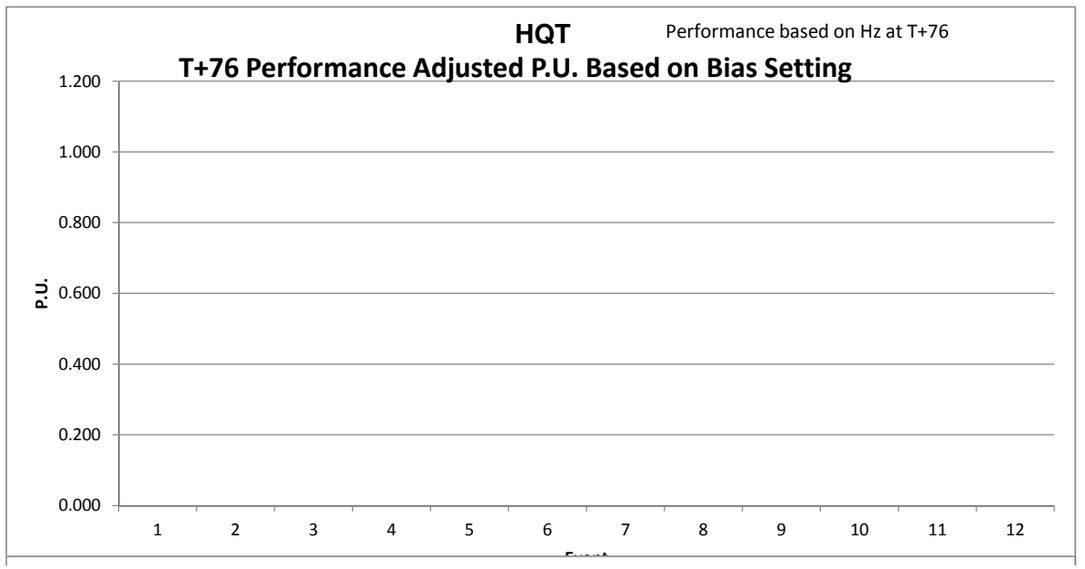
	Average P.U. Performance	#DIV/0!	#DIV/0!	#DIV/0!						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			
ın										Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points												
Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz	

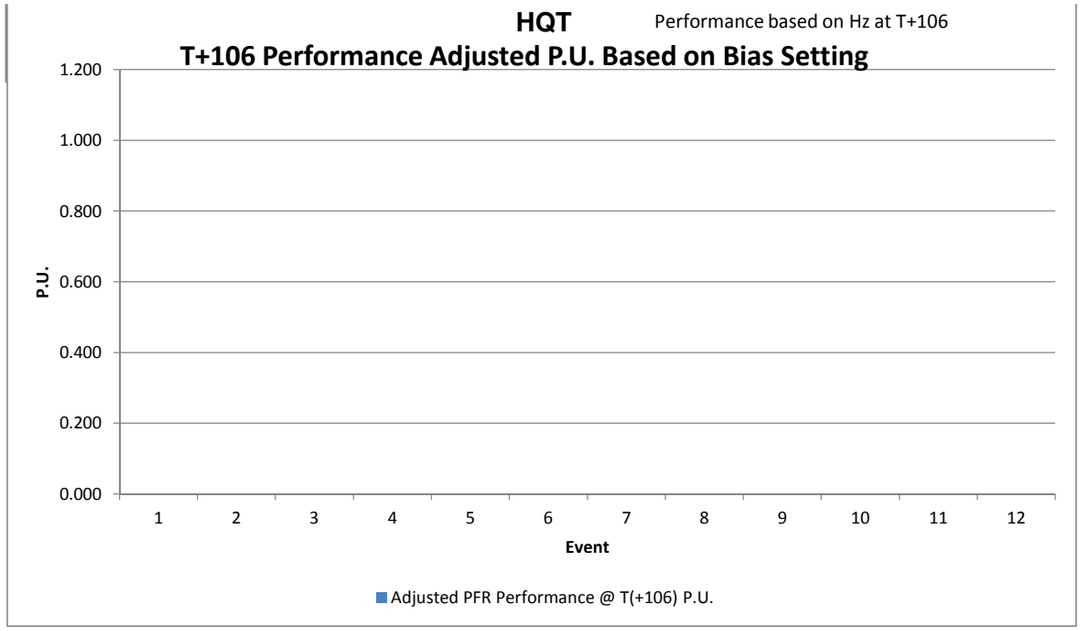
Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours

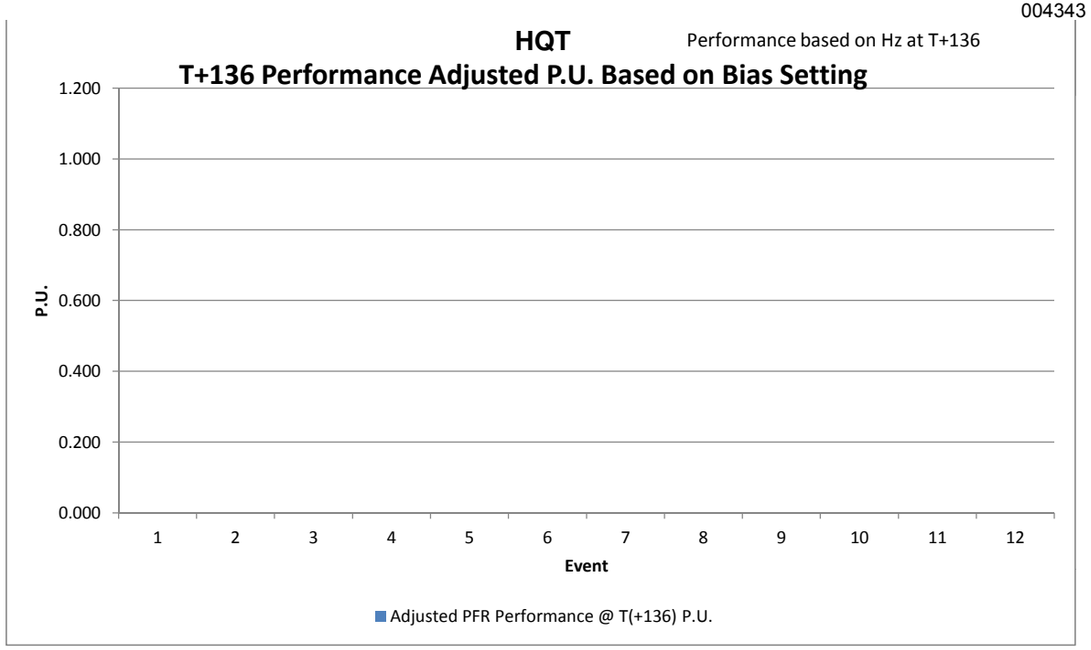

HQT
T20 to T52 Average Performance
Initial Performance Adjusted P.U. Based on Bias Setting
#DIV/0! MW/0.1 Hz Median
#DIV/0 Average P.U. Performance
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P.U.
1 2 3 4 5 6 7 8 9 10 11 12
Event
Initial Performance Adjusted P.U.

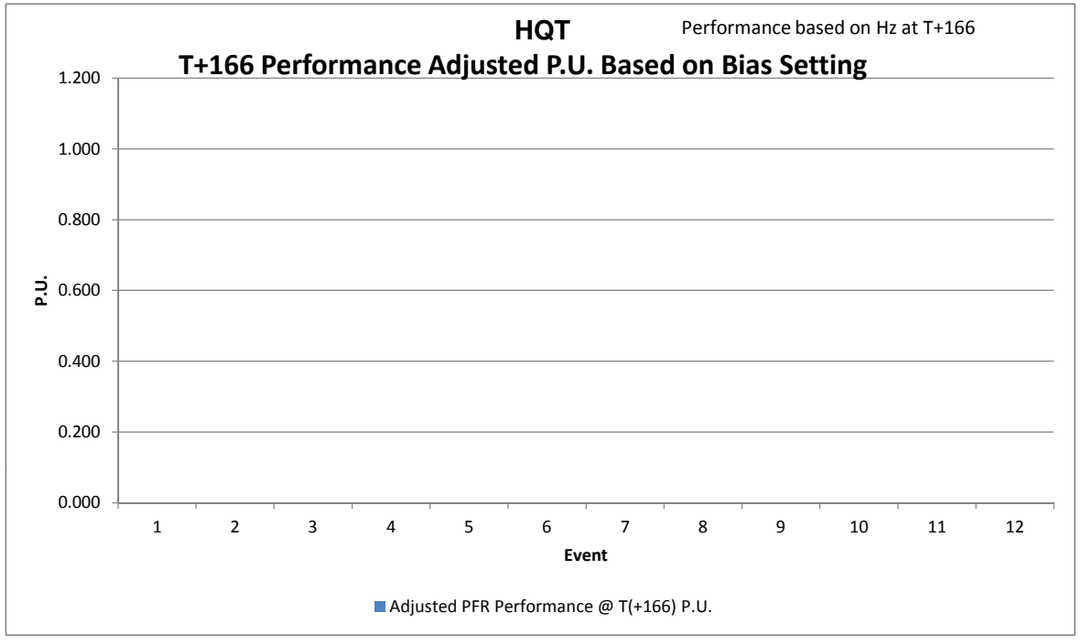

HQT
Event Recovery Period Average Performance
Sustained Performance Adjusted P.U. Based on Bias Setting
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P.U.
1 2 3 4 5 6 7 8 9 10 11 12
Event
Sustained Performance P.U.


HQT
Performance based on Hz at T+46
T+46 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1 2 3 4 5 6 7 8 9 10 11 12


HQT
Performance based on Hz at T+76
T+76 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1 2 3 4 5 6 7 8 9 10 11 12


HQT
Performance based on Hz at T+106
T+106 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+106) P.U.


HQT
Performance based on Hz at T+136
T+136 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+136) P.U.


HQT
Performance based on Hz at T+166
T+166 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+166) P.U.

FRI - NERC Frequency Response Initiative

The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

Some basic observations from this data:

1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.

Event Number	Balancing Authority	MyBA	JOU Dynamic Schedules		Non conforming Load		Pumped Hydro		Not Used		Transferred Frequency Response		Contingent BA Adjustment		004345 Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
     Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
     (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

Balancing Authority: ERCOT

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

Select Reason(s) for adjustment

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information MW/Load Lost	Value "A" Information Adjustment	Value "B" Information MW/Load Lost	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Reason(s)
1	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
2	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
8	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
9	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
10	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

1901	Bias Calculation Form 1 for Year
ERCOT	Interconnection
ERCOT	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
1	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
1	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
1	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
1	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-286	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
-286.00	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
-286.00	**1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.**
Calculate Regression	**BA Bias Type and Bias Setting**
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
65300	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
-587.70	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-653.00	Balancing Authority desired Bias Setting: Single BA Interconnections have no minimum or maximum Bias Setting requirement. If variable Bias is used, enter "Variable".
-653.00	**1901 Frequency Bias Setting - (Single BA Interconnections have no minimum or maximum Bias Setting requirement)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
-529.36	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
-529.36	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Instructions

Step 1	Enter data in all green cells on this "Data Entry" worksheet.
Step 2	For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.
Step 3	PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.
Step 4	Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)
	ERCOT_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.89761	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.90685	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
N		NL & PH & ID & CBA
Y		NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq	10 X BA DelFreq	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics	
	For Bias	For R1			For Bias	
421.08749	-1.014658	-1.014658	-415.00442	-415.00442	-529.362	0
726.02426	-1.212405	-1.212405	-598.8298	-598.8298	18.25749	#N/A
518.4755	-0.89661	-0.89661	-578.26195	-578.26195	0.987084	75.02074
785.54117	-1.445673	-1.445673	-543.37416	-543.37416	840.664	11
691.80448	-1.32911	-1.32911	-520.50213	-520.50213	4731351	61909.23
-226.24	0.3558911	0.3558911	-635.70015	-635.70015		
661.23172	-1.311035	-1.311035	-504.3586	-504.3586	For R1	
995.08267	-1.97183	-1.97183	-504.6492	-504.6492	-529.362	0
533.32526	-0.920725	-0.920725	-579.24498	-579.24498	18.25749	#N/A
762.32339	-1.179408	-1.179408	-646.3608	-646.3608	0.987084	75.02074
480.61002	-0.929121	-0.929121	-517.2738	-517.2738	840.664	11
386.25	-0.942728	-0.942728	-409.71529	-409.71529	4731351	61909.23

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

	Balancing Authority	ERCOT	Load Resources Tripped		Non conforming Load		Not Used		Not Used		Not Used		Not Used		Net Total Adjustments
Event Number	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2

Imports: MWs are -
Exports: MWs are +

Loads in MW as -

Load MW as -
Generation MW as +

Enter Gen MW as +

The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet

Generation MW as +
(If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
     Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
     (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: ERCOT

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**

**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecial/Values the data copied from FRS Form 2 for each event.

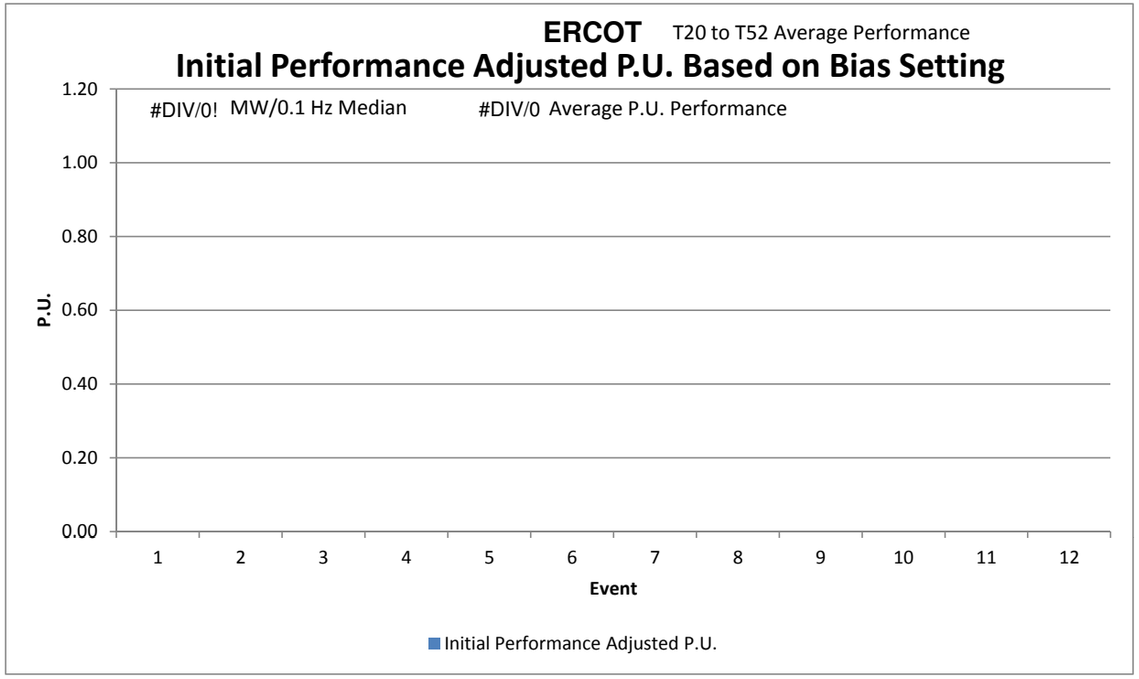
Value A Data BA Performance

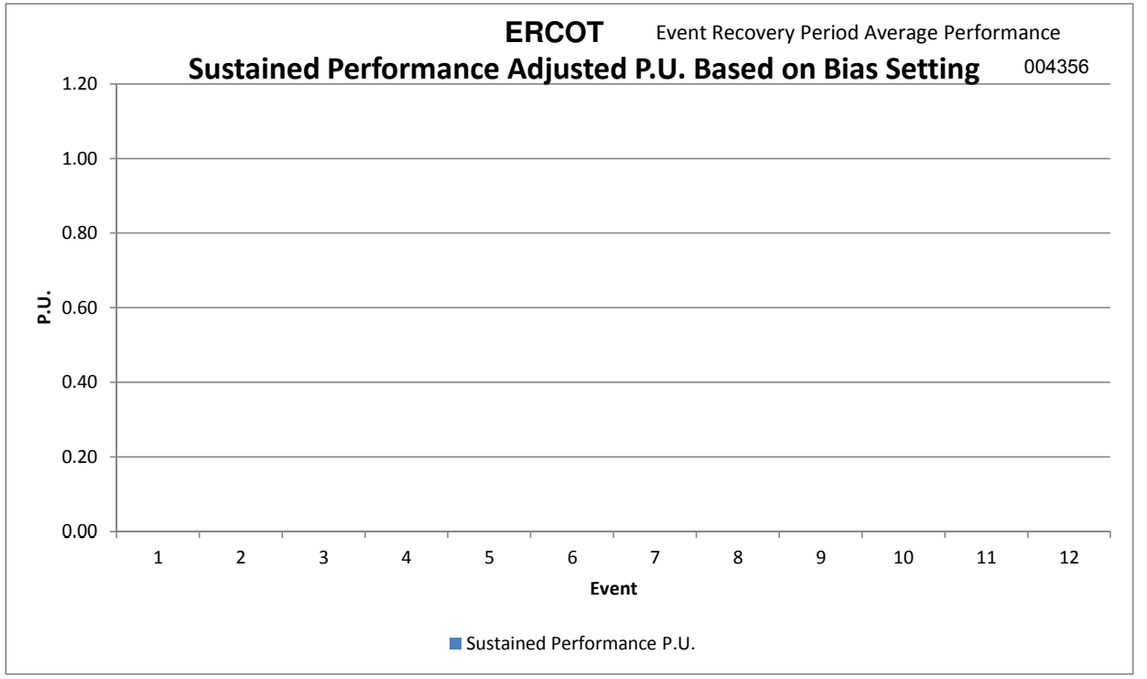
Value B 20 to 52 second Average Period Evaluatic

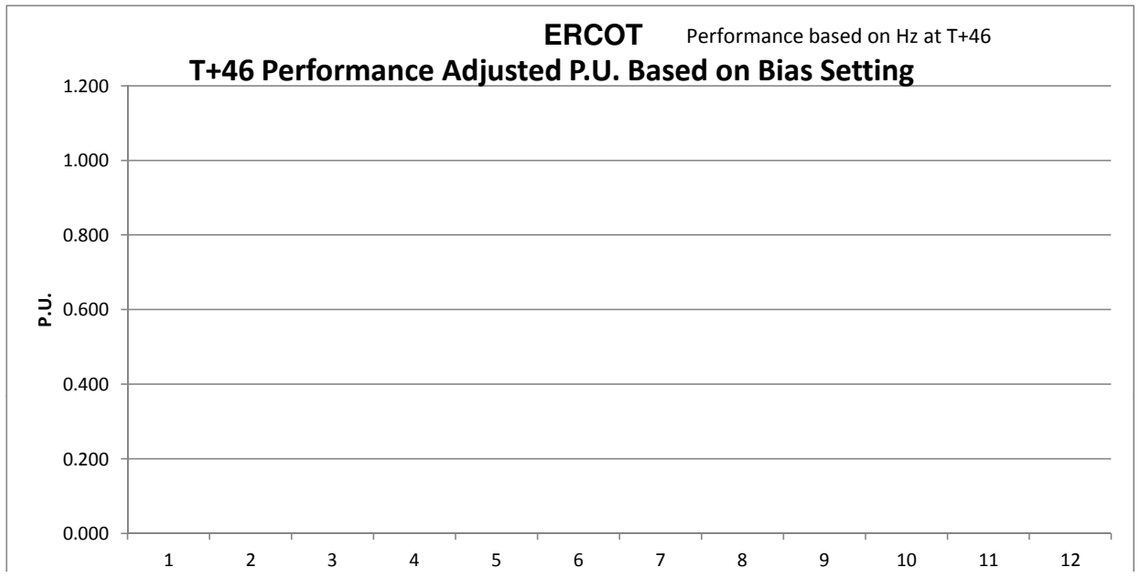
Event Number	Date/Time (Central Prevailing)	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW
1	1/0/1900 0:00	0.000																						
2	1/0/1900 0:00	0.000																						
3	1/0/1900 0:00	0.000																						
4	1/0/1900 0:00	0.000																						
5	1/0/1900 0:00	0.000																						
6	1/0/1900 0:00	0.000																						
7	1/0/1900 0:00	0.000																						
8	1/0/1900 0:00	0.000																						
9	1/0/1900 0:00	0.000																						
10	1/0/1900 0:00	0.000																						
11	1/0/1900 0:00	0.000																						
12	1/0/1900 0:00	0.000																						
13	1/0/1900 0:00	0.000																						
14	1/0/1900 0:00	0.000																						
15	1/0/1900 0:00	0.000																						
16	1/0/1900 0:00	0.000																						
17	1/0/1900 0:00	0.000																						
18	1/0/1900 0:00	0.000																						
19	1/0/1900 0:00	0.000																						
20	1/0/1900 0:00	0.000																						
21	1/0/1900 0:00	0.000																						
22	1/0/1900 0:00	0.000																						
23	1/0/1900 0:00	0.000																						
24	1/0/1900 0:00	0.000																						
25	1/0/1900 0:00	0.000																						
26	1/0/1900 0:00	0.000																						
27	1/0/1900 0:00	0.000																						
28	1/0/1900 0:00	0.000																						
29	1/0/1900 0:00	0.000																						
30	1/0/1900 0:00	0.000																						
31	1/0/1900 0:00	0.000																						
32	1/0/1900 0:00	0.000																						
33	1/0/1900 0:00	0.000																						
34	1/0/1900 0:00	0.000																						
35	1/0/1900 0:00	0.000																						
36	1/0/1900 0:00	0.000																						
37	1/0/1900 0:00	0.000																						
38	1/0/1900 0:00	0.000																						
39	1/0/1900 0:00	0.000																						
40	1/0/1900 0:00	0.000																						
41	1/0/1900 0:00	0.000																						
42	1/0/1900 0:00	0.000																						

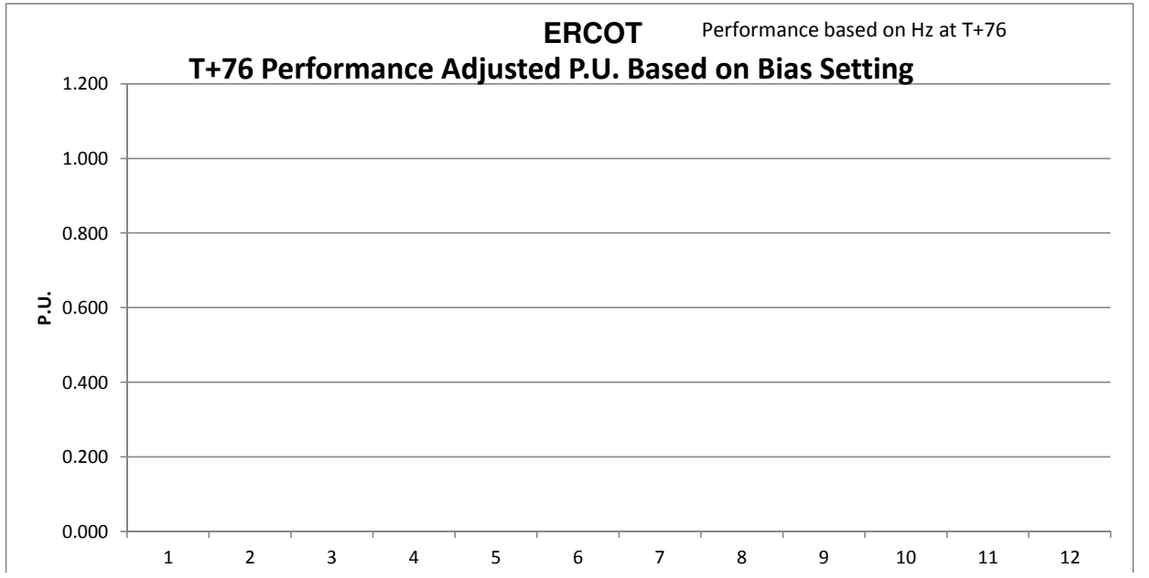
	Average P.U. Performance	#DIV/0!	#DIV/0!	#DIV/0!						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			
ın										Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points												
Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz	

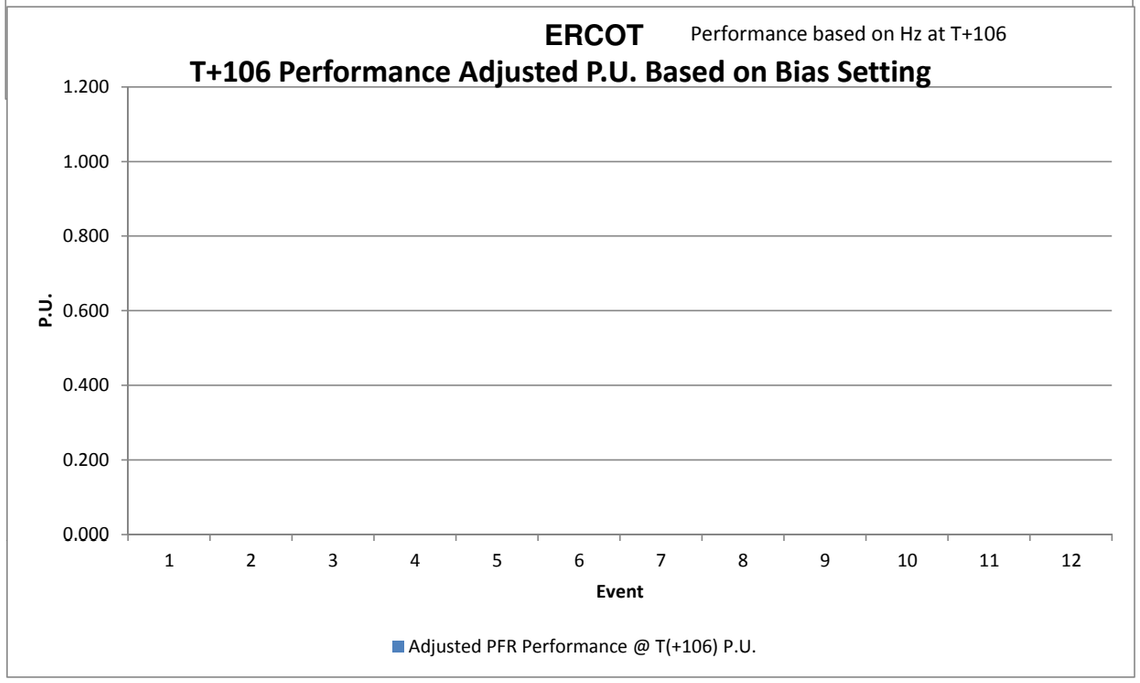
Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours

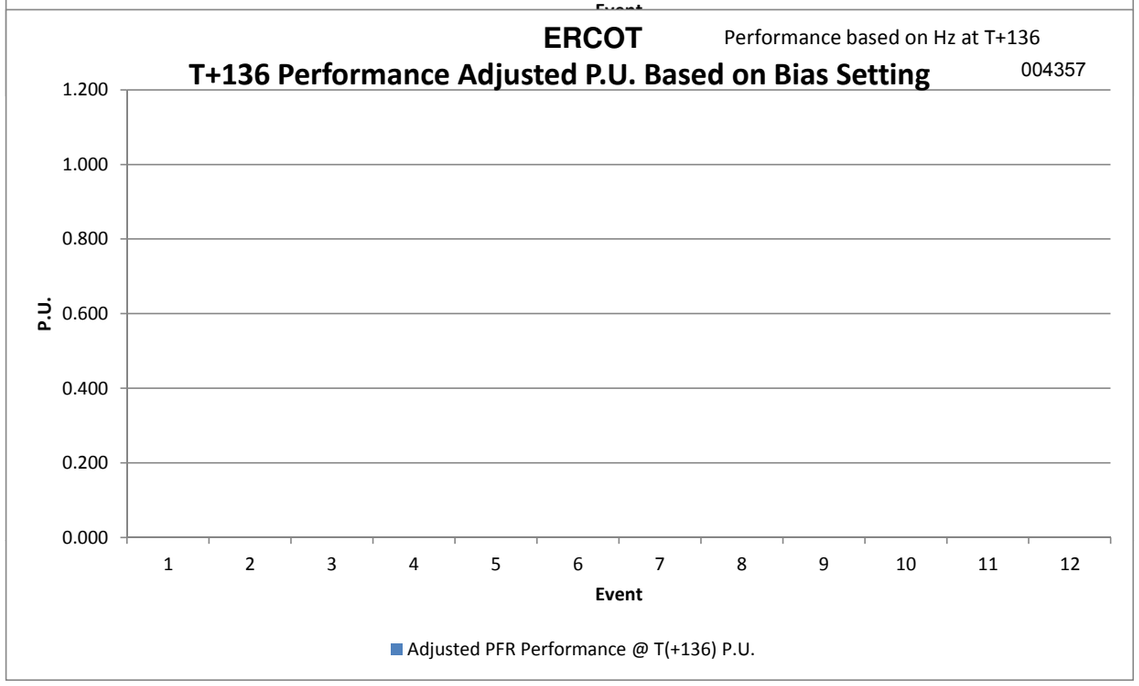

ERCOT
T20 to T52 Average Performance
Initial Performance Adjusted P.U. Based on Bias Setting
#DIV/0! MW/0.1 Hz Median
#DIV/0 Average P.U. Performance
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P.U.
1 2 3 4 5 6 7 8 9 10 11 12
Event
Initial Performance Adjusted P.U.

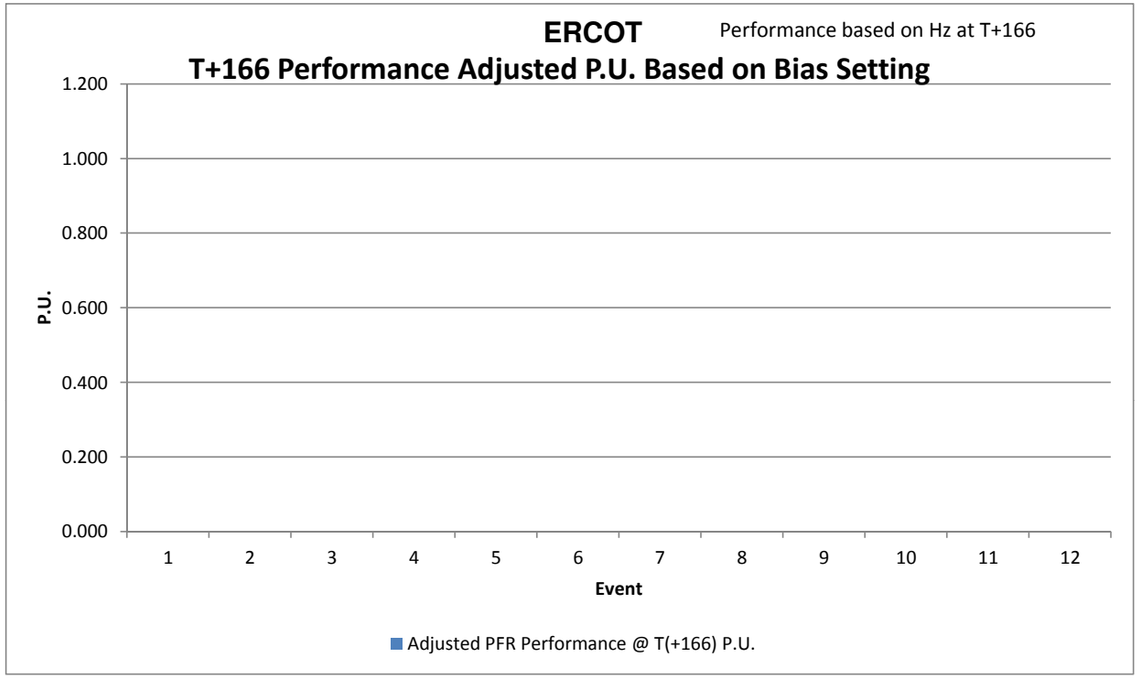

ERCOT
Event Recovery Period Average Performance
Sustained Performance Adjusted P.U. Based on Bias Setting
004356
1.20
1.00
0.80
0.60
0.40
0.20
0.00
P.U.
1 2 3 4 5 6 7 8 9 10 11 12
Event
Sustained Performance P.U.


ERCOT
Performance based on Hz at T+46
T+46 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1 2 3 4 5 6 7 8 9 10 11 12


ERCOT
Performance based on Hz at T+76
T+76 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1 2 3 4 5 6 7 8 9 10 11 12


ERCOT
Performance based on Hz at T+106
T+106 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+106) P.U.


ERCOT
Performance based on Hz at T+136
T+136 Performance Adjusted P.U. Based on Bias Setting
004357
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+136) P.U.


ERCOT
Performance based on Hz at T+166
T+166 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+166) P.U.

The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

Some basic observations from this data:

1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.

Instructions

Step 1 Enter data in all green cells on the "Data Entry" worksheet. Cell G1 with the BA name. Cells R11 through R13 with contact information. Cell R24 with BA Bias Type, Fixed or Variable.

Step 2 For identified events in column C of the "Data Entry" worksheet, collect data and complete one FRS Form 2 workbook for each event in the list.
Detailed Instructions for utilizing the "Adjustments" are located on the "Adjustments" worksheet below the table.

Step 3 PasteSpecial/Values data from FRS Form 2 "Form 1 Summary Data" worksheet into "BA Form 2 Event Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Enter FERC Form 714 data from the most recent completed Form 714 in the worksheet "Form 714 Data" in cells C7 through D18. Use Copy/PasteSpecial/Values to enter data.
Your current year's Frequency Response Obligation will be calculated in cell R20 of the "Data Entry" worksheet.

Step 5 a) If a Fixed Bias was selected, cell R27 will calculate the minimum Bias (least negative) allowed based on your Peak Demand or Peak Generation for Generation only BAs.
b) If a Fixed Bias was selected, cell R28 will calculate the minimum (in absolute terms) Bias allowed based on 100% of your FRM.
c) If a Fixed Bias was selected, cell R29 will calculate the maximum Bias (in absolute terms) allowed based on 125% of your FRM.
d) If R29 was more negative than the value in R27, you may choose a Bias setting that is between R29 and the lesser of R27 or R28 and enter it here. Based on your choice, your Bias Setting will appear in cell R33.

Step 6 a) If a Variable Bias was selected, cell R27 will indicate "not applicable" where there is no maximum or minimum Bias Setting.
b) If a Variable Bias was selected, enter "Variable" in cell R31.
c) If a Variable Bias was selected, cell R30 will calculate the minimum Bias (in absolute terms) allowed based on your FRM and Peak Demand/Peak Generation. Calculate your monthly one minute average Variable Bias setting when frequency is lower than 59.964 Hz or higher than 60.036 Hz and enter these monthly values on the "Variable Bias Supplemental Info" worksheet in cells B2 through D13.
d) If the "average annual Variable Bias Setting" in cell D14 on the "Variable Bias Supplemental Info" worksheet is less negative than cell E14 of this worksheet, R3 of the standard has not been met and cell D14 on the "Variable Bias Supplementa Info" worksheet will turn red. The average minimum Bias Setting will cover two different reporting periods and Cells J3 through K10 require past year's data from those year's Form 1s for this evaluation.
e) Depending on when the Implementation date is each year for the annual Bias Setting, the ERO may be required to edit the selection of each months' minimum average FBS value. This should be completed by the ERO before each year's FRS Form 1 is published.
f) The comparison to the FBS minimum will be from two previous year's analysis prior to the current year and the dates in the table starting at J3 will indicate the appropriate year's data to use. For example, if it is Feb 1, 2013 and you are calculating your 2012 FBS time weigted average, the minimum FBS value will be determined from your FRM that you calculated in Feb of 2012 and based on the Peak Demand/Peak Gen reported in June of 2011 for 2010 data. Enter each field in green using the appropriate year's data.

Step 7 Two FRMs are calculated. One for the BA Bias Setting and one for meeting R1 of the standard.
The FRM for the BA Bias Setting will use all selected events and all SEFRD values will use the delta frequency as measured.
The FRM for the BA compliance to R1 will limit the delta frequency to no greater than those listed in Table 2 of Attachment A for each Interconnection. (Eastern +/-0.500 Hz, Western +/-0.500 Hz, ERCOT +/-0.700 Hz and HQ +/-1.500 Hz.)

Step 7 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsx. (where NYISO is replaced with your Balancing Authority abbreviation). See cell "G74" on the Data Entry worksheet for your exact file name.

Step 8 Send completed Form 1 and each Form 2 to NERC.

Balancing Authority: HQT

NERC FRS FORM 1 20 to 52 second Value B

Enter Addition Data in column W ==>

Event Number	UTC (t-0) Date / Time (MM/DD/YY HH:MM:SS)	Date/Time (t-0) (Central Prevailing)	Time Zone	Date/Time (t-0) BA Time	BA Time Zone	DelFreq	BA Time	BA Bias DelFreq	Relay Lmt R1 DelFreq	Value "A" Information MW/Load Lost	Value "A" Information Adjustment	Value "B" Information MW/Load Lost	Value "B" Information Adjustment	SEFRD (FRM) for Bias (MW/0.1Hz)	SEFRD (FRM) for R1 (MW/0.1Hz)	Exclude for data error *	Information Value "A" Load	Information Value "B" Load	Reason(s)
1	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
2	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
3	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
4	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
5	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
6	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
7	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
8	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
9	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
10	01/00/1900 6:00:00		CST	1/0/1900 1:00:00	CDT		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
11	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
12	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0	#DIV/0!	0.0	N	0.0	0.0	
13	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
14	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
15	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
16	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
17	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
18	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
19	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
20	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
21	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
22	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
23	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
24	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
25	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
26	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
27	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
28	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
29	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
30	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
31	01/00/1900 6:00:00		CST	1/0/1900 0:00:00	CST		0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
32							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
33							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
34							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
35							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
36							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
37							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
38							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
39							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
40							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
41							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	
42							0:00:00	0.000	0.000	0.0	0.0	0.0	0.0			Y	0.0	0.0	

Select Reason(s) for adjustment

Enter Data in Green Highlighted Cells

Send copy to: Chris.Scheetz@nerc.net

1901	Bias Calculation Form 1 for Year
HQ	Interconnection
HQT	Balancing Authority
	Contact Name
	Contact Phone #
	Contact e-mail
1	MWh Annual Gen_{BA} is the annual "Net Generation (MWh)", FERC Form 714, line 13, column c of Part II - Schedule 3.
1	MWh Annual $Load_{BA}$ is the annual "Net Energy for Load (MWh)", FERC Form 714, line 13, column e of Part II - Schedule 3.
1	MWh Annual Gen_{INT} is the Sum of all Annual Gen_{BA} values in this interconnection
1	MWh Annual $Load_{INT}$ is the Sum of all Annual $Load_{BA}$ values in this interconnection
-179	Interconnection Frequency Response Obligation (FRO) MW/0.1 Hz. Determined by ERO.
1900	Current data year (December thru November)
-179.00	**1901 BA Frequency Response Obligation (FRO) for next year's FRM**
-179.00	**1900 BA Frequency Response Obligation (FRO) for this year's FRM from your last year's Form 1.**
Calculate Regression	**BA Bias Type and Bias Setting**
Fixed	Bias Type utilized.
0.90%	Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
37153	The Sum of the Non-Coincident peak demands for all Bas on the interconnection from FERC Form No. 714, provided by ERO.
-334.38	Your BA's lowest absolute Fixed Frequency Bias Setting based on interconnection non-coincident peak demand.
#DIV/0!	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
#DIV/0!	Your BA's highest absolute Fixed Bias Setting: 125% of FRM.
n/a	Balancing Authority lowest absolute Variable Bias Setting (least negative one minute average Bias while frequency is less than 59.964 or greater than 60.036 Hz).
-442.00	Balancing Authority desired Bias Setting: Single BA Interconnections have no minimum or maximum Bias Setting requirement. If variable Bias is used, enter "Variable".
-442.00	**1901 Frequency Bias Setting - (Single BA Interconnections have no minimum or maximum Bias Setting requirement)**
#DIV/0!	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for Bias
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
#DIV/0!	1900 FRM - Median Estimated Frequency Response MW/0.1Hz using SEFRD for Bias
0.00	1900 FRM - Average Estimated Frequency Response MW/0.1 Hz using SEFRD for R1
0.00	1900 FRM - Regression Estimated Frequency Response MW/0.1Hz using SEFRD for R1
0.00	**1900 FRM - Median Estimated Frequency Response MW/0.1Hz for BA Compliance to R1, minimum Frequency Response**
N	Do you RECEIVE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA in the table below.

Bias -MW/0.1 Hz	Balancing Authority

N	Do you PROVIDE Overlap regulation?
	If Yes, list the BA name and the associated Bias of that BA

Bias -MW/0.1 Hz	Balancing Authority

Instructions

Step 1 Enter data in all green cells on this "Data Entry" worksheet.

Step 2 For identified events in column B, collect data and complete FRS Form 2.9 for each event in the list.

Step 3 PasteSpecial/Values data from FRS Form 2.9 "Form 1 Summary Data" into "BA Form 2 Data" worksheet of this workbook. Do this for each event in the list.

Step 4 Save this workbook using the following file name format:NYISO_yyyy_FRS_Form_1.9.xlsm and send a copy of this workbook and all FRS_Form 2 workbooks to NERC. (where NYISO is replaced with your BA name)

HQT_1901_FRS_Form_1.9.xlsm

-0.058	23.2	Dynamic schedules for joint-owned units (DS)
-0.066	27.7	Nonconforming load (NL)
-0.040	10.7	Pumped hydro (PH)
-0.05252493	80.66089	Invalid Data (ID)
-0.07090523	-26.89761	Transfered Frequency Response (TFR)
-0.05190677	9.955449	Contingent BA adjustment for loss of units (CBA)
-0.0580477	3.367024	DS & NL
-0.07557242	36.33443	DS & PH
-0.0563805	0.488253	DS & ID
-0.0573329	2.758037	DS & TFR
-0.0517609	13.64342	DS & CBA
-0.04999924	11.10075	DS & NL & PH
-0.052	-19.90685	DS & NL & ID
-0.05599976	12.32546	JOU DS & NL & TFR
-0.05849838	0.750192	DS & NL & CBA
-0.04850006	2.230058	DS & NL & PH & ID
-0.04500008	9.477859	DS & NL & PH & TFR
-0.03750229	0.355309	DS & NL & PH & CBA
-0.04750061	2.170702	DS & NL & PH & ID & TFR
-0.05550003	29.38207	DS & NL & PH & ID & CBA
-0.047	4.601381	DS & NL & PH & ID & TFR & CBA
-0.06	1.593515	NL & PH
-0.06	52.37091	NL & ID
-0.051	33.94787	NL & TFR
-0.1	100	NL & CBA
		NL & PH & ID
		NL & PH & TFR
		NL & PH & BAA
		NL & PH & ID & TFR
N		NL & PH & ID & CBA
Y		NL & PH & ID & TFR & CBA
		PH & ID
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR
		PH & ID & CBA
		PH & TFR
		PH & CBA
		PH & ID & TFR & CBA
		RU & TFR
		RU & CBA
		RU & TFR & CBA
		TFR & CBA

N
Y

Fixed
Variable

	Relay Limits	
Eastern	59.5	60.5
Western	59.5	60.5
ERCOT	59.3	60.7
HQ	58.5	61.5

Columns BA, BB, BC, BD, BE, BF and BG are reserved for calculation of the linear regression.

BA Delta NAI	10 X BA DelFreq For Bias	10 X BA DelFreq For R1	SEFRDB (MW/0.1Hz)	SEFRDR (MW/0.1Hz)	Regression Statistics For Bias	
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0	0	#N/A
0	0	0	#DIV/0!	0	1	0
0	0	0	#DIV/0!	0	#NUM!	12
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0		
0	0	0	#DIV/0!	0	For R1	
0	0	0	#DIV/0!	0	0	0
0	0	0	#DIV/0!	0	0	#N/A
0	0	0	#DIV/0!	0	1	0
0	0	0	#DIV/0!	0	#NUM!	12
0	0	0	#DIV/0!	0	0	0

004360

Report 714 Data (in MW) Part II Schedule 3	
Column (b) Month	Column (j) Peak Demand
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Average	#DIV/0!
Maximum	0

Peak Demand: (Your BA from Form 714, column j of Part II - Schedule 3)

Event Number	Balancing Authority	HQT	Load Resources Tripped		Non conforming Load		Not Used		Not Used		Not Used		Not Used		Net Total Adjustments
	Date/Time (t-0) (Central Prevailing)	DelFreq	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value A Adjustment	Value B Adjustment	Value B 20 to 52 seconds
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sign Convention for scan data collected in Form 2	Imports: MWs are - Exports: MWs are +	Loads in MW as -	Load MW as - Generation MW as +	Enter Gen MW as +	The transactional amount in MW Receiver enters - Deliverer enters + on Form 2 Data sheet	Generation MW as + (If demand occurs due to gen loss, enter MW as - at value B)

Instructions for utilizing Adjustments:

1) Balancing Authorities making adjustments must retain evidence to verify:
   - Adjustment values are determined from scan-cycle data using Value A and Value B averaging periods. Scan-cycle data must be available if adjustments are made.
   - Adjustments are necessary to improve accuracy of calculations compared to using Net Actual Interchange solely.
     Said differently, unless an adjustment compensates for significant known error, it should not be made. However, as noted in the next item, once a decision to include an adjustment for one or more of the five types is made for one event, the entity must calculate adjustments for that (those) type(s) for all events except for the Contengent BA Adjustment which is only utilized for the events that you are contengent during that event.
   - Adjustments are included consistently for all events (e.g. if adjustments for nonconforming load are made for one event, the load must be included for all events, etc.).

2) Dynamic Schedules:
   - Values use schedule sign convention.
   - Adjustments should include only dynamic schedules accounting for joint-owned units. Other dynamic schedules should be ignored.

3) Nonconforming Loads:
   - Values must be negative numbers.

4) Pumped Hydro:
   - Values for pumping must be negative values.
   - Values for generating must be positive values.

5) Rampling Units:
   - Values are positive values.

6) Transferred Frequency Response:
   - This value is the amount agreed upon between the entities expressed in MW/0.1 Hz. Form 2 will adjust this amount for the frequency deviation experienced.
     (e.g. if an entity agrees to provide 20 MW/0.1 Hz to another entity and a frequency event with a deviation of 50 mHz occurs, the delivering entity should enter +20 in the data column of Form 2 and the receiving entity should enter - 20. The spreadsheet will adjust the SEFRD for each entity by the 10 for this event.)
   - Values for the entity receiving the response must be entered as a negative number.
   - Values for the entity delivering the response must be entered as a positive number.
   - Values between entities must sum to zero.

7) Contingent Balancing Authority Adjustment:
   - Data for Value A is the pre-contingency scan rate generation (+MW values) from the contingent unit(s).
   - Data for Value B is usually 0 MW, but may be the demand (-MW values) that remains on the system that was "netted" out by the now offline generation.

Month	Minimum FBS* for month	Maximum FBS* for month	Time weighted ** average FBS* for month	Time weighted ** minimum average FBS* for month	
January					
Feburary					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					
			0.0	0.0	1900 Average Annual Bias MW/0.1 Hz

Balancing Authority: HQT

1899	Reporting period FRS Form 1 data
0.00	1899 Reporting period: Balancinig Authority FRM MW/0.1 Hz, enter from FRS Form 1 for that year's FRM. If not know enter zero.
1.00%	1899 Reporting period: Interconnection Minimum Fixed Frequency Bias Setting % of Peak Demand or Peak Generation (Set by ERO)
	1899 Reporting period: Your BA's Annual Peak Demand or Peak Gen for Gen only BAs from your BA Form 714.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on BA Peak Demand (Peak Generation for Generation only BA) MW/0.1 Hz.
0.00	Your BA's lowest absolute Fixed Frequency Bias Setting based on 100% of FRM.
0.00	1900 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.
	1899 Minimum, lowest absolute, conditional average Frequency Bias Setting MW/0.1 Hz.

*** Frequency Bias Setting (FBS)**

**** Based on the one minute values used in BAL 001 when frequency is greater than 60.036 Hz or less than 59.964 Hz.**

PasteSpecial/Values the data copied from FRS Form 2 for each event.

Value A Data BA Performance

Value B 20 to 52 second Average Period Evaluatio

Event Number	Date/Time (Central Prevailing)	DelFreq	Date	A Point Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW
1	1/0/1900 0:00	0.000																						
2	1/0/1900 0:00	0.000																						
3	1/0/1900 0:00	0.000																						
4	1/0/1900 0:00	0.000																						
5	1/0/1900 0:00	0.000																						
6	1/0/1900 0:00	0.000																						
7	1/0/1900 0:00	0.000																						
8	1/0/1900 0:00	0.000																						
9	1/0/1900 0:00	0.000																						
10	1/0/1900 0:00	0.000																						
11	1/0/1900 0:00	0.000																						
12	1/0/1900 0:00	0.000																						
13	1/0/1900 0:00	0.000																						
14	1/0/1900 0:00	0.000																						
15	1/0/1900 0:00	0.000																						
16	1/0/1900 0:00	0.000																						
17	1/0/1900 0:00	0.000																						
18	1/0/1900 0:00	0.000																						
19	1/0/1900 0:00	0.000																						
20	1/0/1900 0:00	0.000																						
21	1/0/1900 0:00	0.000																						
22	1/0/1900 0:00	0.000																						
23	1/0/1900 0:00	0.000																						
24	1/0/1900 0:00	0.000																						
25	1/0/1900 0:00	0.000																						
26	1/0/1900 0:00	0.000																						
27	1/0/1900 0:00	0.000																						
28	1/0/1900 0:00	0.000																						
29	1/0/1900 0:00	0.000																						
30	1/0/1900 0:00	0.000																						
31	1/0/1900 0:00	0.000																						
32	1/0/1900 0:00	0.000																						
33	1/0/1900 0:00	0.000																						
34	1/0/1900 0:00	0.000																						
35	1/0/1900 0:00	0.000																						
36	1/0/1900 0:00	0.000																						
37	1/0/1900 0:00	0.000																						
38	1/0/1900 0:00	0.000																						
39	1/0/1900 0:00	0.000																						
40	1/0/1900 0:00	0.000																						
41	1/0/1900 0:00	0.000																						
42	1/0/1900 0:00	0.000																						

	Average P.U. Performance	#DIV/0!	#DIV/0!	#DIV/0!						#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!			

on

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

004366

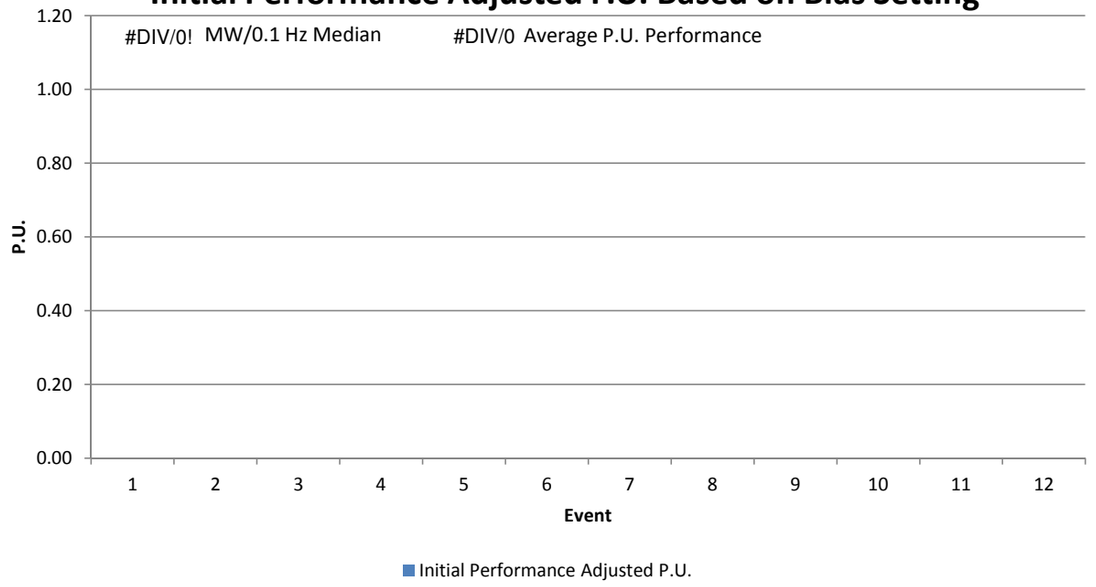
Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz	

Full name	Abbreviation	Offset	Time zone
Atlantic Daylight Time	ADT	3:00	UTC - 3 hours
Atlantic Standard Time	AST	4:00	UTC - 4 hours
Central Daylight Time	CDT	5:00	UTC - 5 hours
Central Standard Time	CST	6:00	UTC - 6 hours
Eastern Daylight Time	EDT	4:00	UTC - 4 hours
Eastern Standard Time	EST	5:00	UTC - 5 hours
Mountain Daylight Time	MDT	6:00	UTC - 6 hours
Mountain Standard Time	MST	7:00	UTC - 7 hours
Pacific Daylight Time	PDT	7:00	UTC - 7 hours
Pacific Standard Time	PST	8:00	UTC - 8 hours

HQT T20 to T52 Average Performance

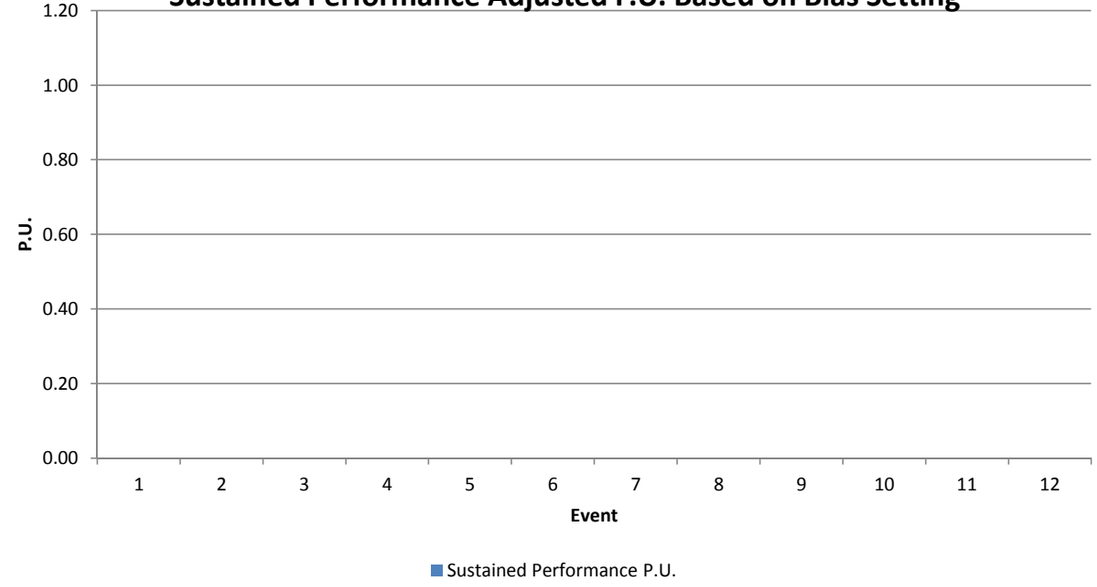
Initial Performance Adjusted P.U. Based on Bias Setting

#DIV/0! MW/0.1 Hz Median #DIV/0 Average P.U. Performance



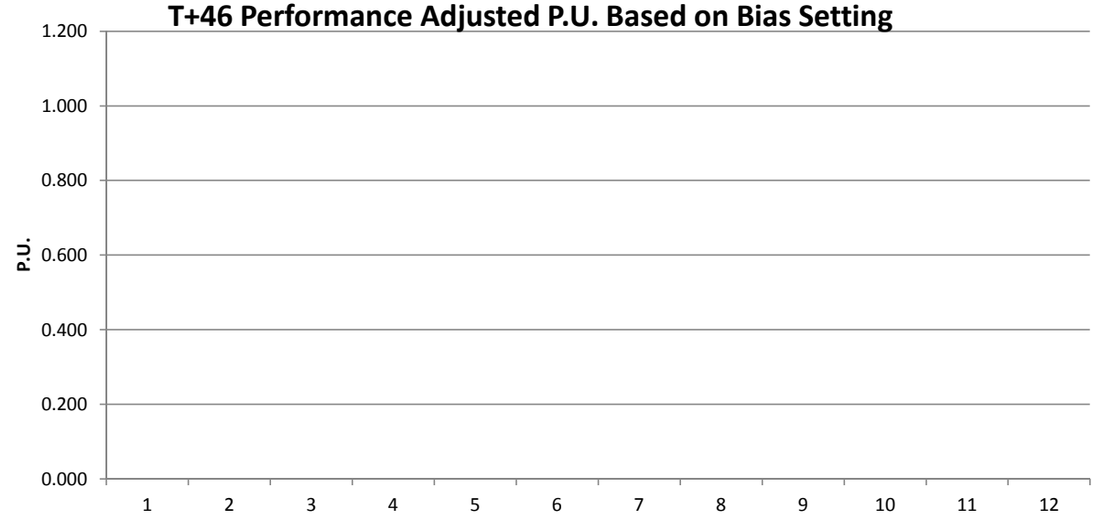
HQT Event Recovery Period Average Performance

Sustained Performance Adjusted P.U. Based on Bias Setting



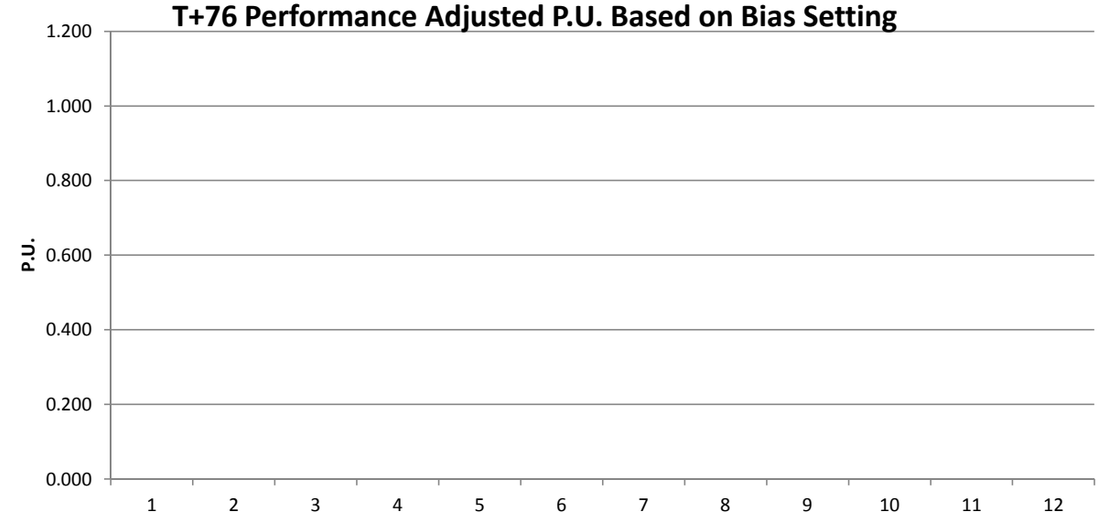
HQT Performance based on Hz at T+46

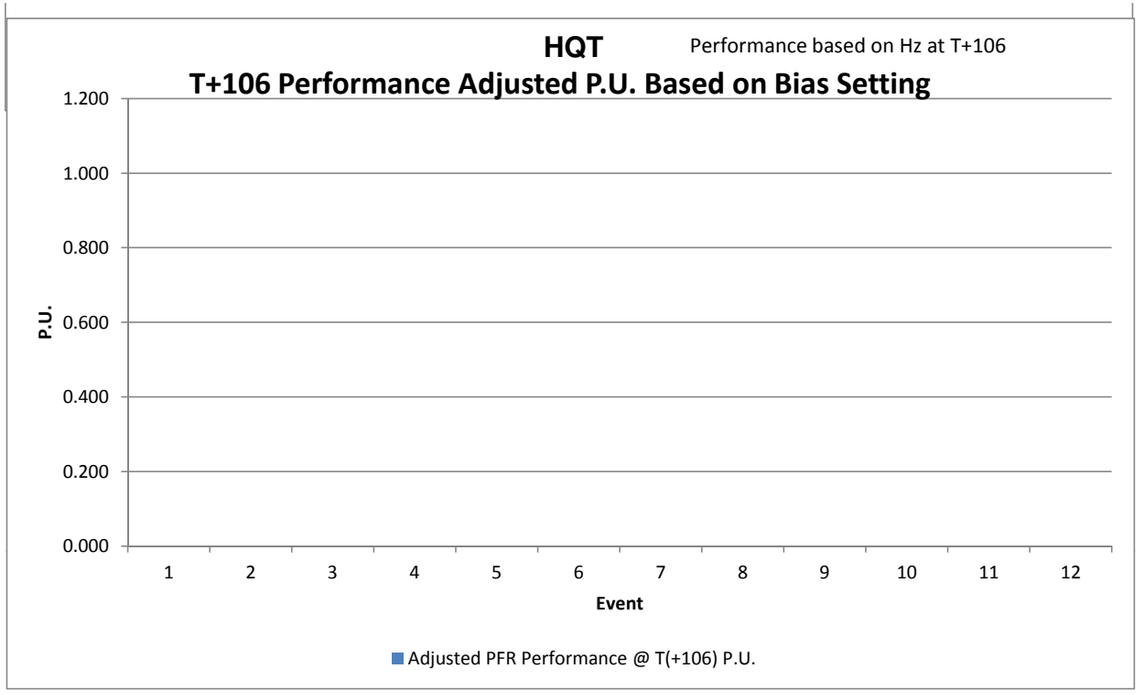
T+46 Performance Adjusted P.U. Based on Bias Setting

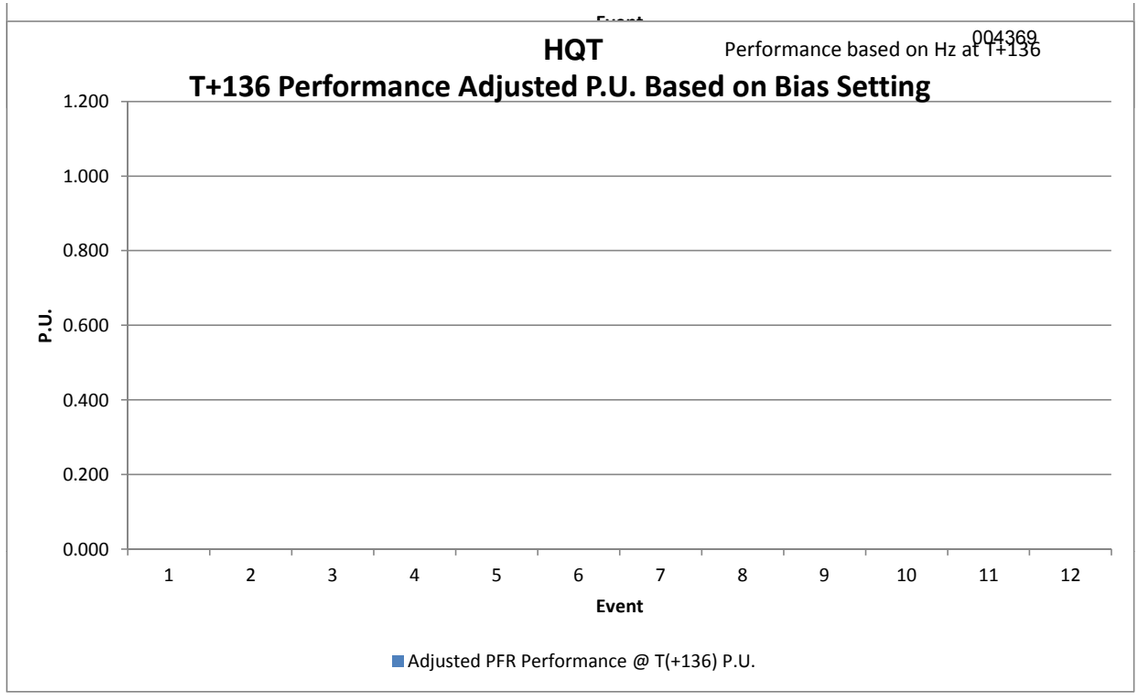


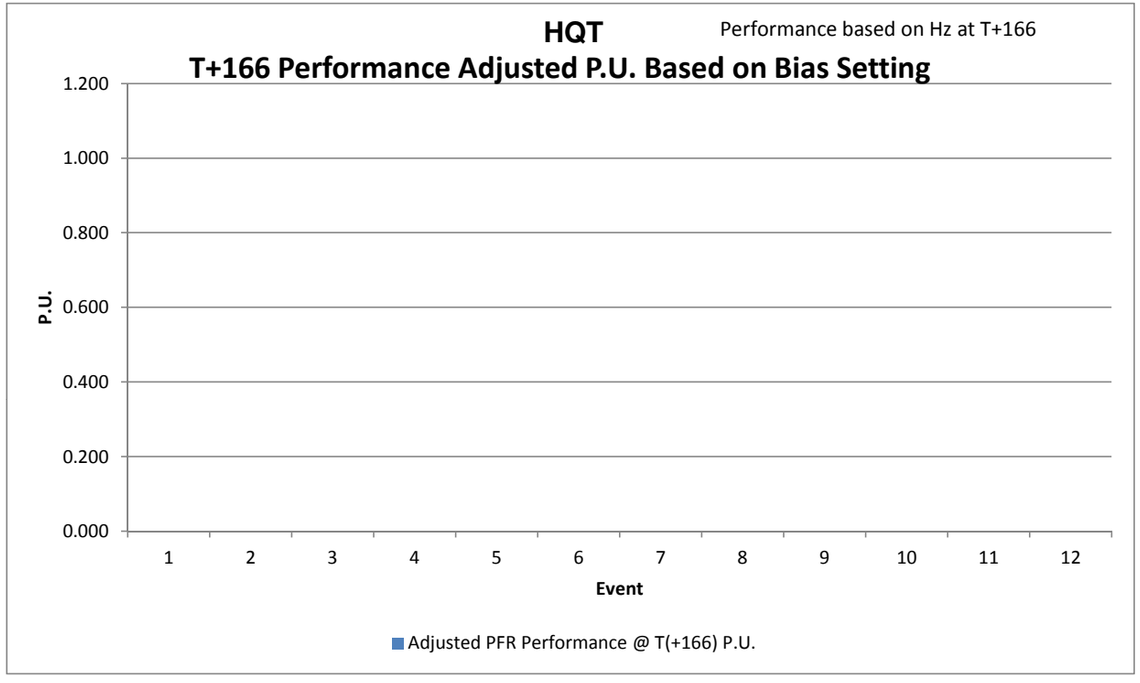
HQT Performance based on Hz at T+76

T+76 Performance Adjusted P.U. Based on Bias Setting




HQT
Performance based on Hz at T+106
T+106 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+106) P.U.


HQT
Performance based on Hz at T+136
T+136 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+136) P.U.


HQT
Performance based on Hz at T+166
T+166 Performance Adjusted P.U. Based on Bias Setting
1.200
1.000
0.800
0.600
0.400
0.200
0.000
P.U.
1
2
3
4
5
6
7
8
9
10
11
12
Event
Adjusted PFR Performance @ T(+166) P.U.

FRI - NERC Frequency Response Initiative

The FRI Report made recommendations to evaluate Primary Frequency Response at additional time intervals during the event recovery period.
Additional evaluations have been added to both Form 1 and Form 2 to evaluate PFR delivery for these suggested time periods.
These evaluations utilize Interconnection frequency at specific times during the recovery period and calculates the BA's delivery of PFR for each selection.
These evaluations are not part of BAL-003 and will not impact compliance to R1 of the draft standard.
The following time selections are evaluated: T+46, T+76, T+106, T+136 and T+166.
Each evaluation is a P.U. measure based on the BA's Bias setting at each of these times.
Performance is the "best" performance at the specific time through 10 seconds past each time.
This is intended to account for any delay in data in the measurement. This measurement may be changed as experience in this effort increases.

Also included is the measure of PFR delivery during the T+20 to T+52 second period, the same as R1 of the standard.
The measure (P.U.) here is based on the BA Bias setting and not the FRO. This was done to provide comparison to the additional measurement times.

Some basic observations from this data:

1) If the P.U. value is close to 1.0, the BA delivered the full amount of PFR equal to its Bias setting.
2) The average performance of the Eastern Interconnection in PFR is about 40% of the total Interconnection Bias setting. If the BA's average score is greater than 0.40 P.U. then they are providing more PFR than the average BA. If the P.U. is less than 40% then they are providing less than average PFR.
3) If the P.U. value at T+46 is consistently less than the P.U. value at T+20 to T+52, then the PFR of the BA is not being sustained.
4) If the P.U. value at later time interval measures is consistently less, then withdrawal of PFR is occurring at a slower rate, but still being withdrawn.
5) If the P.U. value at T+20 to T+52, T+46, or T+76 is consistently greater than 1.0, this indicates that the BA Bias setting is too low.

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:17:26	60.007	3679.946	350	-331.852966	0	81.5	10	15	-103	7553.79		0				
10/12/09 02:17:28	60.009	3679.44	350	-331.852966	0	82	10	15	-103	7554.12	0	0	0	0.002	0.002	
10/12/09 02:17:30	60.009	3679.912	350	-331.852966	0	82.5	10	15	-103	7554.45	0	0	0	0.000	0.000	
10/12/09 02:17:32	60.006	3679.517	350	-331.852966	0	83	10	15	-103	7554.78	0	0	0	-0.003	0.003	
10/12/09 02:17:34	60.006	3679.888	350	-331.852966	0	83.5	10	15	-103	7555.11	0	0	0	0.000	0.000	
10/12/09 02:17:36	60.009	3679.608	350	-329.98822	0	84	10	15	-103	7555.44	0	0	0	0.003	0.003	
10/12/09 02:17:38	60.009	3679.06	350	-329.98822	0	84.5	10	15	-103	7555.77	0	0	0	0.000	0.000	
10/12/09 02:17:40	60.008	3679.261	350	-329.98822	0	85	10	15	-103	7556.1	0	0	0	-0.001	0.001	
10/12/09 02:17:42	60.009	3679.164	350	-329.98822	0	85.5	10	15	-103	7556.43	0	0	0	0.001	0.001	
10/12/09 02:17:44	60.009	3679.025	350	-329.98822	0	86	10	15	-103	7556.76	0	0	0	0.000	0.000	
10/12/09 02:17:46	60.005	3679.152	350	-255.444168	0	86.5	10	15	-103	7557.09	0	0	0	-0.004	0.004	
10/12/09 02:17:48	60.004	3678.572	350	-255.444168	0	87	10	15	-103	7557.42	0	0	0	-0.001	0.001	
10/12/09 02:17:50	60.001	3678.295	350	-255.444168	0	87.5	10	15	-103	7557.75	0	0	0	-0.003	0.003	
10/12/09 02:17:52	59.999	3678.249	350	-255.444168	0	88	10	15	-103	7558.08	0	0	0	-0.002	0.002	
10/12/09 02:17:54	59.993	3678.236	350	-255.444168	0	88.5	10	15	-103	7558.41	0	0	0	-0.006	0.006	
10/12/09 02:17:56	59.991	3677.83	350	-254.838303	0	89	10	15	-103	7558.74	0	0	0	-0.002	0.002	
10/12/09 02:17:58	59.994	3677.955	350	-254.838303	0	89.5	10	15	-103	7559.07	0	0	0	0.003	0.003	
10/12/09 02:18:00	59.992	3677.772	350	-254.838303	0	90	10	15	-103	7559.4	0	0	0	-0.002	0.002	
10/12/09 02:18:02	59.994	3676.666	350	-254.838303	0	90.5	10	15	-103	7559.73	0	0	0	0.002	0.002	
10/12/09 02:18:04	59.992	3677.093	350	-254.838303	0	91	10	15	-103	7560.06	0	0	0	-0.002	0.002	
10/12/09 02:18:06	59.994	3677.141	350	-257.146973	0	91.5	10	15	-103	7560.39	0	0	0	0.002	0.002	
10/12/09 02:18:08	59.995	3676.401	350	-257.146973	0	92	10	15	-103	7560.72	0	0	0	0.001	0.001	
10/12/09 02:18:10	59.993	3678.516	350	-257.146973	0	92.5	10	15	-103	7561.05	0	0	0	-0.002	0.002	
10/12/09 02:18:12	59.99	3679.872	350	-257.146973	0	93	10	15	-103	7561.38	0	0	0	-0.003	0.003	
10/12/09 02:18:14	59.99	3680.197	350	-257.146973	0	93.5	10	15	-103	7561.71	0	0	0	0.000	0.000	
10/12/09 02:18:16	59.987	3678.743	350	-262.289368	0	94	10	15	-103	7562.04	0	0	0	-0.003	0.003	
10/12/09 02:18:18	59.983	3678.428	350	-262.289368	0	94.5	10	15	-103	7562.37	0	0	0	-0.004	0.004	
10/12/09 02:18:20	59.977	3677.921	350	-262.289368	0	95	10	15	-103	7562.7	0	0	0	-0.006	0.006	
10/12/09 02:18:22	59.977	3680.254	350	-262.289368	0	95.5	10	15	-103	7563.03	0	0	0	0.000	0.000	
10/12/09 02:18:24	59.989	3682.07	350	-262.289368	0	96	10	15	-103	7563.36	0	0	0	0.012	0.012	
10/12/09 02:18:26	59.995	3681.329	350	-256.647949	0	96.5	10	15	-103	7563.69	0	0	0	0.006	0.006	
10/12/09 02:18:28	59.999	3678.656	350	-256.647949	0	97	10	15	-103	7564.02	0	0	0	0.004	0.004	
10/12/09 02:18:30	59.994	3678.077	350	-256.647949	0	97.5	10	15	-103	7564.35	0	0	0	-0.005	0.005	
10/12/09 02:18:32	59.989	3677.78	350	-256.647949	0	98	10	15	-103	7564.68	0	0	0	-0.005	0.005	
10/12/09 02:18:34	59.987	3678.427	350	-256.647949	0	98.5	10	15	-103	7565.01	0	0	0	-0.002	0.002	
10/12/09 02:18:36	59.986	3678.473	350	-256.307251	0	99	10	15	-103	7565.34	0	0	0	-0.001	0.001	
10/12/09 02:18:38	59.984	3678.278	350	-256.307251	0	99.5	10	15	-103	7565.67	0	0	0	-0.002	0.002	
10/12/09 02:18:40	59.983	3677.822	350	-256.307251	0	100	10	15	-103	7566	0	0	0	-0.001	0.001	
10/12/09 02:18:42	59.985	3676.615	350	-256.307251	0	100.5	10	15	-103	7566.33	0	0	0	0.002	0.002	
10/12/09 02:18:44	59.986	3677.397	350	-256.307251	0	101	10	15	-103	7566.66	0	0	0	0.001	0.001	
10/12/09 02:18:46	59.985	3677.917	350	-249.086395	0	101.5	10	15	-103	7566.99	0	0	0	-0.001	0.001	
10/12/09 02:18:48	59.986	3677.95	350	-249.086395	0	102	10	15	-103	7567.32	0	0	0	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:18:50	59.98	3678.617	350	-249.086395	0	102.5	10	15	-103	7567.65	0	0	0	-0.006	0.006	
10/12/09 02:18:52	59.981	3678.963	350	-249.086395	0	103	10	15	-103	7567.98	0	0	0	0.001	0.001	
10/12/09 02:18:54	59.981	3681.252	350	-249.086395	0	103.5	10	15	-103	7568.31	0	0	0	0.000	0.000	
10/12/09 02:18:56	59.989	3680.737	350	-253.742477	0	104	10	15	-103	7568.64	0	0	0	0.008	0.008	
10/12/09 02:18:58	59.998	3680.045	350	-253.742477	0	104.5	10	15	-103	7568.97	0	0	0	0.009	0.009	
10/12/09 02:19:00	60.007	3678.161	350	-253.742477	0	105	10	15	-103	7569.3	0	0	0	0.009	0.009	
10/12/09 02:19:02	60.007	3674.076	350	-253.742477	0	105.5	10	15	-103	7569.63	0	0	0	0.000	0.000	
10/12/09 02:19:04	59.997	3676.222	350	-253.742477	0	106	10	15	-103	7569.96	0	0	0	-0.010	0.010	
10/12/09 02:19:06	59.986	3676.669	350	-257.421204	0	106.5	10	15	-103	7570.29	0	0	0	-0.011	0.011	
10/12/09 02:19:08	59.981	3677.497	350	-257.421204	0	107	10	15	-103	7570.62	0	0	0	-0.005	0.005	
10/12/09 02:19:10	59.977	3677.49	350	-257.421204	0	107.5	10	15	-103	7570.95	0	0	0	-0.004	0.004	
10/12/09 02:19:12	59.974	3675.186	350	-257.421204	0	108	10	15	-103	7571.28	0	0	0	-0.003	0.003	
10/12/09 02:19:14	59.976	3675.437	350	-257.421204	0	108.5	10	15	-103	7571.61	0	0	0	0.002	0.002	
10/12/09 02:19:16	59.974	3680.451	350	-261.73822	0	109	10	15	-103	7571.94	0	0	0	-0.002	0.002	
10/12/09 02:19:18	59.974	3682.032	350	-261.73822	0	109.5	10	15	-103	7572.27	0	0	0	0.000	0.000	
10/12/09 02:19:20	59.977	3683.829	350	-261.73822	0	110	10	15	-103	7572.6	0	0	0	0.003	0.003	
10/12/09 02:19:22	59.979	3682.843	350	-261.73822	0	110.5	10	15	-103	7572.93	0	0	0	0.002	0.002	
10/12/09 02:19:24	59.979	3681.108	350	-261.73822	0	111	10	15	-103	7573.26	0	0	0	0.000	0.000	
10/12/09 02:19:26	59.982	3680.566	350	-271.875977	0	111.5	10	15	-103	7573.59	0	0	0	0.003	0.003	
10/12/09 02:19:28	59.984	3678.229	350	-271.875977	0	112	10	15	-103	7573.92	0	0	0	0.002	0.002	
10/12/09 02:19:30	59.987	3676.752	350	-271.875977	0	112.5	10	15	-103	7574.25	0	0	0	0.003	0.003	
10/12/09 02:19:32	59.988	3675.759	350	-271.875977	0	113	10	15	-103	7574.58	0	0	0	0.001	0.001	
10/12/09 02:19:34	59.988	3671.942	350	-271.875977	0	113.5	10	15	-103	7574.91	0	0	0	0.000	0.000	
10/12/09 02:19:36	59.987	3671.166	350	-262.073486	0	114	10	15	-103	7575.24	0	0	0	-0.001	0.001	
10/12/09 02:19:38	59.987	3670.476	350	-262.073486	0	114.5	10	15	-103	7575.57	0	0	0	0.000	0.000	
10/12/09 02:19:40	59.987	3670.129	350	-262.073486	0	115	10	15	-103	7575.9	0	0	0	0.000	0.000	
10/12/09 02:19:42	59.985	3671.542	350	-262.073486	0	115.5	10	15	-103	7576.23	0	0	0	-0.002	0.002	
10/12/09 02:19:44	59.984	3672.048	350	-262.073486	0	116	10	15	-103	7576.56	0	0	0	-0.001	0.001	
10/12/09 02:19:46	59.982	3671.576	350	-260.36441	0	116.5	10	15	-103	7576.89	0	0	0	-0.002	0.002	
10/12/09 02:19:48	59.983	3672.104	350	-260.36441	0	117	10	15	-103	7577.22	0	0	0	0.001	0.001	
10/12/09 02:19:50	59.989	3672.414	350	-260.36441	0	117.5	10	15	-103	7577.55	0	0	0	0.006	0.006	
10/12/09 02:19:52	59.989	3671.882	350	-260.36441	0	118	10	15	-103	7577.88	0	0	0	0.000	0.000	
10/12/09 02:19:54	59.988	3671.837	350	-260.36441	0	118.5	10	15	-103	7578.21	0	0	0	-0.001	0.001	
10/12/09 02:19:56	59.984	3671.336	350	-352.644379	0	119	10	15	-103	7578.54	0	0	0	-0.004	0.004	
10/12/09 02:19:58	59.982	3670.726	350	-352.644379	0	119.5	10	15	-103	7578.87	0	0	0	-0.002	0.002	
10/12/09 02:20:00	59.983	3670.372	350	-352.644379	0	120	10	15	-103	7579.2	0	0	0	0.001	0.001	
10/12/09 02:20:02	59.981	3671.364	350	-352.644379	0	120.5	10	15	-103	7579.53	0	0	0	-0.002	0.002	
10/12/09 02:20:04	59.982	3671.401	350	-352.644379	0	121	10	15	-103	7579.86	0	0	0	0.001	0.001	
10/12/09 02:20:06	59.983	3672.156	350	-354.89566	0	121.5	10	15	-103	7580.19	0	0	0	0.001	0.001	
10/12/09 02:20:08	59.986	3672.181	350	-354.89566	0	122	10	15	-103	7580.52	0	0	0	0.003	0.003	
10/12/09 02:20:10	59.989	3670.296	350	-354.89566	0	122.5	10	15	-103	7580.85	0	0	0	0.003	0.003	
10/12/09 02:20:12	59.987	3668.071	350	-354.89566	0	123	10	15	-103	7581.18	0	0	0	-0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:20:14	59.985	3668.59	350	-354.89566	0	123.5	10	15	-103	7581.51	0	0	0	-0.002	0.002	
10/12/09 02:20:16	59.98	3669.908	350	-340.46936	0	124	10	15	-103	7581.84	0	0	0	-0.005	0.005	
10/12/09 02:20:18	59.98	3670.399	350	-340.46936	0	124.5	10	15	-103	7582.17	0	0	0	0.000	0.000	
10/12/09 02:20:20	59.983	3670.263	350	-340.46936	0	125	10	15	-103	7582.5	0	0	0	0.003	0.003	
10/12/09 02:20:22	59.98	3669.382	350	-340.46936	0	125.5	10	15	-103	7582.83	0	0	0	-0.003	0.003	
10/12/09 02:20:24	59.979	3670.102	350	-340.46936	0	126	10	15	-103	7583.16	0	0	0	-0.001	0.001	
10/12/09 02:20:26	59.979	3670.438	350	-337.642914	0	126.5	10	15	-103	7583.49	0	0	0	0.000	0.000	
10/12/09 02:20:28	59.981	3671.403	350	-337.642914	0	127	10	15	-103	7583.82	0	0	0	0.002	0.002	
10/12/09 02:20:30	59.981	3672.442	350	-337.642914	0	127.5	10	15	-103	7584.15	0	0	0	0.000	0.000	
10/12/09 02:20:32	59.98	3672.372	350	-337.642914	0	128	10	15	-103	7584.48	0	0	0	-0.001	0.001	
10/12/09 02:20:34	59.98	3671.947	350	-337.642914	0	128.5	10	15	-103	7584.81	0	0	0	0.000	0.000	
10/12/09 02:20:36	59.981	3670.938	350	-284.36084	0	129	10	15	-103	7585.14	0	0	0	0.001	0.001	
10/12/09 02:20:38	59.98	3670.705	350	-284.36084	0	129.5	10	15	-103	7585.47	0	0	0	-0.001	0.001	
10/12/09 02:20:40	59.98	3670.137	350	-284.36084	0	130	10	15	-103	7585.8	0	0	0	0.000	0.000	
10/12/09 02:20:42	59.977	3669.279	350	-284.36084	0	130.5	10	15	-103	7586.13	0	0	0	-0.003	0.003	
10/12/09 02:20:44	59.979	3672.391	350	-284.36084	0	131	10	15	-103	7586.46	0	0	0	0.002	0.002	
10/12/09 02:20:46	59.981	3672.558	350	-260.467987	0	131.5	10	15	-103	7586.79	0	0	0	0.002	0.002	
10/12/09 02:20:48	59.979	3674.052	350	-260.467987	0	132	10	15	-103	7587.12	0	0	0	-0.002	0.002	
10/12/09 02:20:50	59.976	3672.626	350	-260.467987	0	132.5	10	15	-103	7587.45	0	0	0	-0.003	0.003	
10/12/09 02:20:52	59.977	3671.8	350	-260.467987	0	133	10	15	-103	7587.78	0	0	0	0.001	0.001	
10/12/09 02:20:54	59.972	3673.183	350	-260.467987	0	133.5	10	15	-103	7588.11	0	0	0	-0.005	0.005	
10/12/09 02:20:56	59.971	3673.874	350	-253.141541	0	134	10	15	-103	7588.44	0	0	0	-0.001	0.001	
10/12/09 02:20:58	59.973	3676.263	350	-253.141541	0	134.5	10	15	-103	7588.77	0	0	0	0.002	0.002	
10/12/09 02:21:00	59.973	3676.623	350	-253.141541	0	135	10	15	-103	7589.1	0	0	0	0.000	0.000	
10/12/09 02:21:02	59.973	3676.87	350	-253.141541	0	135.5	10	15	-103	7589.43	0	0	0	0.000	0.000	
10/12/09 02:21:04	59.974	3676.543	350	-253.141541	0	136	10	15	-103	7589.76	0	0	0	0.001	0.001	
10/12/09 02:21:06	59.971	3675.464	350	-251.929871	0	136.5	10	15	-103	7590.09	0	0	0	-0.003	0.003	
10/12/09 02:21:08	59.975	3675.752	350	-251.929871	0	137	10	15	-103	7590.42	0	0	0	0.004	0.004	
10/12/09 02:21:10	59.977	3675.256	350	-251.929871	0	137.5	10	15	-103	7590.75	0	0	0	0.002	0.002	
10/12/09 02:21:12	59.977	3674.87	350	-251.929871	0	138	10	15	-103	7591.08	0	0	0	0.000	0.000	
10/12/09 02:21:14	59.975	3671.277	350	-251.929871	0	138.5	10	15	-103	7591.41	0	0	0	-0.002	0.002	
10/12/09 02:21:16	59.976	3671.593	350	-250.674194	0	139	10	15	-103	7591.74	0	0	0	0.001	0.001	
10/12/09 02:21:18	59.98	3670.587	350	-250.674194	0	139.5	10	15	-103	7592.07	0	0	0	0.004	0.004	
10/12/09 02:21:20	59.979	3669.963	350	-250.674194	0	140	10	15	-103	7592.4	0	0	0	-0.001	0.001	
10/12/09 02:21:22	59.981	3669.54	350	-250.674194	0	140.5	10	15	-103	7592.73	0	0	0	0.002	0.002	
10/12/09 02:21:24	59.982	3669.497	350	-250.674194	0	141	10	15	-103	7593.06	0	0	0	0.001	0.001	
10/12/09 02:21:26	59.982	3668.706	350	-253.631866	0	141.5	10	15	-103	7593.39	0	0	0	0.000	0.000	
10/12/09 02:21:28	59.982	3667.677	350	-253.631866	0	142	10	15	-103	7593.72	0	0	0	0.000	0.000	
10/12/09 02:21:30	59.982	3666.482	350	-253.631866	0	142.5	10	15	-103	7594.05	0	0	0	0.000	0.000	
10/12/09 02:21:32	59.981	3666.599	350	-253.631866	0	143	10	15	-103	7594.38	0	0	0	-0.001	0.001	
10/12/09 02:21:34	59.982	3666.911	350	-253.631866	0	143.5	10	15	-103	7594.71	0	0	0	0.001	0.001	
10/12/09 02:21:36	59.984	3666.442	350	-246.957306	0	144	10	15	-103	7595.04	0	0	0	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:21:38	59.985	3666.405	350	-246.957306	0	144.5	10	15	-103	7595.37	0	0	0	0.001	0.001	
10/12/09 02:21:40	59.987	3667.456	350	-246.957306	0	145	10	15	-103	7595.7	0	0	0	0.002	0.002	
10/12/09 02:21:42	59.989	3666.38	350	-246.957306	0	145.5	10	15	-103	7596.03	0	0	0	0.002	0.002	
10/12/09 02:21:44	59.993	3665.262	350	-246.957306	0	146	10	15	-103	7596.36	0	0	0	0.004	0.004	
10/12/09 02:21:46	59.996	3664.031	350	-254.541779	0	146.5	10	15	-103	7596.69	0	0	0	0.003	0.003	
10/12/09 02:21:48	59.998	3663.825	350	-254.541779	0	147	10	15	-103	7597.02	0	0	0	0.002	0.002	
10/12/09 02:21:50	59.998	3663.229	350	-254.541779	0	147.5	10	15	-103	7597.35	0	0	0	0.000	0.000	
10/12/09 02:21:52	60.004	3662.055	350	-254.541779	0	148	10	15	-103	7597.68	0	0	0	0.006	0.006	
10/12/09 02:21:54	60.007	3661.695	350	-254.541779	0	148.5	10	15	-103	7598.01	0	0	0	0.003	0.003	
10/12/09 02:21:56	60.01	3662.076	350	-256.571594	0	149	10	15	-103	7598.34	0	0	0	0.003	0.003	
10/12/09 02:21:58	60.013	3662.224	350	-256.571594	0	149.5	10	15	-103	7598.67	0	0	0	0.003	0.003	
10/12/09 02:22:00	60.014	3662.959	350	-256.571594	0	150	10	15	-103	7599	0	0	0	0.001	0.001	
10/12/09 02:22:02	60.013	3663.794	350	-256.571594	0	150.5	10	15	-103	7599.33	0	0	0	-0.001	0.001	
10/12/09 02:22:04	60.008	3664.139	350	-256.571594	0	151	10	15	-103	7599.66	0	0	0	-0.005	0.005	
10/12/09 02:22:06	60.008	3665.278	350	-258.37262	0	151.5	10	15	-103	7599.99	0	0	0	0.000	0.000	
10/12/09 02:22:08	60.01	3664.159	350	-258.37262	0	152	10	15	-103	7600.32	0	0	0	0.002	0.002	
10/12/09 02:22:10	60.019	3663.265	350	-258.37262	0	152.5	10	15	-103	7600.65	0	0	0	0.009	0.009	
10/12/09 02:22:12	60.019	3663.184	350	-258.37262	0	153	10	15	-103	7600.98	0	0	0	0.000	0.000	
10/12/09 02:22:14	60.023	3661.929	350	-258.37262	0	153.5	10	15	-103	7601.31	0	0	0	0.004	0.004	
10/12/09 02:22:16	60.021	3661.512	350	-263.047363	0	154	10	15	-103	7601.64	0	0	0	-0.002	0.002	
10/12/09 02:22:18	60.02	3659.172	350	-263.047363	0	154.5	10	15	-103	7601.97	0	0	0	-0.001	0.001	
10/12/09 02:22:20	60.021	3658.661	350	-263.047363	0	155	10	15	-103	7602.3	0	0	0	0.001	0.001	
10/12/09 02:22:22	60.021	3656.785	350	-263.047363	0	155.5	10	15	-103	7602.63	0	0	0	0.000	0.000	
10/12/09 02:22:24	60.02	3657.571	350	-263.047363	0	156	10	15	-103	7602.96	0	0	0	-0.001	0.001	
10/12/09 02:22:26	60.019	3658.126	350	-260.984375	0	156.5	10	15	-103	7603.29	0	0	0	-0.001	0.001	
10/12/09 02:22:28	60.019	3657.71	350	-260.984375	0	157	10	15	-103	7603.62	0	0	0	0.000	0.000	
10/12/09 02:22:30	60.022	3658.015	350	-260.984375	0	157.5	10	15	-103	7603.95	0	0	0	0.003	0.003	
10/12/09 02:22:32	60.025	3660.228	350	-260.984375	0	158	10	15	-103	7604.28	0	0	0	0.003	0.003	
10/12/09 02:22:34	60.025	3659.224	350	-260.984375	0	158.5	10	15	-103	7604.61	0	0	0	0.000	0.000	
10/12/09 02:22:36	60.026	3658.698	350	-261.318329	0	159	10	15	-103	7604.94	0	0	0	0.001	0.001	
10/12/09 02:22:38	60.02	3658.669	350	-261.318329	0	159.5	10	15	-103	7605.27	0	0	0	-0.006	0.006	
10/12/09 02:22:40	60.02	3658.155	350	-261.318329	0	160	10	15	-103	7605.6	0	0	0	0.000	0.000	
10/12/09 02:22:42	60.018	3659.13	350	-261.318329	0	160.5	10	15	-103	7605.93	0	0	0	-0.002	0.002	
10/12/09 02:22:44	60.018	3659.778	350	-261.318329	0	161	10	15	-103	7606.26	0	0	0	0.000	0.000	
10/12/09 02:22:46	60.02	3660.82	350	-262.1026	0	161.5	10	15	-103	7606.59	0	0	0	0.002	0.002	
10/12/09 02:22:48	60.019	3662.531	350	-262.1026	0	162	10	15	-103	7606.92	0	0	0	-0.001	0.001	
10/12/09 02:22:50	60.019	3662.387	350	-262.1026	0	162.5	10	15	-103	7607.25	0	0	0	0.000	0.000	
10/12/09 02:22:52	60.023	3662.079	350	-262.1026	0	163	10	15	-103	7607.58	0	0	0	0.004	0.004	
10/12/09 02:22:54	60.022	3662.39	350	-262.1026	0	163.5	10	15	-103	7607.91	0	0	0	-0.001	0.001	
10/12/09 02:22:56	60.022	3662.678	350	-262.71701	0	164	10	15	-103	7608.24	0	0	0	0.000	0.000	
10/12/09 02:22:58	60.025	3663.577	350	-262.71701	0	164.5	10	15	-103	7608.57	0	0	0	0.003	0.003	
10/12/09 02:23:00	60.02	3663.539	350	-262.71701	0	165	10	15	-103	7608.9	0	0	0	-0.005	0.005	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:23:02	60.02	3662.959	350	-262.71701	0	165.5	10	15	-103	7609.23	0	0	0	0.000	0.000	
10/12/09 02:23:04	60.02	3662.552	350	-262.71701	0	166	10	15	-103	7609.56	0	0	0	0.000	0.000	
10/12/09 02:23:06	60.02	3662.543	350	-260.016479	0	166.5	10	15	-103	7609.89	0	0	0	0.000	0.000	
10/12/09 02:23:08	60.02	3663.601	350	-260.016479	0	167	10	15	-103	7610.22	0	0	0	0.000	0.000	
10/12/09 02:23:10	60.021	3663.91	350	-260.016479	0	167.5	10	15	-103	7610.55	0	0	0	0.001	0.001	
10/12/09 02:23:12	60.021	3663.69	350	-260.016479	0	168	10	15	-103	7610.88	0	0	0	0.000	0.000	
10/12/09 02:23:14	60.018	3662.791	350	-260.016479	0	168.5	10	15	-103	7611.21	0	0	0	-0.003	0.003	
10/12/09 02:23:16	60.014	3663.396	350	-263.87323	0	169	10	15	-103	7611.54	0	0	0	-0.004	0.004	
10/12/09 02:23:18	60.014	3663.698	350	-263.87323	0	169.5	10	15	-103	7611.87	0	0	0	0.000	0.000	
10/12/09 02:23:20	60.014	3664.315	350	-263.87323	0	170	10	15	-103	7612.2	0	0	0	0.000	0.000	
10/12/09 02:23:22	60.013	3665.313	350	-263.87323	0	170.5	10	15	-103	7612.53	0	0	0	-0.001	0.001	
10/12/09 02:23:24	60.013	3665.798	350	-263.87323	0	171	10	15	-103	7612.86	0	0	0	0.000	0.000	
10/12/09 02:23:26	60.01	3666.141	350	-264.5979	0	171.5	10	15	-103	7613.19	0	0	0	-0.003	0.003	
10/12/09 02:23:28	60.008	3666.726	350	-264.5979	0	172	10	15	-103	7613.52	0	0	0	-0.002	0.002	
10/12/09 02:23:30	60.011	3667.677	350	-264.5979	0	172.5	10	15	-103	7613.85	0	0	0	0.003	0.003	
10/12/09 02:23:32	60.011	3667.545	350	-264.5979	0	173	10	15	-103	7614.18	0	0	0	0.000	0.000	
10/12/09 02:23:34	60.012	3666.688	350	-264.5979	0	173.5	10	15	-103	7614.51	0	0	0	0.001	0.001	
10/12/09 02:23:36	60.012	3666.449	350	-262.415924	0	174	10	15	-103	7614.84	0	0	0	0.000	0.000	
10/12/09 02:23:38	60.009	3666.71	350	-262.415924	0	174.5	10	15	-103	7615.17	0	0	0	-0.003	0.003	
10/12/09 02:23:40	60.009	3667.696	350	-262.415924	0	175	10	15	-103	7615.5	0	0	0	0.000	0.000	
10/12/09 02:23:42	60.009	3667.398	350	-262.415924	0	175.5	10	15	-103	7615.83	0	0	0	0.000	0.000	
10/12/09 02:23:44	60.009	3667.043	350	-262.415924	0	176	10	15	-103	7616.16	0	0	0	0.000	0.000	
10/12/09 02:23:46	60.005	3666.624	350	-259.685242	0	176.5	10	15	-103	7616.49	0	0	0	-0.004	0.004	
10/12/09 02:23:48	60.002	3666.223	350	-259.685242	0	177	10	15	-103	7616.82	0	0	0	-0.003	0.003	
10/12/09 02:23:50	59.999	3665.88	350	-259.685242	0	177.5	10	15	-103	7617.15	0	0	0	-0.003	0.003	
10/12/09 02:23:52	59.996	3665.403	350	-259.685242	0	178	10	15	-103	7617.48	0	0	0	-0.003	0.003	
10/12/09 02:23:54	59.995	3665.802	350	-259.685242	0	178.5	10	15	-103	7617.81	0	0	0	-0.001	0.001	
10/12/09 02:23:56	59.997	3665.68	350	-255.911011	0	179	10	15	-103	7618.14	0	0	0	0.002	0.002	
10/12/09 02:23:58	59.998	3665.352	350	-255.911011	0	179.5	10	15	-103	7618.47	0	0	0	0.001	0.001	
10/12/09 02:24:00	59.998	3664.948	350	-255.911011	0	180	10	15	-103	7618.8	0	0	0	0.000	0.000	
10/12/09 02:24:02	59.998	3665.065	350	-255.911011	0	180.5	10	15	-103	7619.13	0	0	0	0.000	0.000	
10/12/09 02:24:04	59.998	3666.133	350	-255.911011	0	181	10	15	-103	7619.46	0	0	0	0.000	0.000	
10/12/09 02:24:06	59.995	3666.64	350	-258.148193	0	181.5	10	15	-103	7619.79	0	0	0	-0.003	0.003	
10/12/09 02:24:08	59.995	3666.735	350	-258.148193	0	182	10	15	-103	7620.12	0	0	0	0.000	0.000	
10/12/09 02:24:10	59.992	3667.084	350	-258.148193	0	182.5	10	15	-103	7620.45	0	0	0	-0.003	0.003	
10/12/09 02:24:12	59.993	3667.557	350	-258.148193	0	183	10	15	-103	7620.78	0	0	0	0.001	0.001	
10/12/09 02:24:14	59.988	3667.337	350	-258.148193	0	183.5	10	15	-103	7621.11	0	0	0	-0.005	0.005	
10/12/09 02:24:16	59.988	3667.853	350	-258.873596	0	184	10	15	-103	7621.44	0	0	0	0.000	0.000	
10/12/09 02:24:18	59.982	3668.116	350	-258.873596	0	184.5	10	15	-103	7621.77	0	0	0	-0.006	0.006	
10/12/09 02:24:20	59.982	3668.691	350	-258.873596	0	185	10	15	-103	7622.1	0	0	0	0.000	0.000	
10/12/09 02:24:22	59.982	3669.399	350	-258.873596	0	185.5	10	15	-103	7622.43	0	0	0	0.000	0.000	
10/12/09 02:24:24	59.982	3669.606	350	-258.873596	0	186	10	15	-103	7622.76	0	0	0	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:24:26	59.984	3671.228	350	-249.33757	0	186.5	10	15	-103	7623.09	0	0	0	0.002	0.002	
10/12/09 02:24:28	59.982	3670.25	350	-249.33757	0	187	10	15	-103	7623.42	0	0	0	-0.002	0.002	
10/12/09 02:24:30	59.978	3670.265	350	-249.33757	0	187.5	10	15	-103	7623.75	0	0	0	-0.004	0.004	
10/12/09 02:24:32	59.978	3671.549	350	-249.33757	0	188	10	15	-103	7624.08	0	0	0	0.000	0.000	
10/12/09 02:24:34	59.976	3673.243	350	-249.33757	0	188.5	10	15	-103	7624.41	0	0	0	-0.002	0.002	
10/12/09 02:24:36	59.975	3674.263	350	-258.278168	0	189	10	15	-103	7624.74	0	0	0	-0.001	0.001	
10/12/09 02:24:38	59.974	3675.824	350	-258.278168	0	189.5	10	15	-103	7625.07	0	0	0	-0.001	0.001	
10/12/09 02:24:40	59.974	3676.418	350	-258.278168	0	190	10	15	-103	7625.4	0	0	0	0.000	0.000	
10/12/09 02:24:42	59.979	3676.306	350	-258.278168	0	190.5	10	15	-103	7625.73	0	0	0	0.005	0.005	
10/12/09 02:24:44	59.98	3674.637	350	-258.278168	0	191	10	15	-103	7626.06	0	0	0	0.001	0.001	
10/12/09 02:24:46	59.981	3675.329	350	-258.406372	0	191.5	10	15	-103	7626.39	0	0	0	0.001	0.001	
10/12/09 02:24:48	59.98	3675.226	350	-258.406372	0	192	10	15	-103	7626.72	0	0	0	-0.001	0.001	
10/12/09 02:24:50	59.984	3674.768	350	-258.406372	0	192.5	10	15	-103	7627.05	0	0	0	0.004	0.004	
10/12/09 02:24:52	59.987	3674.399	350	-258.406372	0	193	10	15	-103	7627.38	0	0	0	0.003	0.003	
10/12/09 02:24:54	59.988	3673.514	350	-258.406372	0	193.5	10	15	-103	7627.71	0	0	0	0.001	0.001	
10/12/09 02:24:56	59.988	3673.04	350	-260.538879	0	194	10	15	-103	7628.04	0	0	0	0.000	0.000	
10/12/09 02:24:58	59.99	3672.442	350	-260.538879	0	194.5	10	15	-103	7628.37	0	0	0	0.002	0.002	
10/12/09 02:25:00	59.992	3673.056	350	-260.538879	0	195	10	15	-103	7628.7	0	0	0	0.002	0.002	
10/12/09 02:25:02	59.991	3671.68	350	-260.538879	0	195.5	10	15	-103	7629.03	0	0	0	-0.001	0.001	
10/12/09 02:25:04	59.991	3671.493	350	-260.538879	0	196	10	15	-103	7629.36	0	0	0	0.000	0.000	
10/12/09 02:25:06	59.991	3669.53	350	-257.88208	0	196.5	10	15	-103	7629.69	0	0	0	0.000	0.000	
10/12/09 02:25:08	59.993	3670.066	350	-257.88208	0	197	10	15	-103	7630.02	0	0	0	0.002	0.002	
10/12/09 02:25:10	59.993	3670.028	350	-257.88208	0	197.5	10	15	-103	7630.35	0	0	0	0.000	0.000	
10/12/09 02:25:12	59.996	3671.744	350	-257.88208	0	198	10	15	-103	7630.68	0	0	0	0.003	0.003	
10/12/09 02:25:14	60.002	3671.578	350	-257.88208	0	198.5	10	15	-103	7631.01	0	0	0	0.006	0.006	
10/12/09 02:25:16	60.002	3672.625	350	-258.588654	0	199	10	15	-103	7631.34	0	0	0	0.000	0.000	
10/12/09 02:25:18	60.003	3672.674	350	-258.588654	0	199.5	10	15	-103	7631.67	0	0	0	0.001	0.001	
10/12/09 02:25:20	60.004	3673.819	350	-258.588654	0	200	10	15	-103	7632	0	0	0	0.001	0.001	
10/12/09 02:25:22	60.005	3673.25	350	-258.588654	0	200.5	10	15	-103	7632.33	0	0	0	0.001	0.001	
10/12/09 02:25:24	60.004	3673.182	350	-258.588654	0	201	10	15	-103	7632.66	0	0	0	-0.001	0.001	
10/12/09 02:25:26	60.002	3673.496	350	-261.906158	0	201.5	10	15	-103	7632.99	0	0	0	-0.002	0.002	
10/12/09 02:25:28	60.004	3672.418	350	-261.906158	0	202	10	15	-103	7633.32	0	0	0	0.002	0.002	
10/12/09 02:25:30	60.008	3672.363	350	-261.906158	0	202.5	10	15	-103	7633.65	0	0	0	0.004	0.004	
10/12/09 02:25:32	60.01	3672.217	350	-261.906158	0	203	10	15	-103	7633.98	0	0	0	0.002	0.002	
10/12/09 02:25:34	60.01	3672.261	350	-261.906158	0	203.5	10	15	-103	7634.31	0	0	0	0.000	0.000	
10/12/09 02:25:36	60.01	3673.182	350	-256.747803	0	204	10	15	-103	7634.64	0	0	0	0.000	0.000	
10/12/09 02:25:38	60.011	3673.603	350	-256.747803	0	204.5	10	15	-103	7634.97	0	0	0	0.001	0.001	
10/12/09 02:25:40	60.013	3673.553	350	-256.747803	0	205	10	15	-103	7635.3	0	0	0	0.002	0.002	
10/12/09 02:25:42	60.014	3674.312	350	-256.747803	0	205.5	10	15	-103	7635.63	0	0	0	0.001	0.001	
10/12/09 02:25:44	60.013	3674.537	350	-256.747803	0	206	10	15	-103	7635.96	0	0	0	-0.001	0.001	
10/12/09 02:25:46	60.012	3673.813	350	-167.431976	0	206.5	10	15	-103	7636.29	0	0	0	-0.001	0.001	
10/12/09 02:25:48	60.011	3673.204	350	-167.431976	0	207	10	15	-103	7636.62	0	0	0	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 2:33:00 05:34	Max Absolute Delta Hz 0.126 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:25:50	60.011	3672.563	350	-167.431976	0	207.5	10	15	-103	7636.95	0	0	0	0.000	0.000	
10/12/09 02:25:52	60.017	3673.068	350	-167.431976	0	208	10	15	-103	7637.28	0	0	0	0.006	0.006	
10/12/09 02:25:54	60.022	3672.388	350	-167.431976	0	208.5	10	15	-103	7637.61	0	0	0	0.005	0.005	
10/12/09 02:25:56	60.017	3672.52	350	-164.973404	0	209	10	15	-103	7637.94	0	0	0	-0.005	0.005	
10/12/09 02:25:58	60.014	3671.25	350	-164.973404	0	209.5	10	15	-103	7638.27	0	0	0	-0.003	0.003	
10/12/09 02:26:00	60.013	3671.288	350	-164.973404	0	210	10	15	-103	7638.6	0	0	0	-0.001	0.001	
10/12/09 02:26:02	60.014	3672.989	350	-164.973404	0	210.5	10	15	-103	7638.93	0	0	0	0.001	0.001	
10/12/09 02:26:04	60.017	3672.982	350	-164.973404	0	211	10	15	-103	7639.26	0	0	0	0.003	0.003	
10/12/09 02:26:06	60.017	3672.915	350	-157.628082	0	211.5	10	15	-103	7639.59	0	0	0	0.000	0.000	
10/12/09 02:26:08	60.019	3671.952	350	-157.628082	0	212	10	15	-103	7639.92	0	0	0	0.002	0.002	
10/12/09 02:26:10	60.019	3671.193	350	-157.628082	0	212.5	10	15	-103	7640.25	0	0	0	0.000	0.000	
10/12/09 02:26:12	60.019	3671.627	350	-157.628082	0	213	10	15	-103	7640.58	0	0	0	0.000	0.000	
10/12/09 02:26:14	60.027	3671.189	350	-157.628082	0	213.5	10	15	-103	7640.91	0	0	0	0.008	0.008	
10/12/09 02:26:16	60.026	3668.611	350	-155.531708	0	214	10	15	-103	7641.24	0	0	0	-0.001	0.001	
10/12/09 02:26:18	60.026	3665.232	350	-155.531708	0	214.5	10	15	-103	7641.57	0	0	0	0.000	0.000	
10/12/09 02:26:20	60.022	3664.495	350	-155.531708	0	215	10	15	-103	7641.9	0	0	0	-0.004	0.004	
10/12/09 02:26:22	60.019	3666.062	350	-155.531708	0	215.5	10	15	-103	7642.23	0	0	0	-0.003	0.003	
10/12/09 02:26:24	60.017	3666.821	350	-155.531708	0	216	10	15	-103	7642.56	0	0	0	-0.002	0.002	
10/12/09 02:26:26	60.019	3666.787	350	-160.447235	0	216.5	10	15	-103	7642.89	0	0	0	0.002	0.002	
10/12/09 02:26:28	60.02	3670.454	350	-160.447235	0	217	10	15	-103	7643.22	0	0	0	0.001	0.001	
10/12/09 02:26:30	60.019	3670.267	350	-160.447235	0	217.5	10	15	-103	7643.55	0	0	0	-0.001	0.001	
10/12/09 02:26:32	60.021	3671.668	350	-160.447235	0	218	10	15	-103	7643.88	0	0	0	0.002	0.002	
10/12/09 02:26:34	60.021	3672.493	350	-160.447235	0	218.5	10	15	-103	7644.21	0	0	0	0.000	0.000	
10/12/09 02:26:36	60.021	3672.685	350	-163.958603	0	219	10	15	-103	7644.54	0	0	0	0.000	0.000	
10/12/09 02:26:38	60.019	3672.857	350	-163.958603	0	219.5	10	15	-103	7644.87	0	0	0	-0.002	0.002	
10/12/09 02:26:40	60.018	3672.164	350	-163.958603	0	220	10	15	-103	7645.2	0	0	0	-0.001	0.001	
10/12/09 02:26:42	60.022	3671.413	350	-163.958603	0	220.5	10	15	-103	7645.53	0	0	0	0.004	0.004	
10/12/09 02:26:44	60.031	3669.983	350	-163.958603	0	221	10	15	-103	7645.86	0	0	0	0.009	0.009	
10/12/09 02:26:46	60.037	3666.467	350	-166.072449	0	221.5	10	15	-103	7646.19	0	0	0	0.006	0.006	
10/12/09 02:26:48	60.037	3663.758	350	-166.072449	0	222	10	15	-103	7646.52	0	0	0	0.000	0.000	
10/12/09 02:26:50	60.036	3661.599	350	-166.072449	0	222.5	10	15	-103	7646.85	0	0	0	-0.001	0.001	
10/12/09 02:26:52	60.037	3660.672	350	-166.072449	0	223	10	15	-103	7647.18	0	0	0	0.001	0.001	
10/12/09 02:26:54	60.046	3651.492	350	-166.072449	0	223.5	10	15	-103	7647.51	0	0	0	0.009	0.009	
10/12/09 02:26:56	60.048	3649.19	350	-163.766586	0	224	10	15	-103	7647.84	0	0	0	0.002	0.002	
10/12/09 02:26:58	60.048	3650.025	350	-163.766586	0	224.5	10	15	-103	7648.17	0	0	0	0.000	0.000	
10/12/09 02:27:00	60.043	3648.246	350	-163.766586	0	225	10	15	-103	7648.5	0	0	0	-0.005	0.005	
10/12/09 02:27:02	60.041	3649.512	350	-163.766586	0	225.5	10	15	-103	7648.83	0	0	0	-0.002	0.002	
10/12/09 02:27:04	60.041	3654.294	350	-163.766586	0	226	10	15	-103	7649.16	0	0	0	0.000	0.000	
10/12/09 02:27:06	60.041	3655.007	350	-165.101685	0	226.5	10	15	-103	7649.49	0	0	0	0.000	0.000	
10/12/09 02:27:08	60.039	3651.874	350	-165.101685	0	227	10	15	-103	7649.82	0	0	0	-0.002	0.002	
10/12/09 02:27:10	60.041	3651.059	350	-165.101685	0	227.5	10	15	-103	7650.15	0	0	0	0.002	0.002	
10/12/09 02:27:12	60.043	3649.187	350	-165.101685	0	228	10	15	-103	7650.48	0	0	0	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:27:14	60.045	3648.236	350	-165.101685	0	228.5	10	15	-103	7650.81	0	0	0	0.002	0.002	
10/12/09 02:27:16	60.046	3645.387	350	-165.476395	0	229	10	15	-103	7651.14	0	0	0	0.001	0.001	
10/12/09 02:27:18	60.041	3644.628	350	-165.476395	0	229.5	10	15	-103	7651.47	0	0	0	-0.005	0.005	
10/12/09 02:27:20	60.041	3645.446	350	-165.476395	0	230	10	15	-103	7651.8	0	0	0	0.000	0.000	
10/12/09 02:27:22	60.041	3640.682	350	-165.476395	0	230.5	10	15	-103	7652.13	0	0	0	0.000	0.000	
10/12/09 02:27:24	60.039	3641.191	350	-165.476395	0	231	10	15	-103	7652.46	0	0	0	-0.002	0.002	
10/12/09 02:27:26	59.978	3659.465	350	-206.459106	0	231.5	10	15	-103	7652.79	0	0	1	-0.061	0.061	
10/12/09 02:27:28	59.852	3696.362	350	-206.459106	0	232	10	0	-103	7616	1	0	1	-0.126	0.126	
10/12/09 02:27:30	59.836	3734.904	335	-206.459106	0	232.5	10	0	-103	7626	1	0	1	-0.016	0.016	
10/12/09 02:27:32	59.869	3734.673	335	-206.459106	0	233	10	0	-103	7632	1	0	1	0.033	0.033	
10/12/09 02:27:34	59.892	3737.157	335	-206.459106	0	233.5	10	0	-103	7632	1	0	1	0.023	0.023	
10/12/09 02:27:36	59.891	3761.25	335	-211.256042	0	234	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:27:38	59.88	3766.113	335	-211.256042	1	234.5	10	0	-103	7632	1	0	1	-0.011	0.011	
10/12/09 02:27:40	59.876	3766.194	335	-211.256042	1	235	10	0	-103	7632	1	0	1	-0.004	0.004	
10/12/09 02:27:42	59.875	3768.877	335	-211.256042	1	235.5	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:27:44	59.883	3769.925	335	-211.256042	1	236	10	0	-103	7632	1	0	1	0.008	0.008	
10/12/09 02:27:46	59.887	3780.621	335	-214.346695	1	236.5	10	0	-103	7632	1	0	1	0.004	0.004	
10/12/09 02:27:48	59.886	3781.592	335	-214.346695	1	237	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:27:50	59.885	3782.5	335	-214.346695	1	237.5	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:27:52	59.887	3784.962	335	-214.346695	2	238	10	0	-103	7632	1	0	1	0.002	0.002	
10/12/09 02:27:54	59.888	3784.73	335	-214.346695	3	238.5	10	0	-103	7632	1	0	1	0.001	0.001	
10/12/09 02:27:56	59.89	3784.419	335	-212.172699	4	239	10	0	-103	7632	1	0	1	0.002	0.002	
10/12/09 02:27:58	59.895	3788.072	335	-212.172699	5	239.5	10	0	-103	7632	1	0	1	0.005	0.005	
10/12/09 02:28:00	59.894	3788.328	335	-212.172699	6	240	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:28:02	59.893	3788.868	335	-212.172699	7	240.5	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:28:04	59.894	3788.472	335	-212.172699	8	241	10	0	-103	7632	1	0	1	0.001	0.001	
10/12/09 02:28:06	59.894	3792.276	335	-215.598175	9	241.5	10	0	-103	7632	1	0	1	0.000	0.000	
10/12/09 02:28:08	59.891	3793.074	335	-215.598175	10	242	10	0	-103	7632	1	0	1	-0.003	0.003	
10/12/09 02:28:10	59.89	3794.374	335	-215.598175	11	242.5	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:28:12	59.885	3799.428	335	-215.598175	12	243	10	0	-103	7632	1	0	1	-0.005	0.005	
10/12/09 02:28:14	59.885	3800.427	335	-215.598175	13	243.5	10	0	-103	7632	1	0	1	0.000	0.000	
10/12/09 02:28:16	59.888	3799.959	335	-218.327255	14	244	10	0	-103	7632	1	0	1	0.003	0.003	
10/12/09 02:28:18	59.887	3803.625	335	-218.327255	15	244.5	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:28:20	59.888	3802.925	335	-218.327255	16	245	10	0	-103	7632	1	0	1	0.001	0.001	
10/12/09 02:28:22	59.888	3802.951	335	-218.327255	16	245.5	10	0	-103	7632	1	0	1	0.000	0.000	
10/12/09 02:28:24	59.89	3804.388	335	-218.327255	16	246	10	0	-103	7632	1	0	1	0.002	0.002	
10/12/09 02:28:26	59.889	3805.496	335	-217.379425	16	246.5	10	0	-103	7632	1	0	1	-0.001	0.001	
10/12/09 02:28:28	59.882	3805.617	335	-217.379425	16	247	10	0	-103	7632	1	0	1	-0.007	0.007	
10/12/09 02:28:30	59.873	3809.237	335	-217.379425	16	247.5	10	0	-103	7631	1	0	1	-0.009	0.009	
10/12/09 02:28:32	59.857	3811.503	335	-217.379425	16	248	10	0	-103	7625	1	0	1	-0.016	0.016	
10/12/09 02:28:34	59.849	3814.862	335	-217.379425	16	248.5	10	0	-103	7623	1	0	1	-0.008	0.008	
10/12/09 02:28:36	59.852	3815.889	335	-214.830353	16	249	10	0	-103	7621	1	0	1	0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1			
											306	2:27:26	t(0)						
											473	2:33:00	t(Recovery)						
											307	05:34	Event Length mm:ss	Delta Hz	Absolute Delta Hz				
10/12/09 02:28:38	59.858	3825.643	335	-214.830353	16	249.5	10	0	-103	7623	1	0	1	0.006	0.006				
10/12/09 02:28:40	59.863	3826.053	335	-214.830353	16	250	10	0	-103	7625	1	0	1	0.005	0.005				
10/12/09 02:28:42	59.866	3826.002	335	-214.830353	16	250.5	10	0	-103	7627	1	0	1	0.003	0.003				
10/12/09 02:28:44	59.865	3827.524	335	-214.830353	16	251	10	0	-103	7628	1	0	1	-0.001	0.001				
10/12/09 02:28:46	59.867	3826.753	335	-227.655914	16	251.5	10	0	-103	7628	1	0	1	0.002	0.002				
10/12/09 02:28:48	59.866	3826.783	335	-227.655914	16	252	10	0	-103	7629	1	0	1	-0.001	0.001				
10/12/09 02:28:50	59.871	3826.454	335	-227.655914	16	252.5	10	0	-103	7630	1	0	1	0.005	0.005				
10/12/09 02:28:52	59.874	3825.713	335	-227.655914	16	253	10	0	-103	7631	1	0	1	0.003	0.003				
10/12/09 02:28:54	59.879	3823.826	335	-227.655914	16	253.5	10	0	-103	7635	1	0	1	0.005	0.005				
10/12/09 02:28:56	59.88	3822.505	335	-225.018082	16	254	10	0	-103	7638	1	0	1	0.001	0.001				
10/12/09 02:28:58	59.883	3819.081	335	-225.018082	16	254.5	10	0	-103	7639	1	0	1	0.003	0.003				
10/12/09 02:29:00	59.886	3818.055	335	-225.018082	16	255	10	0	-103	7642	1	0	1	0.003	0.003				
10/12/09 02:29:02	59.89	3816.815	335	-225.018082	16	255.5	10	0	-103	7644	1	0	1	0.004	0.004				
10/12/09 02:29:04	59.892	3815.01	335	-225.018082	16	256	10	0	-103	7645	1	0	1	0.002	0.002				
10/12/09 02:29:06	59.889	3813.783	335	-228.365158	16	256.5	10	0	-103	7647	1	0	1	-0.003	0.003				
10/12/09 02:29:08	59.893	3811.838	335	-228.365158	16	257	10	0	-103	7648	1	0	1	0.004	0.004				
10/12/09 02:29:10	59.899	3809.652	335	-228.365158	16	257.5	10	0	-103	7649	1	0	1	0.006	0.006				
10/12/09 02:29:12	59.903	3806.972	335	-228.365158	16	258	10	0	-103	7650	1	0	1	0.004	0.004				
10/12/09 02:29:14	59.902	3805.593	335	-228.365158	16	258.5	10	0	-103	7651	1	0	1	-0.001	0.001				
10/12/09 02:29:16	59.902	3804.188	335	-234.075333	16	259	10	0	-103	7652	1	0	1	0.000	0.000				
10/12/09 02:29:18	59.904	3796.078	335	-234.075333	16	259.5	10	0	-103	7653	1	0	1	0.002	0.002				
10/12/09 02:29:20	59.907	3793.975	335	-234.075333	16	260	10	0	-103	7654	1	0	1	0.003	0.003				
10/12/09 02:29:22	59.911	3792.169	335	-234.075333	16	260.5	10	0	-103	7655	1	0	1	0.004	0.004				
10/12/09 02:29:24	59.916	3791.502	335	-234.075333	16	261	10	0	-103	7655	1	0	1	0.005	0.005				
10/12/09 02:29:26	59.916	3789.534	335	-228.798157	16	261.5	10	0	-103	7656	1	0	1	0.000	0.000				
10/12/09 02:29:28	59.917	3788.132	335	-228.798157	16	262	10	0	-103	7656	1	0	1	0.001	0.001				
10/12/09 02:29:30	59.918	3784.563	335	-228.798157	16	262.5	10	0	-103	7657	1	0	1	0.001	0.001				
10/12/09 02:29:32	59.92	3783.028	335	-228.798157	16	263	10	0	-103	7657	1	0	1	0.002	0.002				
10/12/09 02:29:34	59.921	3781.701	335	-228.798157	16	263.5	10	0	-103	7658	1	0	1	0.001	0.001				
10/12/09 02:29:36	59.92	3776.358	335	-229.466965	16	264	10	0	-103	7658	1	0	1	-0.001	0.001				
10/12/09 02:29:38	59.917	3775.635	335	-229.466965	16	264.5	10	0	-103	7659	1	0	1	-0.003	0.003				
10/12/09 02:29:40	59.92	3774.604	335	-229.466965	16	265	10	0	-103	7659	1	0	1	0.003	0.003				
10/12/09 02:29:42	59.921	3773.334	335	-229.466965	16	265.5	10	0	-103	7659	1	0	1	0.001	0.001				
10/12/09 02:29:44	59.923	3773.958	335	-229.466965	16	266	10	0	-103	7660	1	0	1	0.002	0.002				
10/12/09 02:29:46	59.926	3772.722	335	-228.980164	16	266.5	10	0	-103	7660	1	0	1	0.003	0.003				
10/12/09 02:29:48	59.925	3771.67	335	-228.980164	16	267	10	0	-103	7661	1	0	1	-0.001	0.001				
10/12/09 02:29:50	59.928	3769.63	335	-228.980164	16	267.5	10	0	-103	7661	1	0	1	0.003	0.003				
10/12/09 02:29:52	59.927	3768.707	335	-228.980164	16	268	10	0	-103	7662	1	0	1	-0.001	0.001				
10/12/09 02:29:54	59.932	3767.643	335	-228.980164	16	268.5	10	0	-103	7662	1	0	1	0.005	0.005				
10/12/09 02:29:56	59.927	3767.021	335	-219.975555	16	269	10	0	-103	7663	1	0	1	-0.005	0.005				
10/12/09 02:29:58	59.928	3767.408	335	-219.975555	16	269.5	10	0	-103	7663	1	0	1	0.001	0.001				
10/12/09 02:30:00	59.931	3766.788	335	-219.975555	16	270	10	0	-103	7664	1	0	1	0.003	0.003				

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:30:02	59.929	3766.259	335	-219.975555	16	270.5	10	0	-103	7664	1	0	1	-0.002	0.002	
10/12/09 02:30:04	59.931	3765.672	335	-219.975555	16	271	10	0	-103	7665	1	0	1	0.002	0.002	
10/12/09 02:30:06	59.933	3766.123	335	-229.089249	16	271.5	10	0	-103	7666	1	0	1	0.002	0.002	
10/12/09 02:30:08	59.937	3764.243	335	-229.089249	16	272	10	0	-103	7666	1	0	1	0.004	0.004	
10/12/09 02:30:10	59.937	3765.105	335	-229.089249	16	272.5	10	0	-103	7667	1	0	1	0.000	0.000	
10/12/09 02:30:12	59.945	3762.935	335	-229.089249	16	273	10	0	-103	7668	1	0	1	0.008	0.008	
10/12/09 02:30:14	59.949	3758.387	335	-229.089249	16	273.5	10	0	-103	7668	1	0	1	0.004	0.004	
10/12/09 02:30:16	59.947	3753.922	335	-229.663269	16	274	10	0	-103	7669	1	0	1	-0.002	0.002	
10/12/09 02:30:18	59.942	3749.867	335	-229.663269	16	274.5	10	0	-103	7669	1	0	1	-0.005	0.005	
10/12/09 02:30:20	59.941	3746.889	335	-229.663269	16	275	10	0	-103	7670	1	0	1	-0.001	0.001	
10/12/09 02:30:22	59.942	3747.875	335	-229.663269	16	275.5	10	0	-103	7670	1	0	1	0.001	0.001	
10/12/09 02:30:24	59.945	3749.593	335	-229.663269	16	276	10	0	-103	7671	1	0	1	0.003	0.003	
10/12/09 02:30:26	59.948	3748.661	335	-229.233856	16	276.5	10	0	-103	7671	1	0	1	0.003	0.003	
10/12/09 02:30:28	59.947	3746.706	335	-229.233856	16	277	10	0	-103	7672	1	0	1	-0.001	0.001	
10/12/09 02:30:30	59.949	3749.077	335	-229.233856	16	277.5	10	0	-103	7673	1	0	1	0.002	0.002	
10/12/09 02:30:32	59.951	3742.741	335	-229.233856	16	278	10	0	-103	7673	1	0	1	0.002	0.002	
10/12/09 02:30:34	59.952	3740.259	350	-229.233856	16	278.5	10	0	-103	7673	1	0	1	0.001	0.001	
10/12/09 02:30:36	59.953	3736.139	350	-231.409882	16	279	10	0	-103	7673	1	0	1	0.001	0.001	
10/12/09 02:30:38	59.951	3731.382	350	-231.409882	16	279.5	10	0	-103	7673	1	0	1	-0.002	0.002	
10/12/09 02:30:40	59.952	3727.838	350	-231.409882	16	280	10	0	-103	7673	1	0	1	0.001	0.001	
10/12/09 02:30:42	59.952	3725.952	350	-231.409882	16	280.5	10	0	-103	7673	1	0	1	0.000	0.000	
10/12/09 02:30:44	59.952	3722.649	350	-231.409882	16	281	10	0	-103	7673	1	0	1	0.000	0.000	
10/12/09 02:30:46	59.955	3720.578	350	-218.622284	16	281.5	10	0	-103	7673	1	0	1	0.003	0.003	
10/12/09 02:30:48	59.952	3717.996	350	-218.622284	16	282	10	0	-103	7673	1	0	1	-0.003	0.003	
10/12/09 02:30:50	59.954	3718.142	350	-218.622284	16	282.5	10	0	-103	7673	1	0	1	0.002	0.002	
10/12/09 02:30:52	59.952	3715.753	350	-218.622284	16	283	10	0	-103	7673	1	0	1	-0.002	0.002	
10/12/09 02:30:54	59.953	3713.694	350	-218.622284	16	283.5	10	0	-103	7673	1	0	1	0.001	0.001	
10/12/09 02:30:56	59.953	3713.484	350	-213.535858	16	284	10	0	-103	7673	1	0	1	0.000	0.000	
10/12/09 02:30:58	59.952	3710.848	350	-213.535858	16	284.5	10	0	-103	7673	1	0	1	-0.001	0.001	
10/12/09 02:31:00	59.954	3710.81	350	-213.535858	16	285	10	0	-103	7673	1	0	1	0.002	0.002	
10/12/09 02:31:02	59.954	3712.092	350	-213.535858	16	285.5	10	0	-103	7674	1	0	1	0.000	0.000	
10/12/09 02:31:04	59.959	3714.623	350	-213.535858	16	286	10	0	-103	7675	1	0	1	0.005	0.005	
10/12/09 02:31:06	59.957	3715.13	350	-225.651855	16	286.5	10	0	-103	7676	1	0	1	-0.002	0.002	
10/12/09 02:31:08	59.956	3716.168	350	-225.651855	16	287	10	0	-103	7677	1	0	1	-0.001	0.001	
10/12/09 02:31:10	59.954	3716.461	350	-225.651855	16	287.5	10	0	-103	7678	1	0	1	-0.002	0.002	
10/12/09 02:31:12	59.956	3716.98	350	-225.651855	16	288	10	0	-103	7679	1	0	1	0.002	0.002	
10/12/09 02:31:14	59.955	3717.759	350	-225.651855	16	288.5	10	0	-103	7680	1	0	1	-0.001	0.001	
10/12/09 02:31:16	59.958	3722.361	350	-212.573639	16	289	10	0	-103	7681	1	0	1	0.003	0.003	
10/12/09 02:31:18	59.961	3721.973	350	-212.573639	16	289.5	10	0	-103	7682	1	0	1	0.003	0.003	
10/12/09 02:31:20	59.962	3722.658	350	-212.573639	16	290	10	0	-103	7684	1	0	1	0.001	0.001	
10/12/09 02:31:22	59.962	3722.267	350	-212.573639	16	290.5	10	0	-103	7685	1	0	1	0.000	0.000	
10/12/09 02:31:24	59.968	3722.278	350	-212.573639	16	291	10	0	-103	7687	1	0	1	0.006	0.006	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 2:33:00 05:34	Max Absolute Delta Hz 0.126 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:31:26	59.966	3721.787	350	-219.897293	16	291.5	10	0	-103	7689	1	0	1	-0.002	0.002	
10/12/09 02:31:28	59.966	3723.091	350	-219.897293	16	292	10	0	-103	7690	1	0	1	0.000	0.000	
10/12/09 02:31:30	59.968	3723.984	350	-219.897293	16	292.5	10	0	-103	7692	1	0	1	0.002	0.002	
10/12/09 02:31:32	59.97	3723.435	350	-219.897293	16	293	10	0	-103	7692	1	0	1	0.002	0.002	
10/12/09 02:31:34	59.974	3723.893	350	-219.897293	16	293.5	10	0	-103	7693	1	0	1	0.004	0.004	
10/12/09 02:31:36	59.97	3725.403	350	-231.1754	16	294	10	0	-103	7693	1	0	1	-0.004	0.004	
10/12/09 02:31:38	59.969	3727.121	350	-231.1754	16	294.5	10	0	-103	7694	1	0	1	-0.001	0.001	
10/12/09 02:31:40	59.969	3728.053	350	-231.1754	16	295	10	0	-103	7694	1	0	1	0.000	0.000	
10/12/09 02:31:42	59.97	3731.13	350	-231.1754	16	295.5	10	0	-103	7695	1	0	1	0.001	0.001	
10/12/09 02:31:44	59.971	3732.53	350	-231.1754	16	296	10	0	-103	7695	1	0	1	0.001	0.001	
10/12/09 02:31:46	59.973	3733.327	350	-226.634125	16	296.5	10	0	-103	7695	1	0	1	0.002	0.002	
10/12/09 02:31:48	59.973	3736.535	350	-226.634125	16	297	10	0	-103	7696	1	0	1	0.000	0.000	
10/12/09 02:31:50	59.976	3736.907	350	-226.634125	16	297.5	10	0	-103	7696	1	0	1	0.003	0.003	
10/12/09 02:31:52	59.978	3736.822	350	-226.634125	16	298	10	0	-103	7697	1	0	1	0.002	0.002	
10/12/09 02:31:54	59.978	3738.699	350	-226.634125	16	298.5	10	0	-103	7697	1	0	1	0.000	0.000	
10/12/09 02:31:56	59.976	3739.944	350	-227.255066	16	299	10	0	-103	7697	1	0	1	-0.002	0.002	
10/12/09 02:31:58	59.978	3740.877	350	-227.255066	16	299.5	10	0	-103	7698	1	0	1	0.002	0.002	
10/12/09 02:32:00	59.976	3741.794	350	-227.255066	16	300	10	0	-103	7698	1	0	1	-0.002	0.002	
10/12/09 02:32:02	59.978	3745.234	350	-227.255066	16	300.5	10	0	-103	7698.33	1	0	1	0.002	0.002	
10/12/09 02:32:04	59.977	3746.608	350	-227.255066	16	301	10	0	-103	7698.66	1	0	1	-0.001	0.001	
10/12/09 02:32:06	59.98	3748.3	350	-229.290222	16	301.5	10	0	-103	7698.99	1	0	1	0.003	0.003	
10/12/09 02:32:08	59.982	3750.716	350	-229.290222	16	302	10	0	-103	7699.32	1	0	1	0.002	0.002	
10/12/09 02:32:10	59.981	3751.558	350	-229.290222	16	302.5	10	0	-103	7699.65	1	0	1	-0.001	0.001	
10/12/09 02:32:12	59.98	3752.748	350	-229.290222	16	303	10	0	-103	7699.98	1	0	1	-0.001	0.001	
10/12/09 02:32:14	59.979	3755.599	350	-229.290222	16	303.5	10	0	-103	7700.31	1	0	1	-0.001	0.001	
10/12/09 02:32:16	59.98	3756.407	350	-221.461365	16	304	10	0	-103	7700.64	1	0	1	0.001	0.001	
10/12/09 02:32:18	59.979	3756.975	350	-221.461365	16	304.5	10	0	-103	7700.97	1	0	1	-0.001	0.001	
10/12/09 02:32:20	59.983	3760.405	350	-221.461365	16	305	10	0	-103	7701.3	1	0	1	0.004	0.004	
10/12/09 02:32:22	59.983	3760.982	350	-221.461365	16	305.5	10	0	-103	7701.63	1	0	1	0.000	0.000	
10/12/09 02:32:24	59.984	3761.407	350	-221.461365	16	306	10	0	-103	7701.96	1	0	1	0.001	0.001	
10/12/09 02:32:26	59.988	3762.737	350	-241.274368	16	306.5	10	0	-103	7702.29	1	0	1	0.004	0.004	
10/12/09 02:32:28	59.989	3763.212	350	-241.274368	16	307	10	0	-103	7702.62	1	0	1	0.001	0.001	
10/12/09 02:32:30	59.987	3764.958	350	-241.274368	16	307.5	10	0	-103	7702.95	1	0	1	-0.002	0.002	
10/12/09 02:32:32	59.987	3766.085	350	-241.274368	16	308	10	0	-103	7703.28	1	0	1	0.000	0.000	
10/12/09 02:32:34	59.991	3766.433	350	-241.274368	16	308.5	10	0	-103	7703.61	1	0	1	0.004	0.004	
10/12/09 02:32:36	59.993	3767.251	350	-243.071854	16	309	10	0	-103	7703.94	1	0	1	0.002	0.002	
10/12/09 02:32:38	59.992	3767.792	350	-243.071854	16	309.5	10	0	-103	7704.27	1	0	1	-0.001	0.001	
10/12/09 02:32:40	59.991	3768.634	350	-243.071854	16	310	10	0	-103	7704.6	1	0	1	-0.001	0.001	
10/12/09 02:32:42	59.989	3771.146	350	-243.071854	16	310.5	10	0	-103	7704.93	1	0	1	-0.002	0.002	
10/12/09 02:32:44	59.986	3772.445	350	-243.071854	16	311	10	0	-103	7705.26	1	0	1	-0.003	0.003	
10/12/09 02:32:46	59.983	3773.695	350	-241.670212	16	311.5	10	0	-103	7705.59	1	0	1	-0.003	0.003	
10/12/09 02:32:48	59.983	3774.668	350	-241.670212	16	312	10	0	-103	7705.92	1	0	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW						
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26 t(0)				
											473	2:33:00 t(Recovery)		Delta Hz	Absolute Delta Hz	
											307	05:34 Event Length mm:ss				
10/12/09 02:32:50	59.988	3775.841	350	-241.670212	16	312.5	10	0	-103	7706.25	1	0	1	0.005	0.005	
10/12/09 02:32:52	59.993	3775.363	350	-241.670212	16	313	10	0	-103	7706.58	1	0	1	0.005	0.005	
10/12/09 02:32:54	59.996	3774.866	350	-241.670212	16	313.5	10	0	-103	7706.91	1	0	1	0.003	0.003	
10/12/09 02:32:56	59.998	3775.492	350	-228.149307	16	314	10	0	-103	7707.24	1	0	1	0.002	0.002	
10/12/09 02:32:58	59.999	3776.42	350	-228.149307	16	314.5	10	0	-103	7707.57	1	0	1	0.001	0.001	
10/12/09 02:33:00	60.001	3778.554	350	-228.149307	16	315	10	0	-103	7707.9	1	1	1	0.002	0.002	
10/12/09 02:33:02	59.999	3779.692	350	-228.149307	16	315.5	10	0	-103	7708.23	1	0	1	-0.002	0.002	
10/12/09 02:33:04	59.999	3781.256	350	-228.149307	16	316	10	0	-103	7708.56	1	0	1	0.000	0.000	
10/12/09 02:33:06	59.999	3780.595	350	-235.128983	16	316.5	10	0	-103	7708.89	1	0	1	0.000	0.000	
10/12/09 02:33:08	60.002	3783.092	350	-235.128983	16	317	10	0	-103	7709.22	1	1	1	0.003	0.003	
10/12/09 02:33:10	60.005	3783.896	350	-235.128983	16	317.5	10	0	-103	7709.55	1	1	1	0.003	0.003	
10/12/09 02:33:12	60.007	3784.421	350	-235.128983	16	318	10	0	-103	7709.88	1	1	1	0.002	0.002	
10/12/09 02:33:14	60.008	3785.768	350	-235.128983	16	318.5	10	0	-103	7710.21	1	1	1	0.001	0.001	
10/12/09 02:33:16	60.011	3785.463	350	-246.433136	16	319	10	0	-103	7710.54	1	1	1	0.003	0.003	
10/12/09 02:33:18	60.014	3786.85	350	-246.433136	16	319.5	10	0	-103	7710.87	1	1	1	0.003	0.003	
10/12/09 02:33:20	60.017	3786.304	350	-246.433136	16	320	10	0	-103	7711.2	1	1	1	0.003	0.003	
10/12/09 02:33:22	60.019	3787.259	350	-246.433136	16	320.5	10	0	-103	7711.53	1	1	1	0.002	0.002	
10/12/09 02:33:24	60.021	3787.516	350	-246.433136	16	321	10	0	-103	7711.86	1	1	1	0.002	0.002	
10/12/09 02:33:26	60.017	3787.955	350	-236.553543	16	321.5	10	0	-103	7712.19	1	1	1	-0.004	0.004	
10/12/09 02:33:28	60.017	3788.03	350	-236.553543	16	322	10	0	-103	7712.52	1	1	1	0.000	0.000	
10/12/09 02:33:30	60.019	3788.607	350	-236.553543	16	322.5	10	0	-103	7712.85	1	1	1	0.002	0.002	
10/12/09 02:33:32	60.023	3789.216	350	-236.553543	16	323	10	0	-103	7713.18	1	1	1	0.004	0.004	
10/12/09 02:33:34	60.024	3787.537	350	-236.553543	16	323.5	10	0	-103	7713.51	1	1	1	0.001	0.001	
10/12/09 02:33:36	60.025	3785.842	350	-230.297562	16	324	10	0	-103	7713.84	1	1	1	0.001	0.001	
10/12/09 02:33:38	60.021	3786.077	350	-230.297562	16	324.5	10	0	-103	7714.17	1	1	1	-0.004	0.004	
10/12/09 02:33:40	60.019	3787.93	350	-230.297562	16	325	10	0	-103	7714.5	1	1	1	-0.002	0.002	
10/12/09 02:33:42	60.024	3788.76	350	-230.297562	16	325.5	10	0	-103	7714.83	1	1	1	0.005	0.005	
10/12/09 02:33:44	60.024	3786.875	350	-230.297562	16	326	10	0	-103	7715.16	1	1	1	0.000	0.000	
10/12/09 02:33:46	60.021	3786.55	350	-231.175537	16	326.5	10	0	-103	7715.49	1	1	1	-0.003	0.003	
10/12/09 02:33:48	60.02	3787.358	350	-231.175537	16	327	10	0	-103	7715.82	1	1	1	-0.001	0.001	
10/12/09 02:33:50	60.025	3785.018	350	-231.175537	16	327.5	10	0	-103	7716.15	1	1	1	0.005	0.005	
10/12/09 02:33:52	60.024	3785.614	350	-231.175537	16	328	10	0	-103	7716.48	1	1	1	-0.001	0.001	
10/12/09 02:33:54	60.02	3785.949	350	-231.175537	16	328.5	10	0	-103	7716.81	1	1	1	-0.004	0.004	
10/12/09 02:33:56	60.02	3785.804	350	-225.61763	16	329	10	0	-103	7717.14	1	1	1	0.000	0.000	
10/12/09 02:33:58	60.022	3786.864	350	-225.61763	16	329.5	10	0	-103	7717.47	1	1	1	0.002	0.002	
10/12/09 02:34:00	60.022	3786.877	350	-225.61763	16	330	10	0	-103	7717.8	1	1	1	0.000	0.000	
10/12/09 02:34:02	60.022	3785.254	350	-225.61763	16	330.5	10	0	-103	7718.13	1	1	1	0.000	0.000	
10/12/09 02:34:04	60.021	3785.726	350	-225.61763	16	331	10	0	-103	7718.46	1	1	1	-0.001	0.001	
10/12/09 02:34:06	60.021	3786.347	350	-230.734421	16	331.5	10	0	-103	7718.79	1	1	1	0.000	0.000	
10/12/09 02:34:08	60.023	3785.821	350	-230.734421	16	332	10	0	-103	7719.12	1	1	1	0.002	0.002	
10/12/09 02:34:10	60.023	3785.798	350	-230.734421	16	332.5	10	0	-103	7719.45	1	1	1	0.000	0.000	
10/12/09 02:34:12	60.022	3786.284	350	-230.734421	16	333	10	0	-103	7719.78	1	1	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW						
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26 t(0)				
											473	2:33:00 t(Recovery)		Delta Hz	Absolute Delta Hz	
											307	05:34 Event Length mm:ss				
10/12/09 02:34:14	60.019	3786.939	350	-230.734421	16	333.5	10	0	-103	7720.11	1	1	1	-0.003	0.003	
10/12/09 02:34:16	60.016	3787.627	350	-234.847107	16	334	10	0	-103	7720.44	1	1	1	-0.003	0.003	
10/12/09 02:34:18	60.018	3789.444	350	-234.847107	16	334.5	10	0	-103	7720.77	1	1	1	0.002	0.002	
10/12/09 02:34:20	60.018	3789.673	350	-234.847107	16	335	10	0	-103	7721.1	1	1	1	0.000	0.000	
10/12/09 02:34:22	60.018	3789.404	350	-234.847107	16	335.5	10	0	-103	7721.43	1	1	1	0.000	0.000	
10/12/09 02:34:24	60.019	3788.479	350	-234.847107	16	336	10	0	-103	7721.76	1	1	1	0.001	0.001	
10/12/09 02:34:26	60.019	3789.183	350	-228.960922	16	336.5	10	0	-103	7722.09	1	1	1	0.000	0.000	
10/12/09 02:34:28	60.016	3789.369	350	-228.960922	16	337	10	0	-103	7722.42	1	1	1	-0.003	0.003	
10/12/09 02:34:30	60.015	3789.005	350	-228.960922	16	337.5	10	0	-103	7722.75	1	1	1	-0.001	0.001	
10/12/09 02:34:32	60.016	3788.665	350	-228.960922	16	338	10	0	-103	7723.08	1	1	1	0.001	0.001	
10/12/09 02:34:34	60.014	3788.933	350	-228.960922	16	338.5	10	0	-103	7723.41	1	1	1	-0.002	0.002	
10/12/09 02:34:36	60.013	3790.667	350	-231.177917	16	339	10	0	-103	7723.74	1	1	1	-0.001	0.001	
10/12/09 02:34:38	60.012	3790.805	350	-231.177917	16	339.5	10	0	-103	7724.07	1	1	1	-0.001	0.001	
10/12/09 02:34:40	60.012	3790.411	350	-231.177917	16	340	10	0	-103	7724.4	1	1	1	0.000	0.000	
10/12/09 02:34:42	60.01	3789.769	350	-231.177917	16	340.5	10	0	-103	7724.73	1	1	1	-0.002	0.002	
10/12/09 02:34:44	60.007	3791.54	350	-231.177917	16	341	10	0	-103	7725.06	1	1	1	-0.003	0.003	
10/12/09 02:34:46	60.007	3792.945	350	-236.489288	16	341.5	10	0	-103	7725.39	1	1	1	0.000	0.000	
10/12/09 02:34:48	60.009	3791.027	350	-236.489288	16	342	10	0	-103	7725.72	1	1	1	0.002	0.002	
10/12/09 02:34:50	60.009	3791.443	350	-236.489288	16	342.5	10	0	-103	7726.05	1	1	1	0.000	0.000	
10/12/09 02:34:52	60.01	3791.426	350	-236.489288	16	343	10	0	-103	7726.38	1	1	1	0.001	0.001	
10/12/09 02:34:54	60.003	3790.603	350	-236.489288	16	343.5	10	0	-103	7726.71	1	1	1	-0.007	0.007	
10/12/09 02:34:56	59.999	3790.457	350	-245.038925	16	344	10	0	-103	7727.04	1	0	1	-0.004	0.004	
10/12/09 02:34:58	59.995	3790.216	350	-245.038925	16	344.5	10	0	-103	7727.37	1	0	1	-0.004	0.004	
10/12/09 02:35:00	59.992	3789.585	350	-245.038925	16	345	10	0	-103	7727.7	1	0	1	-0.003	0.003	
10/12/09 02:35:02	59.991	3788.457	350	-245.038925	16	345.5	10	0	-103	7728.03	1	0	1	-0.001	0.001	
10/12/09 02:35:04	59.992	3788.105	350	-245.038925	16	346	10	0	-103	7728.36	1	0	1	0.001	0.001	
10/12/09 02:35:06	59.992	3788.057	350	-223.605682	16	346.5	10	0	-103	7728.69	1	0	1	0.000	0.000	
10/12/09 02:35:08	59.988	3788.189	350	-223.605682	16	347	10	0	-103	7729.02	1	0	1	-0.004	0.004	
10/12/09 02:35:10	59.986	3788.497	350	-223.605682	16	347.5	10	0	-103	7729.35	1	0	1	-0.002	0.002	
10/12/09 02:35:12	59.985	3788.54	350	-223.605682	16	348	10	0	-103	7729.68	1	0	1	-0.001	0.001	
10/12/09 02:35:14	59.984	3788.571	350	-223.605682	16	348.5	10	0	-103	7730.01	1	0	1	-0.001	0.001	
10/12/09 02:35:16	59.985	3788.101	350	-231.119354	16	349	10	0	-103	7730.34	1	0	1	0.001	0.001	
10/12/09 02:35:18	59.984	3787.133	350	-231.119354	16	349.5	10	0	-103	7730.67	1	0	1	-0.001	0.001	
10/12/09 02:35:20	59.982	3786.453	350	-231.119354	16	350	10	0	-103	7731	1	0	1	-0.002	0.002	
10/12/09 02:35:22	59.981	3787.732	350	-231.119354	16	350.5	10	0	-103	7731.33	1	0	1	-0.001	0.001	
10/12/09 02:35:24	59.982	3788.813	350	-231.119354	16	351	10	0	-103	7731.66	1	0	1	0.001	0.001	
10/12/09 02:35:26	59.979	3789.285	350	-237.20665	16	351.5	10	0	-103	7731.99	1	0	1	-0.003	0.003	
10/12/09 02:35:28	59.977	3788.256	350	-237.20665	16	352	10	0	-103	7732.32	1	0	1	-0.002	0.002	
10/12/09 02:35:30	59.976	3788.41	350	-237.20665	16	352.5	10	0	-103	7732.65	1	0	1	-0.001	0.001	
10/12/09 02:35:32	59.976	3790.467	350	-237.20665	16	353	10	0	-103	7732.98	1	0	1	0.000	0.000	
10/12/09 02:35:34	59.979	3790.665	350	-237.20665	16	353.5	10	0	-103	7733.31	1	0	1	0.003	0.003	
10/12/09 02:35:36	59.982	3790.42	350	-240.516373	16	354	10	0	-103	7733.64	1	0	1	0.003	0.003	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW						
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26 t(0)				
											473	2:33:00 t(Recovery)		Delta Hz	Absolute Delta Hz	
											307	05:34 Event Length mm:ss				
10/12/09 02:35:38	59.978	3789.674	350	-240.516373	16	354.5	10	0	-103	7733.97	1	0	1	-0.004	0.004	
10/12/09 02:35:40	59.976	3789.267	350	-240.516373	16	355	10	0	-103	7734.3	1	0	1	-0.002	0.002	
10/12/09 02:35:42	59.974	3789.148	350	-240.516373	16	355.5	10	0	-103	7734.63	1	0	1	-0.002	0.002	
10/12/09 02:35:44	59.976	3790.43	350	-240.516373	16	356	10	0	-103	7734.96	1	0	1	0.002	0.002	
10/12/09 02:35:46	59.977	3789.914	350	-237.566055	16	356.5	10	0	-103	7735.29	1	0	1	0.001	0.001	
10/12/09 02:35:48	59.977	3786.243	350	-237.566055	16	357	10	0	-103	7735.62	1	0	1	0.000	0.000	
10/12/09 02:35:50	59.975	3787.442	350	-237.566055	16	357.5	10	0	-103	7735.95	1	0	1	-0.002	0.002	
10/12/09 02:35:52	59.973	3788.963	350	-237.566055	16	358	10	0	-103	7736.28	1	0	1	-0.002	0.002	
10/12/09 02:35:54	59.969	3790.602	350	-237.566055	16	358.5	10	0	-103	7736.61	1	0	1	-0.004	0.004	
10/12/09 02:35:56	59.97	3791.877	350	-231.581421	16	359	10	0	-103	7736.94	1	0	1	0.001	0.001	
10/12/09 02:35:58	59.971	3792.911	350	-231.581421	16	359.5	10	0	-103	7737.27	1	0	1	0.001	0.001	
10/12/09 02:36:00	59.973	3792.311	350	-231.581421	16	360	10	0	-103	7737.6	1	0	1	0.002	0.002	
10/12/09 02:36:02	59.978	3789.125	350	-231.581421	16	360.5	10	0	-103	7737.93	1	0	1	0.005	0.005	
10/12/09 02:36:04	59.981	3788.08	350	-231.581421	16	361	10	0	-103	7738.26	1	0	1	0.003	0.003	
10/12/09 02:36:06	59.978	3787.844	350	-235.850845	16	361.5	10	0	-103	7738.59	1	0	1	-0.003	0.003	
10/12/09 02:36:08	59.975	3787.135	350	-235.850845	16	362	10	0	-103	7738.92	1	0	1	-0.003	0.003	
10/12/09 02:36:10	59.972	3787.164	350	-235.850845	16	362.5	10	0	-103	7739.25	1	0	1	-0.003	0.003	
10/12/09 02:36:12	59.976	3786.996	350	-235.850845	16	363	10	0	-103	7739.58	1	0	1	0.004	0.004	
10/12/09 02:36:14	59.975	3787.405	350	-235.850845	16	363.5	10	0	-103	7739.91	1	0	1	-0.001	0.001	
10/12/09 02:36:16	59.973	3786.487	350	-233.559982	16	364	10	0	-103	7740.24	1	0	1	-0.002	0.002	
10/12/09 02:36:18	59.969	3787.079	350	-233.559982	16	364.5	10	0	-103	7740.57	1	0	1	-0.004	0.004	
10/12/09 02:36:20	59.966	3789.214	350	-233.559982	16	365	10	0	-103	7740.9	1	0	1	-0.003	0.003	
10/12/09 02:36:22	59.965	3790.512	350	-233.559982	16	365.5	10	0	-103	7741.23	1	0	1	-0.001	0.001	
10/12/09 02:36:24	59.966	3791.221	350	-233.559982	16	366	10	0	-103	7741.56	1	0	1	0.001	0.001	
10/12/09 02:36:26	59.969	3792.218	350	-219.009995	16	366.5	10	0	-103	7741.89	1	0	1	0.003	0.003	
10/12/09 02:36:28	59.97	3790.959	350	-219.009995	16	367	10	0	-103	7742.22	1	0	1	0.001	0.001	
10/12/09 02:36:30	59.968	3788.824	350	-219.009995	16	367.5	10	0	-103	7742.55	1	0	1	-0.002	0.002	
10/12/09 02:36:32	59.965	3789.026	350	-219.009995	16	368	10	0	-103	7742.88	1	0	1	-0.003	0.003	
10/12/09 02:36:34	59.964	3789.167	350	-219.009995	16	368.5	10	0	-103	7743.21	1	0	1	-0.001	0.001	
10/12/09 02:36:36	59.97	3787.394	350	-205.338913	16	369	10	0	-103	7743.54	1	0	1	0.006	0.006	
10/12/09 02:36:38	59.972	3785.69	350	-205.338913	16	369.5	10	0	-103	7743.87	1	0	1	0.002	0.002	
10/12/09 02:36:40	59.967	3784.831	350	-205.338913	16	370	10	0	-103	7744.2	1	0	1	-0.005	0.005	
10/12/09 02:36:42	59.967	3785.01	350	-205.338913	16	370.5	10	0	-103	7744.53	1	0	1	0.000	0.000	
10/12/09 02:36:44	59.969	3784.32	350	-205.338913	16	371	10	0	-103	7744.86	1	0	1	0.002	0.002	
10/12/09 02:36:46	59.968	3782.809	350	-236.285355	16	371.5	10	0	-103	7745.19	1	0	1	-0.001	0.001	
10/12/09 02:36:48	59.969	3782.11	350	-236.285355	16	372	10	0	-103	7745.52	1	0	1	0.001	0.001	
10/12/09 02:36:50	59.967	3779.352	350	-236.285355	16	372.5	10	0	-103	7745.85	1	0	1	-0.002	0.002	
10/12/09 02:36:52	59.967	3779.056	350	-236.285355	16	373	10	0	-103	7746.18	1	0	1	0.000	0.000	
10/12/09 02:36:54	59.966	3778.633	350	-236.285355	16	373.5	10	0	-103	7746.51	1	0	1	-0.001	0.001	
10/12/09 02:36:56	59.965	3779.212	350	-223.015732	16	374	10	0	-103	7746.84	1	0	1	-0.001	0.001	
10/12/09 02:36:58	59.971	3779.335	350	-223.015732	16	374.5	10	0	-103	7747.17	1	0	1	0.006	0.006	
10/12/09 02:37:00	59.967	3776.429	350	-223.015732	16	375	10	0	-103	7747.5	1	0	1	-0.004	0.004	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:37:02	59.965	3775.647	350	-223.015732	16	375.5	10	0	-103	7747.83	1	0	1	-0.002	0.002	
10/12/09 02:37:04	59.962	3776.597	350	-223.015732	16	376	10	0	-103	7748.16	1	0	1	-0.003	0.003	
10/12/09 02:37:06	59.964	3776.559	350	-223.015732	16	376.5	10	0	-103	7748.49	1	0	1	0.002	0.002	
10/12/09 02:37:08	59.97	3776.023	350	-223.015732	16	377	10	0	-103	7748.82	1	0	1	0.006	0.006	
10/12/09 02:37:10	59.967	3773.17	350	-223.015732	16	377.5	10	0	-103	7749.15	1	0	1	-0.003	0.003	
10/12/09 02:37:12	59.969	3771.73	350	-223.015732	16	378	10	0	-103	7749.48	1	0	1	0.002	0.002	
10/12/09 02:37:14	59.968	3768.793	350	-223.015732	16	378.5	10	0	-103	7749.81	1	0	1	-0.001	0.001	
10/12/09 02:37:16	59.963	3768.503	350	-223.015732	16	379	10	0	-103	7750.14	1	0	1	-0.005	0.005	
10/12/09 02:37:18	59.965	3768.917	350	-223.015732	16	379.5	10	0	-103	7750.47	1	0	1	0.002	0.002	
10/12/09 02:37:20	59.97	3767.366	350	-223.015732	16	380	10	0	-103	7750.8	1	0	1	0.005	0.005	
10/12/09 02:37:22	59.973	3764.786	350	-223.015732	16	380.5	10	0	-103	7751.13	1	0	1	0.003	0.003	
10/12/09 02:37:24	59.968	3760.295	350	-223.015732	16	381	10	0	-103	7751.46	1	0	1	-0.005	0.005	
10/12/09 02:37:26	59.965	3759.592	350	-223.015732	16	381.5	10	0	-103	7751.79	1	0	1	-0.003	0.003	
10/12/09 02:37:28	59.968	3761.894	350	-223.015732	16	382	10	0	-103	7752.12	1	0	1	0.003	0.003	
10/12/09 02:37:30	59.969	3761.777	350	-223.015732	16	382.5	10	0	-103	7752.45	1	0	1	0.001	0.001	
10/12/09 02:37:32	59.967	3760.583	350	-223.015732	16	383	10	0	-103	7752.78	1	0	1	-0.002	0.002	
10/12/09 02:37:34	59.964	3760.157	350	-223.015732	16	383.5	10	0	-103	7753.11	1	0	1	-0.003	0.003	
10/12/09 02:37:36	59.966	3759.781	350	-223.015732	16	384	10	0	-103	7753.44	1	0	1	0.002	0.002	
10/12/09 02:37:38	59.979	3759.495	350	-223.015732	16	384.5	10	0	-103	7753.77	1	0	1	0.013	0.013	
10/12/09 02:37:40	59.99	3757.773	350	-223.015732	16	385	10	0	-103	7754.1	1	0	1	0.011	0.011	
10/12/09 02:37:42	59.983	3753.277	350	-223.015732	16	385.5	10	0	-103	7754.43	1	0	1	-0.007	0.007	
10/12/09 02:37:44	59.974	3753.087	350	-223.015732	16	386	10	0	-103	7754.76	1	0	1	-0.009	0.009	
10/12/09 02:37:46	59.967	3751.637	350	-223.015732	16	386.5	10	0	-103	7755.09	1	0	1	-0.007	0.007	
10/12/09 02:37:48	59.965	3753.751	350	-223.015732	16	387	10	0	-103	7755.42	1	0	1	-0.002	0.002	
10/12/09 02:37:50	59.962	3758.225	350	-223.015732	16	387.5	10	0	-103	7755.75	1	0	1	-0.003	0.003	
10/12/09 02:37:52	59.962	3759.25	350	-223.015732	16	388	10	0	-103	7756.08	1	0	1	0.000	0.000	
10/12/09 02:37:54	59.961	3758.041	350	-223.015732	16	388.5	10	0	-103	7756.41	1	0	1	-0.001	0.001	
10/12/09 02:37:56	59.961	3760.965	350	-223.015732	16	389	10	0	-103	7756.74	1	0	1	0.000	0.000	
10/12/09 02:37:58	59.96	3762.022	350	-223.015732	16	389.5	10	0	-103	7757.07	1	0	1	-0.001	0.001	
10/12/09 02:38:00	59.963	3763.822	350	-223.015732	16	390	10	0	-103	7757.4	1	0	1	0.003	0.003	
10/12/09 02:38:02	59.959	3763.1	350	-223.015732	16	390.5	10	0	-103	7757.73	1	0	1	-0.004	0.004	
10/12/09 02:38:04	59.956	3763.858	350	-223.015732	16	391	10	0	-103	7758.06	1	0	1	-0.003	0.003	
10/12/09 02:38:06	59.951	3764.158	350	-223.015732	16	391.5	10	0	-103	7758.39	1	0	1	-0.005	0.005	
10/12/09 02:38:08	59.953	3766.127	350	-223.015732	16	392	10	0	-103	7758.72	1	0	1	0.002	0.002	
10/12/09 02:38:10	59.954	3768.339	350	-223.015732	16	392.5	10	0	-103	7759.05	1	0	1	0.001	0.001	
10/12/09 02:38:12	59.957	3767.972	350	-223.015732	16	393	10	0	-103	7759.38	1	0	1	0.003	0.003	
10/12/09 02:38:14	59.956	3767.438	350	-223.015732	16	393.5	10	0	-103	7759.71	1	0	1	-0.001	0.001	
10/12/09 02:38:16	59.961	3765.606	350	-223.015732	16	394	10	0	-103	7760.04	1	0	1	0.005	0.005	
10/12/09 02:38:18	59.963	3762.688	350	-223.015732	16	394.5	10	0	-103	7760.37	1	0	1	0.002	0.002	
10/12/09 02:38:20	59.961	3761.57	350	-223.015732	16	395	10	0	-103	7760.7	1	0	1	-0.002	0.002	
10/12/09 02:38:22	59.959	3761.92	350	-223.015732	16	395.5	10	0	-103	7761.03	1	0	1	-0.002	0.002	
10/12/09 02:38:24	59.963	3759.627	350	-223.015732	16	396	10	0	-103	7761.36	1	0	1	0.004	0.004	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:38:26	59.963	3758.522	350	-223.015732	16	396.5	10	0	-103	7761.69	1	0	1	0.000	0.000	
10/12/09 02:38:28	59.965	3752.429	350	-223.015732	16	397	10	0	-103	7762.02	1	0	1	0.002	0.002	
10/12/09 02:38:30	59.968	3750.102	350	-223.015732	16	397.5	10	0	-103	7762.35	1	0	1	0.003	0.003	
10/12/09 02:38:32	59.968	3753.83	350	-223.015732	16	398	10	0	-103	7762.68	1	0	1	0.000	0.000	
10/12/09 02:38:34	59.968	3753.51	350	-223.015732	16	398.5	10	0	-103	7763.01	1	0	1	0.000	0.000	
10/12/09 02:38:36	59.97	3753.523	350	-223.015732	16	399	10	0	-103	7763.34	1	0	1	0.002	0.002	
10/12/09 02:38:38	59.973	3752.741	350	-223.015732	16	399.5	10	0	-103	7763.67	1	0	1	0.003	0.003	
10/12/09 02:38:40	59.971	3753.178	350	-223.015732	16	400	10	0	-103	7764	1	0	1	-0.002	0.002	
10/12/09 02:38:42	59.965	3752.729	350	-223.015732	16	400.5	10	0	-103	7764.33	1	0	1	-0.006	0.006	
10/12/09 02:38:44	59.967	3753.291	350	-223.015732	16	401	10	0	-103	7764.66	1	0	1	0.002	0.002	
10/12/09 02:38:46	59.967	3752.872	350	-223.015732	16	401.5	10	0	-103	7764.99	1	0	1	0.000	0.000	
10/12/09 02:38:48	59.972	3752.359	350	-223.015732	16	402	10	0	-103	7765.32	1	0	1	0.005	0.005	
10/12/09 02:38:50	59.976	3749.398	350	-223.015732	16	402.5	10	0	-103	7765.65	1	0	1	0.004	0.004	
10/12/09 02:38:52	59.975	3747.476	350	-223.015732	16	403	10	0	-103	7765.98	1	0	1	-0.001	0.001	
10/12/09 02:38:54	59.969	3740.37	350	-223.015732	16	403.5	10	0	-103	7766.31	1	0	1	-0.006	0.006	
10/12/09 02:38:56	59.973	3741.285	350	-223.015732	16	404	10	0	-103	7766.64	1	0	1	0.004	0.004	
10/12/09 02:38:58	59.974	3746.651	350	-223.015732	16	404.5	10	0	-103	7766.97	1	0	1	0.001	0.001	
10/12/09 02:39:00	59.978	3745.738	350	-223.015732	16	405	10	0	-103	7767.3	1	0	1	0.004	0.004	
10/12/09 02:39:02	59.981	3743.351	350	-223.015732	16	405.5	10	0	-103	7767.63	1	0	1	0.003	0.003	
10/12/09 02:39:04	59.981	3741.618	350	-223.015732	16	406	10	0	-103	7767.96	1	0	1	0.000	0.000	
10/12/09 02:39:06	59.981	3740.306	350	-223.015732	16	406.5	10	0	-103	7768.29	1	0	1	0.000	0.000	
10/12/09 02:39:08	59.982	3738.484	350	-223.015732	16	407	10	0	-103	7768.62	1	0	1	0.001	0.001	
10/12/09 02:39:10	59.982	3738.901	350	-223.015732	16	407.5	10	0	-103	7768.95	1	0	1	0.000	0.000	
10/12/09 02:39:12	59.984	3737.404	350	-223.015732	16	408	10	0	-103	7769.28	1	0	1	0.002	0.002	
10/12/09 02:39:14	59.982	3737.273	350	-223.015732	16	408.5	10	0	-103	7769.61	1	0	1	-0.002	0.002	
10/12/09 02:39:16	59.981	3736.308	350	-223.015732	16	409	10	0	-103	7769.94	1	0	1	-0.001	0.001	
10/12/09 02:39:18	59.979	3736.272	350	-223.015732	16	409.5	10	0	-103	7770.27	1	0	1	-0.002	0.002	
10/12/09 02:39:20	59.98	3735.448	350	-223.015732	16	410	10	0	-103	7770.6	1	0	1	0.001	0.001	
10/12/09 02:39:22	59.978	3735.65	350	-223.015732	16	410.5	10	0	-103	7770.93	1	0	1	-0.002	0.002	
10/12/09 02:39:24	59.978	3737.541	350	-223.015732	16	411	10	0	-103	7771.26	1	0	1	0.000	0.000	
10/12/09 02:39:26	59.98	3738.012	350	-223.015732	16	411.5	10	0	-103	7771.59	1	0	1	0.002	0.002	
10/12/09 02:39:28	59.981	3736.748	350	-223.015732	16	412	10	0	-103	7771.92	1	0	1	0.001	0.001	
10/12/09 02:39:30	59.98	3736.693	350	-223.015732	16	412.5	10	0	-103	7772.25	1	0	1	-0.001	0.001	
10/12/09 02:39:32	59.978	3736.067	350	-223.015732	16	413	10	0	-103	7772.58	1	0	1	-0.002	0.002	
10/12/09 02:39:34	59.976	3736.094	350	-223.015732	16	413.5	10	0	-103	7772.91	1	0	1	-0.002	0.002	
10/12/09 02:39:36	59.972	3736.575	350	-223.015732	16	414	10	0	-103	7773.24	1	0	1	-0.004	0.004	
10/12/09 02:39:38	59.971	3738.571	350	-223.015732	16	414.5	10	0	-103	7773.57	1	0	1	-0.001	0.001	
10/12/09 02:39:40	59.969	3738.875	350	-223.015732	16	415	10	0	-103	7773.9	1	0	1	-0.002	0.002	
10/12/09 02:39:42	59.974	3738.935	350	-223.015732	16	415.5	10	0	-103	7774.23	1	0	1	0.005	0.005	
10/12/09 02:39:44	59.975	3738.647	350	-223.015732	16	416	10	0	-103	7774.56	1	0	1	0.001	0.001	
10/12/09 02:39:46	59.976	3737.684	350	-223.015732	16	416.5	10	0	-103	7774.89	1	0	1	0.001	0.001	
10/12/09 02:39:48	59.972	3737.382	350	-223.015732	16	417	10	0	-103	7775.22	1	0	1	-0.004	0.004	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:39:50	59.969	3737.892	350	-223.015732	16	417.5	10	0	-103	7775.55	1	0	1	-0.003	0.003	
10/12/09 02:39:52	59.971	3740.017	350	-223.015732	16	418	10	0	-103	7775.88	1	0	1	0.002	0.002	
10/12/09 02:39:54	59.974	3740.329	350	-223.015732	16	418.5	10	0	-103	7776.21	1	0	1	0.003	0.003	
10/12/09 02:39:56	59.972	3742.053	350	-223.015732	16	419	10	0	-103	7776.54	1	0	1	-0.002	0.002	
10/12/09 02:39:58	59.972	3742.424	350	-223.015732	16	419.5	10	0	-103	7776.87	1	0	1	0.000	0.000	
10/12/09 02:40:00	59.972	3742.524	350	-223.015732	16	420	10	0	-103	7777.2	1	0	1	0.000	0.000	
10/12/09 02:40:02	59.977	3742.245	350	-223.015732	16	420.5	10	0	-103	7777.53	1	0	1	0.005	0.005	
10/12/09 02:40:04	59.982	3741.723	350	-223.015732	16	421	10	0	-103	7777.86	1	0	1	0.005	0.005	
10/12/09 02:40:06	59.978	3740.085	350	-223.015732	16	421.5	10	0	-103	7778.19	1	0	1	-0.004	0.004	
10/12/09 02:40:08	59.976	3740.629	350	-223.015732	16	422	10	0	-103	7778.52	1	0	1	-0.002	0.002	
10/12/09 02:40:10	59.973	3739.964	350	-223.015732	16	422.5	10	0	-103	7778.85	1	0	1	-0.003	0.003	
10/12/09 02:40:12	59.974	3740.775	350	-223.015732	16	423	10	0	-103	7779.18	1	0	1	0.001	0.001	
10/12/09 02:40:14	59.977	3742.833	350	-223.015732	16	423.5	10	0	-103	7779.51	1	0	1	0.003	0.003	
10/12/09 02:40:16	59.977	3741.268	350	-223.015732	16	424	10	0	-103	7779.84	1	0	1	0.000	0.000	
10/12/09 02:40:18	59.978	3739.776	350	-223.015732	16	424.5	10	0	-103	7780.17	1	0	1	0.001	0.001	
10/12/09 02:40:20	59.979	3738.966	350	-223.015732	16	425	10	0	-103	7780.5	1	0	1	0.001	0.001	
10/12/09 02:40:22	59.981	3738.706	350	-223.015732	16	425.5	10	0	-103	7780.83	1	0	1	0.002	0.002	
10/12/09 02:40:24	59.977	3738.879	350	-223.015732	16	426	10	0	-103	7781.16	1	0	1	-0.004	0.004	
10/12/09 02:40:26	59.974	3739.86	350	-223.015732	16	426.5	10	0	-103	7781.49	1	0	1	-0.003	0.003	
10/12/09 02:40:28	59.971	3738.102	350	-223.015732	16	427	10	0	-103	7781.82	1	0	1	-0.003	0.003	
10/12/09 02:40:30	59.971	3738.558	350	-223.015732	16	427.5	10	0	-103	7782.15	1	0	1	0.000	0.000	
10/12/09 02:40:32	59.971	3743.507	350	-223.015732	16	428	10	0	-103	7782.48	1	0	1	0.000	0.000	
10/12/09 02:40:34	59.972	3743.419	350	-223.015732	16	428.5	10	0	-103	7782.81	1	0	1	0.001	0.001	
10/12/09 02:40:36	59.968	3745.251	350	-223.015732	16	429	10	0	-103	7783.14	1	0	1	-0.004	0.004	
10/12/09 02:40:38	59.966	3745.744	350	-223.015732	16	429.5	10	0	-103	7783.47	1	0	1	-0.002	0.002	
10/12/09 02:40:40	59.966	3747.34	350	-223.015732	16	430	10	0	-103	7783.8	1	0	1	0.000	0.000	
10/12/09 02:40:42	59.971	3750.7	350	-223.015732	16	430.5	10	0	-103	7784.13	1	0	1	0.005	0.005	
10/12/09 02:40:44	59.973	3749.75	350	-223.015732	16	431	10	0	-103	7784.46	1	0	1	0.002	0.002	
10/12/09 02:40:46	59.972	3746.217	350	-223.015732	16	431.5	10	0	-103	7784.79	1	0	1	-0.001	0.001	
10/12/09 02:40:48	59.969	3744.683	350	-223.015732	16	432	10	0	-103	7785.12	1	0	1	-0.003	0.003	
10/12/09 02:40:50	59.972	3743.745	350	-223.015732	16	432.5	10	0	-103	7785.45	1	0	1	0.003	0.003	
10/12/09 02:40:52	59.974	3743.149	350	-223.015732	16	433	10	0	-103	7785.78	1	0	1	0.002	0.002	
10/12/09 02:40:54	59.973	3740.299	350	-223.015732	16	433.5	10	0	-103	7786.11	1	0	1	-0.001	0.001	
10/12/09 02:40:56	59.97	3739.453	350	-223.015732	16	434	10	0	-103	7786.44	1	0	1	-0.003	0.003	
10/12/09 02:40:58	59.971	3733.376	350	-223.015732	16	434.5	10	0	-103	7786.77	1	0	1	0.001	0.001	
10/12/09 02:41:00	59.974	3731.83	350	-223.015732	16	435	10	0	-103	7787.1	1	0	1	0.003	0.003	
10/12/09 02:41:02	59.982	3737.583	350	-223.015732	16	435.5	10	0	-103	7787.43	1	0	1	0.008	0.008	
10/12/09 02:41:04	59.985	3736.229	350	-223.015732	16	436	10	0	-103	7787.76	1	0	1	0.003	0.003	
10/12/09 02:41:06	59.985	3734.897	350	-223.015732	16	436.5	10	0	-103	7788.09	1	0	1	0.000	0.000	
10/12/09 02:41:08	59.985	3733.434	350	-223.015732	16	437	10	0	-103	7788.42	1	0	1	0.000	0.000	
10/12/09 02:41:10	59.987	3733.115	350	-223.015732	16	437.5	10	0	-103	7788.75	1	0	1	0.002	0.002	
10/12/09 02:41:12	59.989	3730.51	350	-223.015732	16	438	10	0	-103	7789.08	1	0	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW						
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26 t(0)				
											473	2:33:00 t(Recovery)		Delta Hz	Absolute Delta Hz	
											307	05:34 Event Length mm:ss				
10/12/09 02:41:14	59.989	3729.18	350	-223.015732	16	438.5	10	0	-103	7789.41	1	0	1	0.000	0.000	
10/12/09 02:41:16	59.986	3725.459	350	-223.015732	16	439	10	0	-103	7789.74	1	0	1	-0.003	0.003	
10/12/09 02:41:18	59.987	3724.785	350	-223.015732	16	439.5	10	0	-103	7790.07	1	0	1	0.001	0.001	
10/12/09 02:41:20	59.99	3720.108	350	-223.015732	16	440	10	0	-103	7790.4	1	0	1	0.003	0.003	
10/12/09 02:41:22	59.994	3720.938	350	-223.015732	16	440.5	10	0	-103	7790.73	1	0	1	0.004	0.004	
10/12/09 02:41:24	59.996	3725.661	350	-223.015732	16	441	10	0	-103	7791.06	1	0	1	0.002	0.002	
10/12/09 02:41:26	60.001	3725.677	350	-223.015732	16	441.5	10	0	-103	7791.39	1	1	1	0.005	0.005	
10/12/09 02:41:28	60.003	3727.754	350	-223.015732	16	442	10	0	-103	7791.72	1	1	1	0.002	0.002	
10/12/09 02:41:30	60.004	3727.825	350	-223.015732	16	442.5	10	0	-103	7792.05	1	1	1	0.001	0.001	
10/12/09 02:41:32	60.006	3727.683	350	-223.015732	16	443	10	0	-103	7792.38	1	1	1	0.002	0.002	
10/12/09 02:41:34	60.012	3727.231	350	-223.015732	16	443.5	10	0	-103	7792.71	1	1	1	0.006	0.006	
10/12/09 02:41:36	60.014	3725.012	350	-223.015732	16	444	10	0	-103	7793.04	1	1	1	0.002	0.002	
10/12/09 02:41:38	60.019	3726.446	350	-223.015732	16	444.5	10	0	-103	7793.37	1	1	1	0.005	0.005	
10/12/09 02:41:40	60.021	3726.016	350	-223.015732	16	445	10	0	-103	7793.7	1	1	1	0.002	0.002	
10/12/09 02:41:42	60.025	3719.123	350	-223.015732	16	445.5	10	0	-103	7794.03	1	1	1	0.004	0.004	
10/12/09 02:41:44	60.026	3716.375	350	-223.015732	16	446	10	0	-103	7794.36	1	1	1	0.001	0.001	
10/12/09 02:41:46	60.027	3717.333	350	-223.015732	16	446.5	10	0	-103	7794.69	1	1	1	0.001	0.001	
10/12/09 02:41:48	60.029	3717.56	350	-223.015732	16	447	10	0	-103	7795.02	1	1	1	0.002	0.002	
10/12/09 02:41:50	60.029	3717.142	350	-223.015732	16	447.5	10	0	-103	7795.35	1	1	1	0.000	0.000	
10/12/09 02:41:52	60.037	3715.166	350	-223.015732	16	448	10	0	-103	7795.68	1	1	1	0.008	0.008	
10/12/09 02:41:54	60.036	3713.632	350	-223.015732	16	448.5	10	0	-103	7796.01	1	1	1	-0.001	0.001	
10/12/09 02:41:56	60.037	3710.283	350	-223.015732	16	449	10	0	-103	7796.34	1	1	1	0.001	0.001	
10/12/09 02:41:58	60.037	3710.158	350	-223.015732	16	449.5	10	0	-103	7796.67	1	1	1	0.000	0.000	
10/12/09 02:42:00	60.036	3699.356	350	-223.015732	16	450	10	0	-103	7797	1	1	1	-0.001	0.001	
10/12/09 02:42:02	60.041	3698.591	350	-223.015732	16	450.5	10	0	-103	7797.33	1	1	1	0.005	0.005	
10/12/09 02:42:04	60.043	3704.591	350	-223.015732	16	451	10	0	-103	7797.66	1	1	1	0.002	0.002	
10/12/09 02:42:06	60.044	3703.275	350	-223.015732	16	451.5	10	0	-103	7797.99	1	1	1	0.001	0.001	
10/12/09 02:42:08	60.043	3702.482	350	-223.015732	16	452	10	0	-103	7798.32	1	1	1	-0.001	0.001	
10/12/09 02:42:10	60.046	3701.316	350	-223.015732	16	452.5	10	0	-103	7798.65	1	1	1	0.003	0.003	
10/12/09 02:42:12	60.048	3700.826	350	-223.015732	16	453	10	0	-103	7798.98	1	1	1	0.002	0.002	
10/12/09 02:42:14	60.046	3699.529	350	-223.015732	16	453.5	10	0	-103	7799.31	1	1	1	-0.002	0.002	
10/12/09 02:42:16	60.046	3699.726	350	-223.015732	16	454	10	0	-103	7799.64	1	1	1	0.000	0.000	
10/12/09 02:42:18	60.043	3690.1	350	-223.015732	16	454.5	10	0	-103	7799.97	1	1	1	-0.003	0.003	
10/12/09 02:42:20	60.043	3690.477	350	-223.015732	16	455	10	0	-103	7800.3	1	1	1	0.000	0.000	
10/12/09 02:42:22	60.044	3696.865	350	-223.015732	16	455.5	10	0	-103	7800.63	1	1	1	0.001	0.001	
10/12/09 02:42:24	60.043	3696.877	350	-223.015732	16	456	10	0	-103	7800.96	1	1	1	-0.001	0.001	
10/12/09 02:42:26	60.043	3696.182	350	-223.015732	16	456.5	10	0	-103	7801.29	1	1	1	0.000	0.000	
10/12/09 02:42:28	60.045	3696.541	350	-223.015732	16	457	10	0	-103	7801.62	1	1	1	0.002	0.002	
10/12/09 02:42:30	60.04	3696.968	350	-223.015732	16	457.5	10	0	-103	7801.95	1	1	1	-0.005	0.005	
10/12/09 02:42:32	60.041	3698.686	350	-223.015732	16	458	10	0	-103	7802.28	1	1	1	0.001	0.001	
10/12/09 02:42:34	60.039	3699.631	350	-223.015732	16	458.5	10	0	-103	7802.61	1	1	1	-0.002	0.002	
10/12/09 02:42:36	60.039	3698.787	350	-223.015732	16	459	10	0	-103	7802.94	1	1	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)			
											307	05:34	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
10/12/09 02:42:38	60.036	3699.712	350	-223.015732	16	459.5	10	0	-103	7803.27	1	1	1	-0.003	0.003	
10/12/09 02:42:40	60.038	3700.106	350	-223.015732	16	460	10	0	-103	7803.6	1	1	1	0.002	0.002	
10/12/09 02:42:42	60.033	3699.968	350	-223.015732	16	460.5	10	0	-103	7803.93	1	1	1	-0.005	0.005	
10/12/09 02:42:44	60.034	3701.122	350	-223.015732	16	461	10	0	-103	7804.26	1	1	1	0.001	0.001	
10/12/09 02:42:46	60.037	3701.865	350	-223.015732	16	461.5	10	0	-103	7804.59	1	1	1	0.003	0.003	
10/12/09 02:42:48	60.037	3701.614	350	-223.015732	16	462	10	0	-103	7804.92	1	1	1	0.000	0.000	
10/12/09 02:42:50	60.035	3701.998	350	-223.015732	16	462.5	10	0	-103	7805.25	1	1	1	-0.002	0.002	
10/12/09 02:42:52	60.03	3702.913	350	-223.015732	16	463	10	0	-103	7805.58	1	1	1	-0.005	0.005	
10/12/09 02:42:54	60.033	3703.909	350	-223.015732	16	463.5	10	0	-103	7805.91	1	1	1	0.003	0.003	
10/12/09 02:42:56	60.036	3705.522	350	-223.015732	16	464	10	0	-103	7806.24	1	1	1	0.003	0.003	
10/12/09 02:42:58	60.033	3704.967	350	-223.015732	16	464.5	10	0	-103	7806.57	1	1	1	-0.003	0.003	
10/12/09 02:43:00	60.034	3704.087	350	-223.015732	16	465	10	0	-103	7806.9	1	1	1	0.001	0.001	
10/12/09 02:43:02	60.032	3702.771	350	-223.015732	16	465.5	10	0	-103	7807.23	1	1	1	-0.002	0.002	
10/12/09 02:43:04	60.032	3703.706	350	-223.015732	16	466	10	0	-103	7807.56	1	1	1	0.000	0.000	
10/12/09 02:43:06	60.034	3704.905	350	-223.015732	16	466.5	10	0	-103	7807.89	1	1	1	0.002	0.002	
10/12/09 02:43:08	60.033	3705.435	350	-223.015732	16	467	10	0	-103	7808.22	1	1	1	-0.001	0.001	
10/12/09 02:43:10	60.037	3704.36	350	-223.015732	16	467.5	10	0	-103	7808.55	1	1	1	0.004	0.004	
10/12/09 02:43:12	60.035	3702.588	350	-223.015732	16	468	10	0	-103	7808.88	1	1	1	-0.002	0.002	
10/12/09 02:43:14	60.035	3702.204	350	-223.015732	16	468.5	10	0	-103	7809.21	1	1	1	0.000	0.000	
10/12/09 02:43:16	60.036	3701.942	350	-223.015732	16	469	10	0	-103	7809.54	1	1	1	0.001	0.001	
10/12/09 02:43:18	60.039	3702.25	350	-223.015732	16	469.5	10	0	-103	7809.87	1	1	1	0.003	0.003	
10/12/09 02:43:20	60.037	3703.318	350	-223.015732	16	470	10	0	-103	7810.2	1	1	1	-0.002	0.002	
10/12/09 02:43:22	60.039	3702.457	350	-223.015732	16	470.5	10	0	-103	7810.53	1	1	1	0.002	0.002	
10/12/09 02:43:24	60.036	3702.525	350	-223.015732	16	471	10	0	-103	7810.86	1	1	1	-0.003	0.003	
10/12/09 02:43:26	60.034	3703.269	350	-223.015732	16	471.5	10	0	-103	7811.19	1	1	1	-0.002	0.002	
10/12/09 02:43:28	60.038	3703.844	350	-223.015732	16	472	10	0	-103	7811.52	1	1	1	0.004	0.004	
10/12/09 02:43:30	60.037	3702.865	350	-223.015732	16	472.5	10	0	-103	7811.85	1	1	1	-0.001	0.001	
10/12/09 02:43:32	60.037	3702.518	350	-223.015732	16	473	10	0	-103	7812.18	1	1	1	0.000	0.000	
10/12/09 02:43:34	60.037	3702.28	350	-223.015732	16	473.5	10	0	-103	7812.51	1	1	1	0.000	0.000	
10/12/09 02:43:36	60.038	3692.427	350	-223.015732	16	474	10	0	-103	7812.84	1	1	1	0.001	0.001	
10/12/09 02:43:38	60.04	3692.178	350	-223.015732	16	474.5	10	0	-103	7813.17	1	1	1	0.002	0.002	
10/12/09 02:43:40	60.043	3700.276	350	-223.015732	16	475	10	0	-103	7813.5	1	1	1	0.003	0.003	
10/12/09 02:43:42	60.045	3698.755	350	-223.015732	16	475.5	10	0	-103	7813.83	1	1	1	0.002	0.002	
10/12/09 02:43:44	60.045	3697.729	350	-223.015732	16	476	10	0	-103	7814.16	1	1	1	0.000	0.000	
10/12/09 02:43:46	60.042	3696.916	350	-223.015732	16	476.5	10	0	-103	7814.49	1	1	1	-0.003	0.003	
10/12/09 02:43:48	60.043	3697.368	350	-223.015732	16	477	10	0	-103	7814.82	1	1	1	0.001	0.001	
10/12/09 02:43:50	60.04	3697.346	350	-223.015732	16	477.5	10	0	-103	7815.15	1	1	1	-0.003	0.003	
10/12/09 02:43:52	60.044	3698.429	350	-223.015732	16	478	10	0	-103	7815.48	1	1	1	0.004	0.004	
10/12/09 02:43:54	60.046	3694.763	350	-223.015732	16	478.5	10	0	-103	7815.81	1	1	1	0.002	0.002	
10/12/09 02:43:56	60.042	3693.584	350	-223.015732	16	479	10	0	-103	7816.14	1	1	1	-0.004	0.004	
10/12/09 02:43:58	60.034	3693.241	350	-223.015732	16	479.5	10	0	-103	7816.47	1	1	1	-0.008	0.008	
10/12/09 02:44:00	60.039	3696.798	350	-223.015732	16	480	10	0	-103	7816.8	1	1	1	0.005	0.005	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:44:02	60.039	3699.364	350	-223.015732	16	480.5	10	0	-103	7817.13	1	1	1	0.000	0.000	
10/12/09 02:44:04	60.036	3701.791	350	-223.015732	16	481	10	0	-103	7817.46	1	1	1	-0.003	0.003	
10/12/09 02:44:06	60.037	3700.708	350	-223.015732	16	481.5	10	0	-103	7817.79	1	1	1	0.001	0.001	
10/12/09 02:44:08	60.034	3700.753	350	-223.015732	16	482	10	0	-103	7818.12	1	1	1	-0.003	0.003	
10/12/09 02:44:10	60.033	3702.148	350	-223.015732	16	482.5	10	0	-103	7818.45	1	1	1	-0.001	0.001	
10/12/09 02:44:12	60.032	3705.213	350	-223.015732	16	483	10	0	-103	7818.78	1	1	1	-0.001	0.001	
10/12/09 02:44:14	60.031	3707.521	350	-223.015732	16	483.5	10	0	-103	7819.11	1	1	1	-0.001	0.001	
10/12/09 02:44:16	60.033	3707.287	350	-223.015732	16	484	10	0	-103	7819.44	1	1	1	0.002	0.002	
10/12/09 02:44:18	60.027	3706.988	350	-223.015732	16	484.5	10	0	-103	7819.77	1	1	1	-0.006	0.006	
10/12/09 02:44:20	60.031	3707.34	350	-223.015732	16	485	10	0	-103	7820.1	1	1	1	0.004	0.004	
10/12/09 02:44:22	60.032	3707.917	350	-223.015732	16	485.5	10	0	-103	7820.43	1	1	1	0.001	0.001	
10/12/09 02:44:24	60.031	3707.384	350	-223.015732	16	486	10	0	-103	7820.76	1	1	1	-0.001	0.001	
10/12/09 02:44:26	60.031	3706.857	350	-223.015732	16	486.5	10	0	-103	7821.09	1	1	1	0.000	0.000	
10/12/09 02:44:28	60.033	3707.615	350	-223.015732	16	487	10	0	-103	7821.42	1	1	1	0.002	0.002	
10/12/09 02:44:30	60.039	3706.823	350	-223.015732	16	487.5	10	0	-103	7821.75	1	1	1	0.006	0.006	
10/12/09 02:44:32	60.039	3703.746	350	-223.015732	16	488	10	0	-103	7822.08	1	1	1	0.000	0.000	
10/12/09 02:44:34	60.038	3701.582	350	-223.015732	16	488.5	10	0	-103	7822.41	1	1	1	-0.001	0.001	
10/12/09 02:44:36	60.037	3700.847	350	-223.015732	16	489	10	0	-103	7822.74	1	1	1	-0.001	0.001	
10/12/09 02:44:38	60.035	3701.208	350	-223.015732	16	489.5	10	0	-103	7823.07	1	1	1	-0.002	0.002	
10/12/09 02:44:40	60.037	3702.212	350	-223.015732	16	490	10	0	-103	7823.4	1	1	1	0.002	0.002	
10/12/09 02:44:42	60.04	3701.686	350	-223.015732	16	490.5	10	0	-103	7823.73	1	1	1	0.003	0.003	
10/12/09 02:44:44	60.042	3700.397	350	-223.015732	16	491	10	0	-103	7824.06	1	1	1	0.002	0.002	
10/12/09 02:44:46	60.035	3699.69	350	-223.015732	16	491.5	10	0	-103	7824.39	1	1	1	-0.007	0.007	
10/12/09 02:44:48	60.036	3700.366	350	-223.015732	16	492	10	0	-103	7824.72	1	1	1	0.001	0.001	
10/12/09 02:44:50	60.04	3700.827	350	-223.015732	16	492.5	10	0	-103	7825.05	1	1	1	0.004	0.004	
10/12/09 02:44:52	60.045	3700.662	350	-223.015732	16	493	10	0	-103	7825.38	1	1	1	0.005	0.005	
10/12/09 02:44:54	60.045	3696.935	350	-223.015732	16	493.5	10	0	-103	7825.71	1	1	1	0.000	0.000	
10/12/09 02:44:56	60.048	3695.688	350	-223.015732	16	494	10	0	-103	7826.04	1	1	1	0.003	0.003	
10/12/09 02:44:58	60.042	3695.819	350	-223.015732	16	494.5	10	0	-103	7826.37	1	1	1	-0.006	0.006	
10/12/09 02:45:00	60.044	3693.824	350	-223.015732	16	495	10	0	-103	7826.7	1	1	1	0.002	0.002	
10/12/09 02:45:02	60.044	3694.799	350	-223.015732	16	495.5	10	0	-103	7827.03	1	1	1	0.000	0.000	
10/12/09 02:45:04	60.044	3696.897	350	-223.015732	16	496	10	0	-103	7827.36	1	1	1	0.000	0.000	
10/12/09 02:45:06	60.041	3696.023	350	-223.015732	16	496.5	10	0	-103	7827.69	1	1	1	-0.003	0.003	
10/12/09 02:45:08	60.04	3697.502	350	-223.015732	16	497	10	0	-103	7828.02	1	1	1	-0.001	0.001	
10/12/09 02:45:10	60.04	3698.424	350	-223.015732	16	497.5	10	0	-103	7828.35	1	1	1	0.000	0.000	
10/12/09 02:45:12	60.045	3699.427	350	-223.015732	16	498	10	0	-103	7828.68	1	1	1	0.005	0.005	
10/12/09 02:45:14	60.044	3700.177	350	-223.015732	16	498.5	10	0	-103	7829.01	1	1	1	-0.001	0.001	
10/12/09 02:45:16	60.042	3699.806	350	-223.015732	16	499	10	0	-103	7829.34	1	1	1	-0.002	0.002	
10/12/09 02:45:18	60.039	3697.577	350	-223.015732	16	499.5	10	0	-103	7829.67	1	1	1	-0.003	0.003	
10/12/09 02:45:20	60.042	3697.681	350	-223.015732	16	500	10	0	-103	7830	1	1	1	0.003	0.003	
10/12/09 02:45:22	60.042	3698.507	350	-223.015732	16	500.5	10	0	-103	7830.33	1	1	1	0.000	0.000	
10/12/09 02:45:24	60.041	3698.359	350	-223.015732	16	501	10	0	-103	7830.66	1	1	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1				
											306	2:27:26	t(0)							
											473	2:33:00	t(Recovery)							
											307	05:34	Event Length mm:ss	Delta Hz	Absolute Delta Hz					
10/12/09 02:45:26	60.038	3698.466	350	-223.015732	16	501.5	10	0	-103	7830.99				1	1	1	-0.003	0.003		
10/12/09 02:45:28	60.036	3699.077	350	-223.015732	16	502	10	0	-103	7831.32				1	1	1	-0.002	0.002		
10/12/09 02:45:30	60.037	3700.262	350	-223.015732	16	502.5	10	0	-103	7831.65				1	1	1	0.001	0.001		
10/12/09 02:45:32	60.039	3701.592	350	-223.015732	16	503	10	0	-103	7831.98				1	1	1	0.002	0.002		
10/12/09 02:45:34	60.038	3700.902	350	-223.015732	16	503.5	10	0	-103	7832.31				1	1	1	-0.001	0.001		
10/12/09 02:45:36	60.04	3700.143	350	-223.015732	16	504	10	0	-103	7832.64				1	1	1	0.002	0.002		
10/12/09 02:45:38	60.039	3700.27	350	-223.015732	16	504.5	10	0	-103	7832.97				1	1	1	-0.001	0.001		
10/12/09 02:45:40	60.037	3701.139	350	-223.015732	16	505	10	0	-103	7833.3				1	1	1	-0.002	0.002		
10/12/09 02:45:42	60.038	3701.586	350	-223.015732	16	505.5	10	0	-103	7833.63				1	1	1	0.001	0.001		
10/12/09 02:45:44	60.039	3700.264	350	-223.015732	16	506	10	0	-103	7833.96				1	1	1	0.001	0.001		
10/12/09 02:45:46	60.04	3699.458	350	-223.015732	16	506.5	10	0	-103	7834.29				1	1	1	0.001	0.001		
10/12/09 02:45:48	60.037	3699.721	350	-223.015732	16	507	10	0	-103	7834.62				1	1	1	-0.003	0.003		
10/12/09 02:45:50	60.037	3700.458	350	-223.015732	16	507.5	10	0	-103	7834.95				1	1	1	0.000	0.000		
10/12/09 02:45:52	60.037	3699.505	350	-223.015732	16	508	10	0	-103	7835.28				1	1	1	0.000	0.000		
10/12/09 02:45:54	60.039	3698.794	350	-223.015732	16	508.5	10	0	-103	7835.61				1	1	1	0.002	0.002		
10/12/09 02:45:56	60.038	3699.216	350	-223.015732	16	509	10	0	-103	7835.94				1	1	1	-0.001	0.001		
10/12/09 02:45:58	60.036	3699.4	350	-223.015732	16	509.5	10	0	-103	7836.27				1	1	1	-0.002	0.002		
10/12/09 02:46:00	60.035	3700.661	350	-223.015732	16	510	10	0	-103	7836.6				1	1	1	-0.001	0.001		
10/12/09 02:46:02	60.033	3702.173	350	-223.015732	16	510.5	10	0	-103	7836.93				1	1	1	-0.002	0.002		
10/12/09 02:46:04	60.031	3702.968	350	-223.015732	16	511	10	0	-103	7837.26				1	1	1	-0.002	0.002		
10/12/09 02:46:06	60.03	3705.195	350	-223.015732	16	511.5	10	0	-103	7837.59				1	1	1	-0.001	0.001		
10/12/09 02:46:08	60.032	3704.952	350	-223.015732	16	512	10	0	-103	7837.92				1	1	1	0.002	0.002		
10/12/09 02:46:10	60.032	3705.775	350	-223.015732	16	512.5	10	0	-103	7838.25				1	1	1	0.000	0.000		
10/12/09 02:46:12	60.037	3705.621	350	-223.015732	16	513	10	0	-103	7838.58				1	1	1	0.005	0.005		
10/12/09 02:46:14	60.042	3703.744	350	-223.015732	16	513.5	10	0	-103	7838.91				1	1	1	0.005	0.005		
10/12/09 02:46:16	60.041	3701.981	350	-223.015732	16	514	10	0	-103	7839.24				1	1	1	-0.001	0.001		
10/12/09 02:46:18	60.036	3700.756	350	-223.015732	16	514.5	10	0	-103	7839.57				1	1	1	-0.005	0.005		
10/12/09 02:46:20	60.031	3700.747	350	-223.015732	16	515	10	0	-103	7839.9				1	1	1	-0.005	0.005		
10/12/09 02:46:22	60.032	3702.213	350	-223.015732	16	515.5	10	0	-103	7840.23				1	1	1	0.001	0.001		
10/12/09 02:46:24	60.031	3705.059	350	-223.015732	16	516	10	0	-103	7840.56				1	1	1	-0.001	0.001		
10/12/09 02:46:26	60.034	3705.514	350	-223.015732	16	516.5	10	0	-103	7840.89				1	1	1	0.003	0.003		
10/12/09 02:46:28	60.034	3704.449	350	-223.015732	16	517	10	0	-103	7841.22				1	1	1	0.000	0.000		
10/12/09 02:46:30	60.032	3703.831	350	-223.015732	16	517.5	10	0	-103	7841.55				1	1	1	-0.002	0.002		
10/12/09 02:46:32	60.038	3703.62	350	-223.015732	16	518	10	0	-103	7841.88				1	1	1	0.006	0.006		
10/12/09 02:46:34	60.043	3702.795	350	-223.015732	16	518.5	10	0	-103	7842.21				1	1	1	0.005	0.005		
10/12/09 02:46:36	60.044	3701.432	350	-223.015732	16	519	10	0	-103	7842.54				1	1	1	0.001	0.001		
10/12/09 02:46:38	60.042	3697.38	350	-223.015732	16	519.5	10	0	-103	7842.87				1	1	1	-0.002	0.002		
10/12/09 02:46:40	60.045	3696.25	350	-223.015732	16	520	10	0	-103	7843.2				1	1	1	0.003	0.003		
10/12/09 02:46:42	60.04	3696.302	350	-223.015732	16	520.5	10	0	-103	7843.53				1	1	1	-0.005	0.005		
10/12/09 02:46:44	60.04	3693.518	350	-223.015732	16	521	10	0	-103	7843.86				1	1	1	0.000	0.000		
10/12/09 02:46:46	60.043	3693.577	350	-223.015732	16	521.5	10	0	-103	7844.19				1	1	1	0.003	0.003		
10/12/09 02:46:48	60.043	3695.197	350	-223.015732	16	522	10	0	-103	7844.52				1	1	1	0.000	0.000		

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:46:50	60.041	3695.186	350	-223.015732	16	522.5	10	0	-103	7844.85	1	1	1	-0.002	0.002	
10/12/09 02:46:52	60.04	3693.786	350	-223.015732	16	523	10	0	-103	7845.18	1	1	1	-0.001	0.001	
10/12/09 02:46:54	60.038	3694.753	350	-223.015732	16	523.5	10	0	-103	7845.51	1	1	1	-0.002	0.002	
10/12/09 02:46:56	60.043	3694.926	350	-223.015732	16	524	10	0	-103	7845.84	1	1	1	0.005	0.005	
10/12/09 02:46:58	60.044	3694.938	350	-223.015732	16	524.5	10	0	-103	7846.17	1	1	1	0.001	0.001	
10/12/09 02:47:00	60.042	3694.159	350	-223.015732	16	525	10	0	-103	7846.5	1	1	1	-0.002	0.002	
10/12/09 02:47:02	60.036	3691.33	350	-223.015732	16	525.5	10	0	-103	7846.83	1	1	1	-0.006	0.006	
10/12/09 02:47:04	60.043	3692.686	350	-223.015732	16	526	10	0	-103	7847.16	1	1	1	0.007	0.007	
10/12/09 02:47:06	60.041	3693.238	350	-223.015732	16	526.5	10	0	-103	7847.49	1	1	1	-0.002	0.002	
10/12/09 02:47:08	60.042	3693.39	350	-223.015732	16	527	10	0	-103	7847.82	1	1	1	0.001	0.001	
10/12/09 02:47:10	60.043	3692.357	350	-223.015732	16	527.5	10	0	-103	7848.15	1	1	1	0.001	0.001	
10/12/09 02:47:12	60.043	3690.951	350	-223.015732	16	528	10	0	-103	7848.48	1	1	1	0.000	0.000	
10/12/09 02:47:14	60.036	3690.836	350	-223.015732	16	528.5	10	0	-103	7848.81	1	1	1	-0.007	0.007	
10/12/09 02:47:16	60.039	3692.042	350	-223.015732	16	529	10	0	-103	7849.14	1	1	1	0.003	0.003	
10/12/09 02:47:18	60.039	3693.114	350	-223.015732	16	529.5	10	0	-103	7849.47	1	1	1	0.000	0.000	
10/12/09 02:47:20	60.037	3694.117	350	-223.015732	16	530	10	0	-103	7849.8	1	1	1	-0.002	0.002	
10/12/09 02:47:22	60.034	3695.258	350	-223.015732	16	530.5	10	0	-103	7850.13	1	1	1	-0.003	0.003	
10/12/09 02:47:24	60.035	3695.581	350	-223.015732	16	531	10	0	-103	7850.46	1	1	1	0.001	0.001	
10/12/09 02:47:26	60.035	3695.949	350	-223.015732	16	531.5	10	0	-103	7850.79	1	1	1	0.000	0.000	
10/12/09 02:47:28	60.035	3695.491	350	-223.015732	16	532	10	0	-103	7851.12	1	1	1	0.000	0.000	
10/12/09 02:47:30	60.036	3696.305	350	-223.015732	16	532.5	10	0	-103	7851.45	1	1	1	0.001	0.001	
10/12/09 02:47:32	60.03	3696.486	350	-223.015732	16	533	10	0	-103	7851.78	1	1	1	-0.006	0.006	
10/12/09 02:47:34	60.03	3697.336	350	-223.015732	16	533.5	10	0	-103	7852.11	1	1	1	0.000	0.000	
10/12/09 02:47:36	60.03	3699.171	350	-223.015732	16	534	10	0	-103	7852.44	1	1	1	0.000	0.000	
10/12/09 02:47:38	60.031	3699.357	350	-223.015732	16	534.5	10	0	-103	7852.77	1	1	1	0.001	0.001	
10/12/09 02:47:40	60.031	3699.251	350	-223.015732	16	535	10	0	-103	7853.1	1	1	1	0.000	0.000	
10/12/09 02:47:42	60.032	3699.117	350	-223.015732	16	535.5	10	0	-103	7853.43	1	1	1	0.001	0.001	
10/12/09 02:47:44	60.031	3699.105	350	-223.015732	16	536	10	0	-103	7853.76	1	1	1	-0.001	0.001	
10/12/09 02:47:46	60.032	3699.126	350	-223.015732	16	536.5	10	0	-103	7854.09	1	1	1	0.001	0.001	
10/12/09 02:47:48	60.032	3698.954	350	-223.015732	16	537	10	0	-103	7854.42	1	1	1	0.000	0.000	
10/12/09 02:47:50	60.032	3698.136	350	-223.015732	16	537.5	10	0	-103	7854.75	1	1	1	0.000	0.000	
10/12/09 02:47:52	60.033	3698.277	350	-223.015732	16	538	10	0	-103	7855.08	1	1	1	0.001	0.001	
10/12/09 02:47:54	60.037	3697.412	350	-223.015732	16	538.5	10	0	-103	7855.41	1	1	1	0.004	0.004	
10/12/09 02:47:56	60.04	3695.94	350	-223.015732	16	539	10	0	-103	7855.74	1	1	1	0.003	0.003	
10/12/09 02:47:58	60.039	3693.736	350	-223.015732	16	539.5	10	0	-103	7856.07	1	1	1	-0.001	0.001	
10/12/09 02:48:00	60.042	3693.224	350	-223.015732	16	540	10	0	-103	7856.4	1	1	1	0.003	0.003	
10/12/09 02:48:02	60.036	3691.759	350	-223.015732	16	540.5	10	0	-103	7856.73	1	1	1	-0.006	0.006	
10/12/09 02:48:04	60.039	3691.919	350	-223.015732	16	541	10	0	-103	7857.06	1	1	1	0.003	0.003	
10/12/09 02:48:06	60.041	3692.798	350	-223.015732	16	541.5	10	0	-103	7857.39	1	1	1	0.002	0.002	
10/12/09 02:48:08	60.04	3691.582	350	-223.015732	16	542	10	0	-103	7857.72	1	1	1	-0.001	0.001	
10/12/09 02:48:10	60.035	3692.374	350	-223.015732	16	542.5	10	0	-103	7858.05	1	1	1	-0.005	0.005	
10/12/09 02:48:12	60.036	3693.302	350	-223.015732	16	543	10	0	-103	7858.38	1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:48:14	60.038	3694.71	350	-223.015732	16	543.5	10	0	-103	7858.71	1	1	1	0.002	0.002	
10/12/09 02:48:16	60.037	3694.331	350	-223.015732	16	544	10	0	-103	7859.04	1	1	1	-0.001	0.001	
10/12/09 02:48:18	60.041	3693.815	350	-223.015732	16	544.5	10	0	-103	7859.37	1	1	1	0.004	0.004	
10/12/09 02:48:20	60.04	3693.617	350	-223.015732	16	545	10	0	-103	7859.7	1	1	1	-0.001	0.001	
10/12/09 02:48:22	60.036	3694.324	350	-223.015732	16	545.5	10	0	-103	7860.03	1	1	1	-0.004	0.004	
10/12/09 02:48:24	60.033	3694.27	350	-223.015732	16	546	10	0	-103	7860.36	1	1	1	-0.003	0.003	
10/12/09 02:48:26	60.034	3694.66	350	-223.015732	16	546.5	10	0	-103	7860.69	1	1	1	0.001	0.001	
10/12/09 02:48:28	60.038	3693.748	350	-223.015732	16	547	10	0	-103	7861.02	1	1	1	0.004	0.004	
10/12/09 02:48:30	60.04	3692.532	350	-223.015732	16	547.5	10	0	-103	7861.35	1	1	1	0.002	0.002	
10/12/09 02:48:32	60.041	3691.445	350	-223.015732	16	548	10	0	-103	7861.68	1	1	1	0.001	0.001	
10/12/09 02:48:34	60.037	3691.012	350	-223.015732	16	548.5	10	0	-103	7862.01	1	1	1	-0.004	0.004	
10/12/09 02:48:36	60.037	3691.799	350	-223.015732	16	549	10	0	-103	7862.34	1	1	1	0.000	0.000	
10/12/09 02:48:38	60.036	3693.077	350	-223.015732	16	549.5	10	0	-103	7862.67	1	1	1	-0.001	0.001	
10/12/09 02:48:40	60.037	3693.727	350	-223.015732	16	550	10	0	-103	7863	1	1	1	0.001	0.001	
10/12/09 02:48:42	60.038	3693.117	350	-223.015732	16	550.5	10	0	-103	7863.33	1	1	1	0.001	0.001	
10/12/09 02:48:44	60.039	3692.641	350	-223.015732	16	551	10	0	-103	7863.66	1	1	1	0.001	0.001	
10/12/09 02:48:46	60.038	3688.159	350	-223.015732	16	551.5	10	0	-103	7863.99	1	1	1	-0.001	0.001	
10/12/09 02:48:48	60.034	3689.02	350	-223.015732	16	552	10	0	-103	7864.32	1	1	1	-0.004	0.004	
10/12/09 02:48:50	60.033	3688.208	350	-223.015732	16	552.5	10	0	-103	7864.65	1	1	1	-0.001	0.001	
10/12/09 02:48:52	60.031	3690.092	350	-223.015732	16	553	10	0	-103	7864.98	1	1	1	-0.002	0.002	
10/12/09 02:48:54	60.034	3693.172	350	-223.015732	16	553.5	10	0	-103	7865.31	1	1	1	0.003	0.003	
10/12/09 02:48:56	60.029	3693.321	350	-223.015732	16	554	10	0	-103	7865.64	1	1	1	-0.005	0.005	
10/12/09 02:48:58	60.029	3694.593	350	-223.015732	16	554.5	10	0	-103	7865.97	1	1	1	0.000	0.000	
10/12/09 02:49:00	60.031	3695.225	350	-223.015732	16	555	10	0	-103	7866.3	1	1	1	0.002	0.002	
10/12/09 02:49:02	60.03	3694.609	350	-223.015732	16	555.5	10	0	-103	7866.63	1	1	1	-0.001	0.001	
10/12/09 02:49:04	60.03	3693.412	350	-223.015732	16	556	10	0	-103	7866.96	1	1	1	0.000	0.000	
10/12/09 02:49:06	60.026	3693.509	350	-223.015732	16	556.5	10	0	-103	7867.29	1	1	1	-0.004	0.004	
10/12/09 02:49:08	60.022	3696.026	350	-223.015732	16	557	10	0	-103	7867.62	1	1	1	-0.004	0.004	
10/12/09 02:49:10	60.021	3698.012	350	-223.015732	16	557.5	10	0	-103	7867.95	1	1	1	-0.001	0.001	
10/12/09 02:49:12	60.024	3699.062	350	-223.015732	16	558	10	0	-103	7868.28	1	1	1	0.003	0.003	
10/12/09 02:49:14	60.023	3699.414	350	-223.015732	16	558.5	10	0	-103	7868.61	1	1	1	-0.001	0.001	
10/12/09 02:49:16	60.02	3698.935	350	-223.015732	16	559	10	0	-103	7868.94	1	1	1	-0.003	0.003	
10/12/09 02:49:18	60.021	3700.084	350	-223.015732	16	559.5	10	0	-103	7869.27	1	1	1	0.001	0.001	
10/12/09 02:49:20	60.023	3700.544	350	-223.015732	16	560	10	0	-103	7869.6	1	1	1	0.002	0.002	
10/12/09 02:49:22	60.025	3700.486	350	-223.015732	16	560.5	10	0	-103	7869.93	1	1	1	0.002	0.002	
10/12/09 02:49:24	60.026	3698.596	350	-223.015732	16	561	10	0	-103	7870.26	1	1	1	0.001	0.001	
10/12/09 02:49:26	60.026	3697.961	350	-223.015732	16	561.5	10	0	-103	7870.59	1	1	1	0.000	0.000	
10/12/09 02:49:28	60.025	3699.914	350	-223.015732	16	562	10	0	-103	7870.92	1	1	1	-0.001	0.001	
10/12/09 02:49:30	60.024	3700.802	350	-223.015732	16	562.5	10	0	-103	7871.25	1	1	1	-0.001	0.001	
10/12/09 02:49:32	60.024	3701.301	350	-223.015732	16	563	10	0	-103	7871.58	1	1	1	0.000	0.000	
10/12/09 02:49:34	60.025	3701.45	350	-223.015732	16	563.5	10	0	-103	7871.91	1	1	1	0.001	0.001	
10/12/09 02:49:36	60.023	3701.349	350	-223.015732	16	564	10	0	-103	7872.24	1	1	1	-0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW						
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26 t(0)				
											473	2:33:00 t(Recovery)		Delta Hz	Absolute Delta Hz	
											307	05:34 Event Length mm:ss				
10/12/09 02:49:38	60.023	3701.094	350	-223.015732	16	564.5	10	0	-103	7872.57	1	1	1	0.000	0.000	
10/12/09 02:49:40	60.022	3701.702	350	-223.015732	16	565	10	0	-103	7872.9	1	1	1	-0.001	0.001	
10/12/09 02:49:42	60.026	3702.07	350	-223.015732	16	565.5	10	0	-103	7873.23	1	1	1	0.004	0.004	
10/12/09 02:49:44	60.029	3701.965	350	-223.015732	16	566	10	0	-103	7873.56	1	1	1	0.003	0.003	
10/12/09 02:49:46	60.026	3700.269	350	-223.015732	16	566.5	10	0	-103	7873.89	1	1	1	-0.003	0.003	
10/12/09 02:49:48	60.024	3700.241	350	-223.015732	16	567	10	0	-103	7874.22	1	1	1	-0.002	0.002	
10/12/09 02:49:50	60.021	3701.09	350	-223.015732	16	567.5	10	0	-103	7874.55	1	1	1	-0.003	0.003	
10/12/09 02:49:52	60.025	3701.268	350	-223.015732	16	568	10	0	-103	7874.88	1	1	1	0.004	0.004	
10/12/09 02:49:54	60.025	3701.205	350	-223.015732	16	568.5	10	0	-103	7875.21	1	1	1	0.000	0.000	
10/12/09 02:49:56	60.025	3700.587	350	-223.015732	16	569	10	0	-103	7875.54	1	1	1	0.000	0.000	
10/12/09 02:49:58	60.023	3700.532	350	-223.015732	16	569.5	10	0	-103	7875.87	1	1	1	-0.002	0.002	
10/12/09 02:50:00	60.026	3700.177	350	-223.015732	16	570	10	0	-103	7876.2	1	1	1	0.003	0.003	
10/12/09 02:50:02	60.024	3700.295	350	-223.015732	16	570.5	10	0	-103	7876.53	1	1	1	-0.002	0.002	
10/12/09 02:50:04	60.022	3700.277	350	-223.015732	16	571	10	0	-103	7876.86	1	1	1	-0.002	0.002	
10/12/09 02:50:06	60.023	3700.841	350	-223.015732	16	571.5	10	0	-103	7877.19	1	1	1	0.001	0.001	
10/12/09 02:50:08	60.026	3700.863	350	-223.015732	16	572	10	0	-103	7877.52	1	1	1	0.003	0.003	
10/12/09 02:50:10	60.025	3700.26	350	-223.015732	16	572.5	10	0	-103	7877.85	1	1	1	-0.001	0.001	
10/12/09 02:50:12	60.02	3700.052	350	-223.015732	16	573	10	0	-103	7878.18	1	1	1	-0.005	0.005	
10/12/09 02:50:14	60.02	3699.926	350	-223.015732	16	573.5	10	0	-103	7878.51	1	1	1	0.000	0.000	
10/12/09 02:50:16	60.019	3700.965	350	-223.015732	16	574	10	0	-103	7878.84	1	1	1	-0.001	0.001	
10/12/09 02:50:18	60.015	3702.581	350	-223.015732	16	574.5	10	0	-103	7879.17	1	1	1	-0.004	0.004	
10/12/09 02:50:20	60.016	3703.516	350	-223.015732	16	575	10	0	-103	7879.5	1	1	1	0.001	0.001	
10/12/09 02:50:22	60.017	3703.824	350	-223.015732	16	575.5	10	0	-103	7879.83	1	1	1	0.001	0.001	
10/12/09 02:50:24	60.015	3703.672	350	-223.015732	16	576	10	0	-103	7880.16	1	1	1	-0.002	0.002	
10/12/09 02:50:26	60.015	3703.689	350	-223.015732	16	576.5	10	0	-103	7880.49	1	1	1	0.000	0.000	
10/12/09 02:50:28	60.017	3703.003	350	-223.015732	16	577	10	0	-103	7880.82	1	1	1	0.002	0.002	
10/12/09 02:50:30	60.017	3702.921	350	-223.015732	16	577.5	10	0	-103	7881.15	1	1	1	0.000	0.000	
10/12/09 02:50:32	60.012	3703	350	-223.015732	16	578	10	0	-103	7881.48	1	1	1	-0.005	0.005	
10/12/09 02:50:34	60.01	3703.167	350	-223.015732	16	578.5	10	0	-103	7881.81	1	1	1	-0.002	0.002	
10/12/09 02:50:36	60.008	3703.918	350	-223.015732	16	579	10	0	-103	7882.14	1	1	1	-0.002	0.002	
10/12/09 02:50:38	60.002	3703.616	350	-223.015732	16	579.5	10	0	-103	7882.47	1	1	1	-0.006	0.006	
10/12/09 02:50:40	59.999	3703.775	350	-223.015732	16	580	10	0	-103	7882.8	1	0	1	-0.003	0.003	
10/12/09 02:50:42	59.999	3703.751	350	-223.015732	16	580.5	10	0	-103	7883.13	1	0	1	0.000	0.000	
10/12/09 02:50:44	60.002	3701.534	350	-223.015732	16	581	10	0	-103	7883.46	1	1	1	0.003	0.003	
10/12/09 02:50:46	60.003	3700.617	350	-223.015732	16	581.5	10	0	-103	7883.79	1	1	1	0.001	0.001	
10/12/09 02:50:48	60.004	3700.88	350	-223.015732	16	582	10	0	-103	7884.12	1	1	1	0.001	0.001	
10/12/09 02:50:50	60.001	3700.625	350	-223.015732	16	582.5	10	0	-103	7884.45	1	1	1	-0.003	0.003	
10/12/09 02:50:52	59.996	3701.389	350	-223.015732	16	583	10	0	-103	7884.78	1	0	1	-0.005	0.005	
10/12/09 02:50:54	59.993	3701.737	350	-223.015732	16	583.5	10	0	-103	7885.11	1	0	1	-0.003	0.003	
10/12/09 02:50:56	59.992	3700.671	350	-223.015732	16	584	10	0	-103	7885.44	1	0	1	-0.001	0.001	
10/12/09 02:50:58	59.989	3700.826	350	-223.015732	16	584.5	10	0	-103	7885.77	1	0	1	-0.003	0.003	
10/12/09 02:51:00	59.987	3700.977	350	-223.015732	16	585	10	0	-103	7886.1	1	0	1	-0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:51:02	59.985	3700.7	350	-223.015732	16	585.5	10	0	-103	7886.43	1	0	1	-0.002	0.002	
10/12/09 02:51:04	59.985	3699.854	350	-223.015732	16	586	10	0	-103	7886.76	1	0	1	0.000	0.000	
10/12/09 02:51:06	59.986	3700.237	350	-223.015732	16	586.5	10	0	-103	7887.09	1	0	1	0.001	0.001	
10/12/09 02:51:08	59.984	3700.342	350	-223.015732	16	587	10	0	-103	7887.42	1	0	1	-0.002	0.002	
10/12/09 02:51:10	59.981	3700.77	350	-223.015732	16	587.5	10	0	-103	7887.75	1	0	1	-0.003	0.003	
10/12/09 02:51:12	59.98	3700.789	350	-223.015732	16	588	10	0	-103	7888.08	1	0	1	-0.001	0.001	
10/12/09 02:51:14	59.977	3701.625	350	-223.015732	16	588.5	10	0	-103	7888.41	1	0	1	-0.003	0.003	
10/12/09 02:51:16	59.975	3703.166	350	-223.015732	16	589	10	0	-103	7888.74	1	0	1	-0.002	0.002	
10/12/09 02:51:18	59.976	3704.187	350	-223.015732	16	589.5	10	0	-103	7889.07	1	0	1	0.001	0.001	
10/12/09 02:51:20	59.972	3704.785	350	-223.015732	16	590	10	0	-103	7889.4	1	0	1	-0.004	0.004	
10/12/09 02:51:22	59.974	3705.811	350	-223.015732	16	590.5	10	0	-103	7889.73	1	0	1	0.002	0.002	
10/12/09 02:51:24	59.977	3706.958	350	-223.015732	16	591	10	0	-103	7890.06	1	0	1	0.003	0.003	
10/12/09 02:51:26	59.975	3706.688	350	-223.015732	16	591.5	10	0	-103	7890.39	1	0	1	-0.002	0.002	
10/12/09 02:51:28	59.973	3706.543	350	-223.015732	16	592	10	0	-103	7890.72	1	0	1	-0.002	0.002	
10/12/09 02:51:30	59.971	3706.257	350	-223.015732	16	592.5	10	0	-103	7891.05	1	0	1	-0.002	0.002	
10/12/09 02:51:32	59.971	3707.027	350	-223.015732	16	593	10	0	-103	7891.38	1	0	1	0.000	0.000	
10/12/09 02:51:34	59.976	3710.118	350	-223.015732	16	593.5	10	0	-103	7891.71	1	0	1	0.005	0.005	
10/12/09 02:51:36	59.979	3710.531	350	-223.015732	16	594	10	0	-103	7892.04	1	0	1	0.003	0.003	
10/12/09 02:51:38	59.98	3708.701	350	-223.015732	16	594.5	10	0	-103	7892.37	1	0	1	0.001	0.001	
10/12/09 02:51:40	59.979	3708.018	350	-223.015732	16	595	10	0	-103	7892.7	1	0	1	-0.001	0.001	
10/12/09 02:51:42	59.982	3706.942	350	-223.015732	16	595.5	10	0	-103	7893.03	1	0	1	0.003	0.003	
10/12/09 02:51:44	59.982	3706.343	350	-223.015732	16	596	10	0	-103	7893.36	1	0	1	0.000	0.000	
10/12/09 02:51:46	59.983	3706.125	350	-223.015732	16	596.5	10	0	-103	7893.69	1	0	1	0.001	0.001	
10/12/09 02:51:48	59.981	3706.311	350	-223.015732	16	597	10	0	-103	7894.02	1	0	1	-0.002	0.002	
10/12/09 02:51:50	59.979	3706.119	350	-223.015732	16	597.5	10	0	-103	7894.35	1	0	1	-0.002	0.002	
10/12/09 02:51:52	59.978	3706.19	350	-223.015732	16	598	10	0	-103	7894.68	1	0	1	-0.001	0.001	
10/12/09 02:51:54	59.976	3707.721	350	-223.015732	16	598.5	10	0	-103	7895.01	1	0	1	-0.002	0.002	
10/12/09 02:51:56	59.978	3709.409	350	-223.015732	16	599	10	0	-103	7895.34	1	0	1	0.002	0.002	
10/12/09 02:51:58	59.977	3708.971	350	-223.015732	16	599.5	10	0	-103	7895.67	1	0	1	-0.001	0.001	
10/12/09 02:52:00	59.976	3708.531	350	-223.015732	16	600	10	0	-103	7896	1	0	1	-0.001	0.001	
10/12/09 02:52:02	59.978	3708.071	350	-223.015732	16	600.5	10	0	-103	7896.33	1	0	1	0.002	0.002	
10/12/09 02:52:04	59.975	3707.24	350	-223.015732	16	601	10	0	-103	7896.66	1	0	1	-0.003	0.003	
10/12/09 02:52:06	59.971	3709.213	350	-223.015732	16	601.5	10	0	-103	7896.99	1	0	1	-0.004	0.004	
10/12/09 02:52:08	59.97	3709.961	350	-223.015732	16	602	10	0	-103	7897.32	1	0	1	-0.001	0.001	
10/12/09 02:52:10	59.97	3711.75	350	-223.015732	16	602.5	10	0	-103	7897.65	1	0	1	0.000	0.000	
10/12/09 02:52:12	59.971	3711.98	350	-223.015732	16	603	10	0	-103	7897.98	1	0	1	0.001	0.001	
10/12/09 02:52:14	59.99	3710.695	350	-223.015732	16	603.5	10	0	-103	7898.31	1	0	1	0.019	0.019	
10/12/09 02:52:16	59.998	3707.867	350	-223.015732	16	604	10	0	-103	7898.64	1	0	1	0.008	0.008	
10/12/09 02:52:18	59.999	3704.912	350	-223.015732	16	604.5	10	0	-103	7898.97	1	0	1	0.001	0.001	
10/12/09 02:52:20	59.999	3705.639	350	-223.015732	16	605	10	0	-103	7899.3	1	0	1	0.000	0.000	
10/12/09 02:52:22	59.998	3703.787	350	-223.015732	16	605.5	10	0	-103	7899.63	1	0	1	-0.001	0.001	
10/12/09 02:52:24	59.999	3703.191	350	-223.015732	16	606	10	0	-103	7899.96	1	0	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 2:33:00 05:34	Max Absolute Delta Hz 0.126 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:52:26	60.003	3702.071	350	-223.015732	16	606.5	10	0	-103	7900.29	1	1	1	0.004	0.004	
10/12/09 02:52:28	60.005	3699.51	350	-223.015732	16	607	10	0	-103	7900.62	1	1	1	0.002	0.002	
10/12/09 02:52:30	60.005	3698.658	350	-223.015732	16	607.5	10	0	-103	7900.95	1	1	1	0.000	0.000	
10/12/09 02:52:32	60.01	3698.137	350	-223.015732	16	608	10	0	-103	7901.28	1	1	1	0.005	0.005	
10/12/09 02:52:34	60.013	3697.882	350	-223.015732	16	608.5	10	0	-103	7901.61	1	1	1	0.003	0.003	
10/12/09 02:52:36	60.02	3698.668	350	-223.015732	16	609	10	0	-103	7901.94	1	1	1	0.007	0.007	
10/12/09 02:52:38	60.022	3698.604	350	-223.015732	16	609.5	10	0	-103	7902.27	1	1	1	0.002	0.002	
10/12/09 02:52:40	60.024	3697.868	350	-223.015732	16	610	10	0	-103	7902.6	1	1	1	0.002	0.002	
10/12/09 02:52:42	60.025	3694.672	350	-223.015732	16	610.5	10	0	-103	7902.93	1	1	1	0.001	0.001	
10/12/09 02:52:44	60.025	3693.912	350	-223.015732	16	611	10	0	-103	7903.26	1	1	1	0.000	0.000	
10/12/09 02:52:46	60.024	3693.418	350	-223.015732	16	611.5	10	0	-103	7903.59	1	1	1	-0.001	0.001	
10/12/09 02:52:48	60.023	3688.301	350	-223.015732	16	612	10	0	-103	7903.92	1	1	1	-0.001	0.001	
10/12/09 02:52:50	60.029	3688.021	350	-223.015732	16	612.5	10	0	-103	7904.25	1	1	1	0.006	0.006	
10/12/09 02:52:52	60.029	3689.143	350	-223.015732	16	613	10	0	-103	7904.58	1	1	1	0.000	0.000	
10/12/09 02:52:54	60.029	3688.237	350	-223.015732	16	613.5	10	0	-103	7904.91	1	1	1	0.000	0.000	
10/12/09 02:52:56	60.028	3687.878	350	-223.015732	16	614	10	0	-103	7905.24	1	1	1	-0.001	0.001	
10/12/09 02:52:58	60.028	3687.026	350	-223.015732	16	614.5	10	0	-103	7905.57	1	1	1	0.000	0.000	
10/12/09 02:53:00	60.031	3686.683	350	-223.015732	16	615	10	0	-103	7905.9	1	1	1	0.003	0.003	
10/12/09 02:53:02	60.032	3685.276	350	-223.015732	16	615.5	10	0	-103	7906.23	1	1	1	0.001	0.001	
10/12/09 02:53:04	60.033	3685.576	350	-223.015732	16	616	10	0	-103	7906.56	1	1	1	0.001	0.001	
10/12/09 02:53:06	60.031	3685.985	350	-223.015732	16	616.5	10	0	-103	7906.89	1	1	1	-0.002	0.002	
10/12/09 02:53:08	60.03	3686.418	350	-223.015732	16	617	10	0	-103	7907.22	1	1	1	-0.001	0.001	
10/12/09 02:53:10	60.022	3687.159	350	-223.015732	16	617.5	10	0	-103	7907.55	1	1	1	-0.008	0.008	
10/12/09 02:53:12	60.021	3687.873	350	-223.015732	16	618	10	0	-103	7907.88	1	1	1	-0.001	0.001	
10/12/09 02:53:14	60.019	3688.997	350	-223.015732	16	618.5	10	0	-103	7908.21	1	1	1	-0.002	0.002	
10/12/09 02:53:16	60.017	3690.426	350	-223.015732	16	619	10	0	-103	7908.54	1	1	1	-0.002	0.002	
10/12/09 02:53:18	60.017	3690.776	350	-223.015732	16	619.5	10	0	-103	7908.87	1	1	1	0.000	0.000	
10/12/09 02:53:20	60.017	3692.715	350	-223.015732	16	620	10	0	-103	7909.2	1	1	1	0.000	0.000	
10/12/09 02:53:22	60.016	3692.578	350	-223.015732	16	620.5	10	0	-103	7909.53	1	1	1	-0.001	0.001	
10/12/09 02:53:24	60.015	3692.462	350	-223.015732	16	621	10	0	-103	7909.86	1	1	1	-0.001	0.001	
10/12/09 02:53:26	60.015	3693.173	350	-223.015732	16	621.5	10	0	-103	7910.19	1	1	1	0.000	0.000	
10/12/09 02:53:28	60.012	3693.249	350	-223.015732	16	622	10	0	-103	7910.52	1	1	1	-0.003	0.003	
10/12/09 02:53:30	60.009	3693.743	350	-223.015732	16	622.5	10	0	-103	7910.85	1	1	1	-0.003	0.003	
10/12/09 02:53:32	60.008	3695.124	350	-223.015732	16	623	10	0	-103	7911.18	1	1	1	-0.001	0.001	
10/12/09 02:53:34	60.008	3694.681	350	-223.015732	16	623.5	10	0	-103	7911.51	1	1	1	0.000	0.000	
10/12/09 02:53:36	60.005	3694.741	350	-223.015732	16	624	10	0	-103	7911.84	1	1	1	-0.003	0.003	
10/12/09 02:53:38	60.005	3694.199	350	-223.015732	16	624.5	10	0	-103	7912.17	1	1	1	0.000	0.000	
10/12/09 02:53:40	60.003	3693.75	350	-223.015732	16	625	10	0	-103	7912.5	1	1	1	-0.002	0.002	
10/12/09 02:53:42	59.999	3693.624	350	-223.015732	16	625.5	10	0	-103	7912.83	1	0	1	-0.004	0.004	
10/12/09 02:53:44	59.997	3692.806	350	-223.015732	16	626	10	0	-103	7913.16	1	0	1	-0.002	0.002	
10/12/09 02:53:46	59.999	3691.15	350	-223.015732	16	626.5	10	0	-103	7913.49	1	0	1	0.002	0.002	
10/12/09 02:53:48	60	3691.407	350	-223.015732	16	627	10	0	-103	7913.82	1	0	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:53:50	59.998	3691.077	350	-223.015732	16	627.5	10	0	-103	7914.15	1	0	1	-0.002	0.002	
10/12/09 02:53:52	59.995	3690.588	350	-223.015732	16	628	10	0	-103	7914.48	1	0	1	-0.003	0.003	
10/12/09 02:53:54	59.994	3689.797	350	-223.015732	16	628.5	10	0	-103	7914.81	1	0	1	-0.001	0.001	
10/12/09 02:53:56	59.992	3688.483	350	-223.015732	16	629	10	0	-103	7915.14	1	0	1	-0.002	0.002	
10/12/09 02:53:58	59.993	3689.445	350	-223.015732	16	629.5	10	0	-103	7915.47	1	0	1	0.001	0.001	
10/12/09 02:54:00	59.988	3689.553	350	-223.015732	16	630	10	0	-103	7915.8	1	0	1	-0.005	0.005	
10/12/09 02:54:02	59.985	3689.525	350	-223.015732	16	630.5	10	0	-103	7916.13	1	0	1	-0.003	0.003	
10/12/09 02:54:04	59.986	3689.736	350	-223.015732	16	631	10	0	-103	7916.46	1	0	1	0.001	0.001	
10/12/09 02:54:06	59.988	3688.853	350	-223.015732	16	631.5	10	0	-103	7916.79	1	0	1	0.002	0.002	
10/12/09 02:54:08	59.988	3688.24	350	-223.015732	16	632	10	0	-103	7917.12	1	0	1	0.000	0.000	
10/12/09 02:54:10	59.985	3687.494	350	-223.015732	16	632.5	10	0	-103	7917.45	1	0	1	-0.003	0.003	
10/12/09 02:54:12	59.983	3687.475	350	-223.015732	16	633	10	0	-103	7917.78	1	0	1	-0.002	0.002	
10/12/09 02:54:14	59.983	3686.707	350	-223.015732	16	633.5	10	0	-103	7918.11	1	0	1	0.000	0.000	
10/12/09 02:54:16	59.985	3685.66	350	-223.015732	16	634	10	0	-103	7918.44	1	0	1	0.002	0.002	
10/12/09 02:54:18	59.986	3684.51	350	-223.015732	16	634.5	10	0	-103	7918.77	1	0	1	0.001	0.001	
10/12/09 02:54:20	59.987	3684.333	350	-223.015732	16	635	10	0	-103	7919.1	1	0	1	0.001	0.001	
10/12/09 02:54:22	59.99	3683.911	350	-223.015732	16	635.5	10	0	-103	7919.43	1	0	1	0.003	0.003	
10/12/09 02:54:24	59.986	3683.735	350	-223.015732	16	636	10	0	-103	7919.76	1	0	1	-0.004	0.004	
10/12/09 02:54:26	59.985	3684.208	350	-223.015732	16	636.5	10	0	-103	7920.09	1	0	1	-0.001	0.001	
10/12/09 02:54:28	59.984	3683.811	350	-223.015732	16	637	10	0	-103	7920.42	1	0	1	-0.001	0.001	
10/12/09 02:54:30	59.983	3683.473	350	-223.015732	16	637.5	10	0	-103	7920.75	1	0	1	-0.001	0.001	
10/12/09 02:54:32	59.982	3684.258	350	-223.015732	16	638	10	0	-103	7921.08	1	0	1	-0.001	0.001	
10/12/09 02:54:34	59.982	3684.884	350	-223.015732	16	638.5	10	0	-103	7921.41	1	0	1	0.000	0.000	
10/12/09 02:54:36	59.98	3685.092	350	-223.015732	16	639	10	0	-103	7921.74	1	0	1	-0.002	0.002	
10/12/09 02:54:38	59.978	3685.654	350	-223.015732	16	639.5	10	0	-103	7922.07	1	0	1	-0.002	0.002	
10/12/09 02:54:40	59.977	3685.087	350	-223.015732	16	640	10	0	-103	7922.4	1	0	1	-0.001	0.001	
10/12/09 02:54:42	59.975	3685.491	350	-223.015732	16	640.5	10	0	-103	7922.73	1	0	1	-0.002	0.002	
10/12/09 02:54:44	59.973	3685.196	350	-223.015732	16	641	10	0	-103	7923.06	1	0	1	-0.002	0.002	
10/12/09 02:54:46	59.975	3687.412	350	-223.015732	16	641.5	10	0	-103	7923.39	1	0	1	0.002	0.002	
10/12/09 02:54:48	59.976	3688.417	350	-223.015732	16	642	10	0	-103	7923.72	1	0	1	0.001	0.001	
10/12/09 02:54:50	59.976	3688.599	350	-223.015732	16	642.5	10	0	-103	7924.05	1	0	1	0.000	0.000	
10/12/09 02:54:52	59.979	3687.848	350	-223.015732	16	643	10	0	-103	7924.38	1	0	1	0.003	0.003	
10/12/09 02:54:54	59.982	3686.678	350	-223.015732	16	643.5	10	0	-103	7924.71	1	0	1	0.003	0.003	
10/12/09 02:54:56	59.979	3685.782	350	-223.015732	16	644	10	0	-103	7925.04	1	0	1	-0.003	0.003	
10/12/09 02:54:58	59.979	3684.89	350	-223.015732	16	644.5	10	0	-103	7925.37	1	0	1	0.000	0.000	
10/12/09 02:55:00	59.977	3685.143	350	-223.015732	16	645	10	0	-103	7925.7	1	0	1	-0.002	0.002	
10/12/09 02:55:02	59.977	3684.549	350	-223.015732	16	645.5	10	0	-103	7926.03	1	0	1	0.000	0.000	
10/12/09 02:55:04	59.978	3684.093	350	-223.015732	16	646	10	0	-103	7926.36	1	0	1	0.001	0.001	
10/12/09 02:55:06	59.978	3684.555	350	-223.015732	16	646.5	10	0	-103	7926.69	1	0	1	0.000	0.000	
10/12/09 02:55:08	59.978	3682.814	350	-223.015732	16	647	10	0	-103	7927.02	1	0	1	0.000	0.000	
10/12/09 02:55:10	59.979	3682.318	350	-223.015732	16	647.5	10	0	-103	7927.35	1	0	1	0.001	0.001	
10/12/09 02:55:12	59.983	3682.366	350	-223.015732	16	648	10	0	-103	7927.68	1	0	1	0.004	0.004	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:55:14	59.981	3682.647	350	-223.015732	16	648.5	10	0	-103	7928.01	1	0	1	-0.002	0.002	
10/12/09 02:55:16	59.98	3682.855	350	-223.015732	16	649	10	0	-103	7928.34	1	0	1	-0.001	0.001	
10/12/09 02:55:18	59.978	3683.557	350	-223.015732	16	649.5	10	0	-103	7928.67	1	0	1	-0.002	0.002	
10/12/09 02:55:20	59.979	3684.052	350	-223.015732	16	650	10	0	-103	7929	1	0	1	0.001	0.001	
10/12/09 02:55:22	59.978	3684.318	350	-223.015732	16	650.5	10	0	-103	7929.33	1	0	1	-0.001	0.001	
10/12/09 02:55:24	59.979	3686.049	350	-223.015732	16	651	10	0	-103	7929.66	1	0	1	0.001	0.001	
10/12/09 02:55:26	59.983	3686.629	350	-223.015732	16	651.5	10	0	-103	7929.99	1	0	1	0.004	0.004	
10/12/09 02:55:28	59.987	3685.286	350	-223.015732	16	652	10	0	-103	7930.32	1	0	1	0.004	0.004	
10/12/09 02:55:30	59.99	3683.415	350	-223.015732	16	652.5	10	0	-103	7930.65	1	0	1	0.003	0.003	
10/12/09 02:55:32	59.992	3682.416	350	-223.015732	16	653	10	0	-103	7930.98	1	0	1	0.002	0.002	
10/12/09 02:55:34	59.993	3681.403	350	-223.015732	16	653.5	10	0	-103	7931.31	1	0	1	0.001	0.001	
10/12/09 02:55:36	59.99	3679.012	350	-223.015732	16	654	10	0	-103	7931.64	1	0	1	-0.003	0.003	
10/12/09 02:55:38	59.988	3679.436	350	-223.015732	16	654.5	10	0	-103	7931.97	1	0	1	-0.002	0.002	
10/12/09 02:55:40	59.988	3671.761	350	-223.015732	16	655	10	0	-103	7932.3	1	0	1	0.000	0.000	
10/12/09 02:55:42	59.99	3670.717	350	-223.015732	16	655.5	10	0	-103	7932.63	1	0	1	0.002	0.002	
10/12/09 02:55:44	59.993	3670.159	350	-223.015732	16	656	10	0	-103	7932.96	1	0	1	0.003	0.003	
10/12/09 02:55:46	59.994	3679	350	-223.015732	16	656.5	10	0	-103	7933.29	1	0	1	0.001	0.001	
10/12/09 02:55:48	59.993	3680.176	350	-223.015732	16	657	10	0	-103	7933.62	1	0	1	-0.001	0.001	
10/12/09 02:55:50	59.994	3681.799	350	-223.015732	16	657.5	10	0	-103	7933.95	1	0	1	0.001	0.001	
10/12/09 02:55:52	59.994	3682.7	350	-223.015732	16	658	10	0	-103	7934.28	1	0	1	0.000	0.000	
10/12/09 02:55:54	59.993	3684.116	350	-223.015732	16	658.5	10	0	-103	7934.61	1	0	1	-0.001	0.001	
10/12/09 02:55:56	59.989	3685.03	350	-223.015732	16	659	10	0	-103	7934.94	1	0	1	-0.004	0.004	
10/12/09 02:55:58	59.984	3684.878	350	-223.015732	16	659.5	10	0	-103	7935.27	1	0	1	-0.005	0.005	
10/12/09 02:56:00	59.986	3684.165	350	-223.015732	16	660	10	0	-103	7935.6	1	0	1	0.002	0.002	
10/12/09 02:56:02	59.985	3684.478	350	-223.015732	16	660.5	10	0	-103	7935.93	1	0	1	-0.001	0.001	
10/12/09 02:56:04	59.988	3685.584	350	-223.015732	16	661	10	0	-103	7936.26	1	0	1	0.003	0.003	
10/12/09 02:56:06	59.987	3685.148	350	-223.015732	16	661.5	10	0	-103	7936.59	1	0	1	-0.001	0.001	
10/12/09 02:56:08	59.986	3684.587	350	-223.015732	16	662	10	0	-103	7936.92	1	0	1	-0.001	0.001	
10/12/09 02:56:10	59.987	3684.976	350	-223.015732	16	662.5	10	0	-103	7937.25	1	0	1	0.001	0.001	
10/12/09 02:56:12	59.985	3683.674	350	-223.015732	16	663	10	0	-103	7937.58	1	0	1	-0.002	0.002	
10/12/09 02:56:14	59.982	3684.872	350	-223.015732	16	663.5	10	0	-103	7937.91	1	0	1	-0.003	0.003	
10/12/09 02:56:16	59.981	3684.245	350	-223.015732	16	664	10	0	-103	7938.24	1	0	1	-0.001	0.001	
10/12/09 02:56:18	59.982	3684.711	350	-223.015732	16	664.5	10	0	-103	7938.57	1	0	1	0.001	0.001	
10/12/09 02:56:20	59.987	3685.589	350	-223.015732	16	665	10	0	-103	7938.9	1	0	1	0.005	0.005	
10/12/09 02:56:22	59.992	3683.736	350	-223.015732	16	665.5	10	0	-103	7939.23	1	0	1	0.005	0.005	
10/12/09 02:56:24	59.997	3682.579	350	-223.015732	16	666	10	0	-103	7939.56	1	0	1	0.005	0.005	
10/12/09 02:56:26	60	3682.234	350	-223.015732	16	666.5	10	0	-103	7939.89	1	0	1	0.003	0.003	
10/12/09 02:56:28	60.003	3682.138	350	-223.015732	16	667	10	0	-103	7940.22	1	1	1	0.003	0.003	
10/12/09 02:56:30	60.003	3682.224	350	-223.015732	16	667.5	10	0	-103	7940.55	1	1	1	0.000	0.000	
10/12/09 02:56:32	60.003	3681.689	350	-223.015732	16	668	10	0	-103	7940.88	1	1	1	0.000	0.000	
10/12/09 02:56:34	60.002	3681.458	350	-223.015732	16	668.5	10	0	-103	7941.21	1	1	1	-0.001	0.001	
10/12/09 02:56:36	60.003	3681.65	350	-223.015732	16	669	10	0	-103	7941.54	1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:56:38	60.002	3681.013	350	-223.015732	16	669.5	10	0	-103	7941.87	1	1	1	-0.001	0.001	
10/12/09 02:56:40	60.003	3680.167	350	-223.015732	16	670	10	0	-103	7942.2	1	1	1	0.001	0.001	
10/12/09 02:56:42	60.004	3679.943	350	-223.015732	16	670.5	10	0	-103	7942.53	1	1	1	0.001	0.001	
10/12/09 02:56:44	60.005	3679.429	350	-223.015732	16	671	10	0	-103	7942.86	1	1	1	0.001	0.001	
10/12/09 02:56:46	60.006	3679.669	350	-223.015732	16	671.5	10	0	-103	7943.19	1	1	1	0.001	0.001	
10/12/09 02:56:48	60.009	3678.981	350	-223.015732	16	672	10	0	-103	7943.52	1	1	1	0.003	0.003	
10/12/09 02:56:50	60.012	3678.267	350	-223.015732	16	672.5	10	0	-103	7943.85	1	1	1	0.003	0.003	
10/12/09 02:56:52	60.017	3676.796	350	-223.015732	16	673	10	0	-103	7944.18	1	1	1	0.005	0.005	
10/12/09 02:56:54	60.021	3676.81	350	-223.015732	16	673.5	10	0	-103	7944.51	1	1	1	0.004	0.004	
10/12/09 02:56:56	60.022	3674.798	350	-223.015732	16	674	10	0	-103	7944.84	1	1	1	0.001	0.001	
10/12/09 02:56:58	60.021	3673.906	350	-223.015732	16	674.5	10	0	-103	7945.17	1	1	1	-0.001	0.001	
10/12/09 02:57:00	60.02	3671.145	350	-223.015732	16	675	10	0	-103	7945.5	1	1	1	-0.001	0.001	
10/12/09 02:57:02	60.018	3670.51	350	-223.015732	16	675.5	10	0	-103	7945.83	1	1	1	-0.002	0.002	
10/12/09 02:57:04	60.021	3673.648	350	-223.015732	16	676	10	0	-103	7946.16	1	1	1	0.003	0.003	
10/12/09 02:57:06	60.02	3673.684	350	-223.015732	16	676.5	10	0	-103	7946.49	1	1	1	-0.001	0.001	
10/12/09 02:57:08	60.02	3675.865	350	-223.015732	16	677	10	0	-103	7946.82	1	1	1	0.000	0.000	
10/12/09 02:57:10	60.018	3676.676	350	-223.015732	16	677.5	10	0	-103	7947.15	1	1	1	-0.002	0.002	
10/12/09 02:57:12	60.018	3676.404	350	-223.015732	16	678	10	0	-103	7947.48	1	1	1	0.000	0.000	
10/12/09 02:57:14	60.019	3676.437	350	-223.015732	16	678.5	10	0	-103	7947.81	1	1	1	0.001	0.001	
10/12/09 02:57:16	60.019	3677.185	350	-223.015732	16	679	10	0	-103	7948.14	1	1	1	0.000	0.000	
10/12/09 02:57:18	60.018	3677.659	350	-223.015732	16	679.5	10	0	-103	7948.47	1	1	1	-0.001	0.001	
10/12/09 02:57:20	60.017	3678.828	350	-223.015732	16	680	10	0	-103	7948.8	1	1	1	-0.001	0.001	
10/12/09 02:57:22	60.016	3679.289	350	-223.015732	16	680.5	10	0	-103	7949.13	1	1	1	-0.001	0.001	
10/12/09 02:57:24	60.016	3678.915	350	-223.015732	16	681	10	0	-103	7949.46	1	1	1	0.000	0.000	
10/12/09 02:57:26	60.016	3679.276	350	-223.015732	16	681.5	10	0	-103	7949.79	1	1	1	0.000	0.000	
10/12/09 02:57:28	60.015	3678.599	350	-223.015732	16	682	10	0	-103	7950.12	1	1	1	-0.001	0.001	
10/12/09 02:57:30	60.014	3678.367	350	-223.015732	16	682.5	10	0	-103	7950.45	1	1	1	-0.001	0.001	
10/12/09 02:57:32	60.014	3678.25	350	-223.015732	16	683	10	0	-103	7950.78	1	1	1	0.000	0.000	
10/12/09 02:57:34	60.013	3678.589	350	-223.015732	16	683.5	10	0	-103	7951.11	1	1	1	-0.001	0.001	
10/12/09 02:57:36	60.013	3677.251	350	-223.015732	16	684	10	0	-103	7951.44	1	1	1	0.000	0.000	
10/12/09 02:57:38	60.015	3675.698	350	-223.015732	16	684.5	10	0	-103	7951.77	1	1	1	0.002	0.002	
10/12/09 02:57:40	60.017	3674.669	350	-223.015732	16	685	10	0	-103	7952.1	1	1	1	0.002	0.002	
10/12/09 02:57:42	60.016	3674.87	350	-223.015732	16	685.5	10	0	-103	7952.43	1	1	1	-0.001	0.001	
10/12/09 02:57:44	60.019	3674.402	350	-223.015732	16	686	10	0	-103	7952.76	1	1	1	0.003	0.003	
10/12/09 02:57:46	60.021	3674.546	350	-223.015732	16	686.5	10	0	-103	7953.09	1	1	1	0.002	0.002	
10/12/09 02:57:48	60.021	3672.969	350	-223.015732	16	687	10	0	-103	7953.42	1	1	1	0.000	0.000	
10/12/09 02:57:50	60.02	3671.914	350	-223.015732	16	687.5	10	0	-103	7953.75	1	1	1	-0.001	0.001	
10/12/09 02:57:52	60.022	3671.982	350	-223.015732	16	688	10	0	-103	7954.08	1	1	1	0.002	0.002	
10/12/09 02:57:54	60.024	3670.946	350	-223.015732	16	688.5	10	0	-103	7954.41	1	1	1	0.002	0.002	
10/12/09 02:57:56	60.026	3670.821	350	-223.015732	16	689	10	0	-103	7954.74	1	1	1	0.002	0.002	
10/12/09 02:57:58	60.025	3671.06	350	-223.015732	16	689.5	10	0	-103	7955.07	1	1	1	-0.001	0.001	
10/12/09 02:58:00	60.026	3671.539	350	-223.015732	16	690	10	0	-103	7955.4	1	1	1	0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 2:33:00 05:34	Max Absolute Delta Hz 0.126 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:58:02	60.022	3673.794	350	-223.015732	16	690.5	10	0	-103	7955.73	1	1	1	-0.004	0.004	
10/12/09 02:58:04	60.021	3674.01	350	-223.015732	16	691	10	0	-103	7956.06	1	1	1	-0.001	0.001	
10/12/09 02:58:06	60.022	3675.102	350	-223.015732	16	691.5	10	0	-103	7956.39	1	1	1	0.001	0.001	
10/12/09 02:58:08	60.024	3675.284	350	-223.015732	16	692	10	0	-103	7956.72	1	1	1	0.002	0.002	
10/12/09 02:58:10	60.027	3676.051	350	-223.015732	16	692.5	10	0	-103	7957.05	1	1	1	0.003	0.003	
10/12/09 02:58:12	60.029	3675.704	350	-223.015732	16	693	10	0	-103	7957.38	1	1	1	0.002	0.002	
10/12/09 02:58:14	60.028	3672.583	350	-223.015732	16	693.5	10	0	-103	7957.71	1	1	1	-0.001	0.001	
10/12/09 02:58:16	60.028	3671.343	350	-223.015732	16	694	10	0	-103	7958.04	1	1	1	0.000	0.000	
10/12/09 02:58:18	60.032	3670.232	350	-223.015732	16	694.5	10	0	-103	7958.37	1	1	1	0.004	0.004	
10/12/09 02:58:20	60.035	3668.654	350	-223.015732	16	695	10	0	-103	7958.7	1	1	1	0.003	0.003	
10/12/09 02:58:22	60.03	3668.767	350	-223.015732	16	695.5	10	0	-103	7959.03	1	1	1	-0.005	0.005	
10/12/09 02:58:24	60.028	3666.312	350	-223.015732	16	696	10	0	-103	7959.36	1	1	1	-0.002	0.002	
10/12/09 02:58:26	60.021	3667.322	350	-223.015732	16	696.5	10	0	-103	7959.69	1	1	1	-0.007	0.007	
10/12/09 02:58:28	60.021	3657.164	350	-223.015732	16	697	10	0	-103	7960.02	1	1	1	0.000	0.000	
10/12/09 02:58:30	60.024	3657.714	350	-223.015732	16	697.5	10	0	-103	7960.35	1	1	1	0.003	0.003	
10/12/09 02:58:32	60.025	3668.637	350	-223.015732	16	698	10	0	-103	7960.68	1	1	1	0.001	0.001	
10/12/09 02:58:34	60.024	3669.309	350	-223.015732	16	698.5	10	0	-103	7961.01	1	1	1	-0.001	0.001	
10/12/09 02:58:36	60.022	3670.112	350	-223.015732	16	699	10	0	-103	7961.34	1	1	1	-0.002	0.002	
10/12/09 02:58:38	60.023	3670.735	350	-223.015732	16	699.5	10	0	-103	7961.67	1	1	1	0.001	0.001	
10/12/09 02:58:40	60.021	3671.332	350	-223.015732	16	700	10	0	-103	7962	1	1	1	-0.002	0.002	
10/12/09 02:58:42	60.02	3672.095	350	-223.015732	16	700.5	10	0	-103	7962.33	1	1	1	-0.001	0.001	
10/12/09 02:58:44	60.02	3672.683	350	-223.015732	16	701	10	0	-103	7962.66	1	1	1	0.000	0.000	
10/12/09 02:58:46	60.02	3673.833	350	-223.015732	16	701.5	10	0	-103	7962.99	1	1	1	0.000	0.000	
10/12/09 02:58:48	60.02	3674.645	350	-223.015732	16	702	10	0	-103	7963.32	1	1	1	0.000	0.000	
10/12/09 02:58:50	60.017	3675.641	350	-223.015732	16	702.5	10	0	-103	7963.65	1	1	1	-0.003	0.003	
10/12/09 02:58:52	60.014	3675.971	350	-223.015732	16	703	10	0	-103	7963.98	1	1	1	-0.003	0.003	
10/12/09 02:58:54	60.012	3677.009	350	-223.015732	16	703.5	10	0	-103	7964.31	1	1	1	-0.002	0.002	
10/12/09 02:58:56	60.01	3678.314	350	-223.015732	16	704	10	0	-103	7964.64	1	1	1	-0.002	0.002	
10/12/09 02:58:58	60.011	3679.393	350	-223.015732	16	704.5	10	0	-103	7964.97	1	1	1	0.001	0.001	
10/12/09 02:59:00	60.01	3680.02	350	-223.015732	16	705	10	0	-103	7965.3	1	1	1	-0.001	0.001	
10/12/09 02:59:02	60.01	3679.792	350	-223.015732	16	705.5	10	0	-103	7965.63	1	1	1	0.000	0.000	
10/12/09 02:59:04	60.01	3679.597	350	-223.015732	16	706	10	0	-103	7965.96	1	1	1	0.000	0.000	
10/12/09 02:59:06	60.012	3680.315	350	-223.015732	16	706.5	10	0	-103	7966.29	1	1	1	0.002	0.002	
10/12/09 02:59:08	60.012	3680.11	350	-223.015732	16	707	10	0	-103	7966.62	1	1	1	0.000	0.000	
10/12/09 02:59:10	60.013	3679.062	350	-223.015732	16	707.5	10	0	-103	7966.95	1	1	1	0.001	0.001	
10/12/09 02:59:12	60.014	3679.127	350	-223.015732	16	708	10	0	-103	7967.28	1	1	1	0.001	0.001	
10/12/09 02:59:14	60.013	3679.587	350	-223.015732	16	708.5	10	0	-103	7967.61	1	1	1	-0.001	0.001	
10/12/09 02:59:16	60.012	3679.637	350	-223.015732	16	709	10	0	-103	7967.94	1	1	1	-0.001	0.001	
10/12/09 02:59:18	60.011	3679.02	350	-223.015732	16	709.5	10	0	-103	7968.27	1	1	1	-0.001	0.001	
10/12/09 02:59:20	60.01	3678.418	350	-223.015732	16	710	10	0	-103	7968.6	1	1	1	-0.001	0.001	
10/12/09 02:59:22	60.008	3679.383	350	-223.015732	16	710.5	10	0	-103	7968.93	1	1	1	-0.002	0.002	
10/12/09 02:59:24	60.01	3679.681	350	-223.015732	16	711	10	0	-103	7969.26	1	1	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW						
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 02:59:26	60.011	3679.932	350	-223.015732	16	711.5	10	0	-103	7969.59	1	1	1	0.001	0.001	
10/12/09 02:59:28	60.013	3679.138	350	-223.015732	16	712	10	0	-103	7969.92	1	1	1	0.002	0.002	
10/12/09 02:59:30	60.016	3678.469	350	-223.015732	16	712.5	10	0	-103	7970.25	1	1	1	0.003	0.003	
10/12/09 02:59:32	60.018	3678.499	350	-223.015732	16	713	10	0	-103	7970.58	1	1	1	0.002	0.002	
10/12/09 02:59:34	60.019	3678.456	350	-223.015732	16	713.5	10	0	-103	7970.91	1	1	1	0.001	0.001	
10/12/09 02:59:36	60.019	3677.615	350	-223.015732	16	714	10	0	-103	7971.24	1	1	1	0.000	0.000	
10/12/09 02:59:38	60.019	3677.446	350	-223.015732	16	714.5	10	0	-103	7971.57	1	1	1	0.000	0.000	
10/12/09 02:59:40	60.02	3677.431	350	-223.015732	16	715	10	0	-103	7971.9	1	1	1	0.001	0.001	
10/12/09 02:59:42	60.02	3677.451	350	-223.015732	16	715.5	10	0	-103	7972.23	1	1	1	0.000	0.000	
10/12/09 02:59:44	60.018	3677.315	350	-223.015732	16	716	10	0	-103	7972.56	1	1	1	-0.002	0.002	
10/12/09 02:59:46	60.018	3678.151	350	-223.015732	16	716.5	10	0	-103	7972.89	1	1	1	0.000	0.000	
10/12/09 02:59:48	60.016	3678.362	350	-223.015732	16	717	10	0	-103	7973.22	1	1	1	-0.002	0.002	
10/12/09 02:59:50	60.016	3678.874	350	-223.015732	16	717.5	10	0	-103	7973.55	1	1	1	0.000	0.000	
10/12/09 02:59:52	60.019	3680.771	350	-223.015732	16	718	10	0	-103	7973.88	1	1	1	0.003	0.003	
10/12/09 02:59:54	60.023	3681.058	350	-223.015732	16	718.5	10	0	-103	7974.21	1	1	1	0.004	0.004	
10/12/09 02:59:56	60.022	3680.353	350	-223.015732	16	719	10	0	-103	7974.54	1	1	1	-0.001	0.001	
10/12/09 02:59:58	60.018	3679.167	350	-223.015732	16	719.5	10	0	-103	7974.87	1	1	1	-0.004	0.004	
10/12/09 03:00:00	60.015	3679.553	350	-223.015732	16	720	10	0	-103	7975.2	1	1	1	-0.003	0.003	
10/12/09 03:00:02	60.016	3680.672	350	-223.015732	16	720.5	10	0	-103	7975.53	1	1	1	0.001	0.001	
10/12/09 03:00:04	60.017	3682.73	350	-223.015732	16	721	10	0	-103	7975.86	1	1	1	0.001	0.001	
10/12/09 03:00:06	60.015	3682.714	350	-223.015732	16	721.5	10	0	-103	7976.19	1	1	1	-0.002	0.002	
10/12/09 03:00:08	60.01	3681.915	350	-223.015732	16	722	10	0	-103	7976.52	1	1	1	-0.005	0.005	
10/12/09 03:00:10	60.004	3682.01	350	-223.015732	16	722.5	10	0	-103	7976.85	1	1	1	-0.006	0.006	
10/12/09 03:00:12	59.999	3682.483	350	-223.015732	16	723	10	0	-103	7977.18	1	0	1	-0.005	0.005	
10/12/09 03:00:14	59.995	3683.813	350	-223.015732	16	723.5	10	0	-103	7977.51	1	0	1	-0.004	0.004	
10/12/09 03:00:16	59.99	3685.306	350	-223.015732	16	724	10	0	-103	7977.84	1	0	1	-0.005	0.005	
10/12/09 03:00:18	59.982	3684.846	350	-223.015732	16	724.5	10	0	-103	7978.17	1	0	1	-0.008	0.008	
10/12/09 03:00:20	59.974	3684.643	350	-223.015732	16	725	10	0	-103	7978.5	1	0	1	-0.008	0.008	
10/12/09 03:00:22	59.97	3687.527	350	-223.015732	16	725.5	10	0	-103	7978.83	1	0	1	-0.004	0.004	
10/12/09 03:00:24	59.97	3689.404	350	-223.015732	16	726	10	0	-103	7979.16	1	0	1	0.000	0.000	
10/12/09 03:00:26	59.968	3692.287	350	-223.015732	16	726.5	10	0	-103	7979.49	1	0	1	-0.002	0.002	
10/12/09 03:00:28	59.968	3692.966	350	-223.015732	16	727	10	0	-103	7979.82	1	0	1	0.000	0.000	
10/12/09 03:00:30	59.968	3693.793	350	-223.015732	16	727.5	10	0	-103	7980.15	1	0	1	0.000	0.000	
10/12/09 03:00:32	59.972	3694.397	350	-223.015732	16	728	10	0	-103	7980.48	1	0	1	0.004	0.004	
10/12/09 03:00:34	59.967	3694.974	350	-223.015732	16	728.5	10	0	-103	7980.81	1	0	1	-0.005	0.005	
10/12/09 03:00:36	59.966	3697.407	350	-223.015732	16	729	10	0	-103	7981.14	1	0	1	-0.001	0.001	
10/12/09 03:00:38	59.964	3698.502	350	-223.015732	16	729.5	10	0	-103	7981.47	1	0	1	-0.002	0.002	
10/12/09 03:00:40	59.965	3698.617	350	-223.015732	16	730	10	0	-103	7981.8	1	0	1	0.001	0.001	
10/12/09 03:00:42	59.966	3698.992	350	-223.015732	16	730.5	10	0	-103	7982.13	1	0	1	0.001	0.001	
10/12/09 03:00:44	59.963	3699.85	350	-223.015732	16	731	10	0	-103	7982.46	1	0	1	-0.003	0.003	
10/12/09 03:00:46	59.963	3702.645	350	-223.015732	16	731.5	10	0	-103	7982.79	1	0	1	0.000	0.000	
10/12/09 03:00:48	59.965	3701.989	350	-223.015732	16	732	10	0	-103	7983.12	1	0	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 03:00:50	59.968	3702.218	350	-223.015732	16	732.5	10	0	-103	7983.45	1	0	1	0.003	0.003	
10/12/09 03:00:52	59.97	3704.023	350	-223.015732	16	733	10	0	-103	7983.78	1	0	1	0.002	0.002	
10/12/09 03:00:54	59.97	3703.365	350	-223.015732	16	733.5	10	0	-103	7984.11	1	0	1	0.000	0.000	
10/12/09 03:00:56	59.97	3702.988	350	-223.015732	16	734	10	0	-103	7984.44	1	0	1	0.000	0.000	
10/12/09 03:00:58	59.973	3703.814	350	-223.015732	16	734.5	10	0	-103	7984.77	1	0	1	0.003	0.003	
10/12/09 03:01:00	59.972	3704.899	350	-223.015732	16	735	10	0	-103	7985.1	1	0	1	-0.001	0.001	
10/12/09 03:01:02	59.976	3705.625	350	-223.015732	16	735.5	10	0	-103	7985.43	1	0	1	0.004	0.004	
10/12/09 03:01:04	59.975	3704.293	350	-223.015732	16	736	10	0	-103	7985.76	1	0	1	-0.001	0.001	
10/12/09 03:01:06	59.975	3702.094	350	-223.015732	16	736.5	10	0	-103	7986.09	1	0	1	0.000	0.000	
10/12/09 03:01:08	59.977	3701.944	350	-223.015732	16	737	10	0	-103	7986.42	1	0	1	0.002	0.002	
10/12/09 03:01:10	59.976	3703.142	350	-223.015732	16	737.5	10	0	-103	7986.75	1	0	1	-0.001	0.001	
10/12/09 03:01:12	59.976	3704.669	350	-223.015732	16	738	10	0	-103	7987.08	1	0	1	0.000	0.000	
10/12/09 03:01:14	59.974	3705.376	350	-223.015732	16	738.5	10	0	-103	7987.41	1	0	1	-0.002	0.002	
10/12/09 03:01:16	59.975	3705.662	350	-223.015732	16	739	10	0	-103	7987.74	1	0	1	0.001	0.001	
10/12/09 03:01:18	59.974	3705.855	350	-223.015732	16	739.5	10	0	-103	7988.07	1	0	1	-0.001	0.001	
10/12/09 03:01:20	59.974	3706.776	350	-223.015732	16	740	10	0	-103	7988.4	1	0	1	0.000	0.000	
10/12/09 03:01:22	59.976	3707.514	350	-223.015732	16	740.5	10	0	-103	7988.73	1	0	1	0.002	0.002	
10/12/09 03:01:24	59.977	3706.928	350	-223.015732	16	741	10	0	-103	7989.06	1	0	1	0.001	0.001	
10/12/09 03:01:26	59.979	3706.446	350	-223.015732	16	741.5	10	0	-103	7989.39	1	0	1	0.002	0.002	
10/12/09 03:01:28	59.981	3706.335	350	-223.015732	16	742	10	0	-103	7989.72	1	0	1	0.002	0.002	
10/12/09 03:01:30	59.983	3706.771	350	-223.015732	16	742.5	10	0	-103	7990.05	1	0	1	0.002	0.002	
10/12/09 03:01:32	59.985	3705.943	350	-223.015732	16	743	10	0	-103	7990.38	1	0	1	0.002	0.002	
10/12/09 03:01:34	59.983	3704.127	350	-223.015732	16	743.5	10	0	-103	7990.71	1	0	1	-0.002	0.002	
10/12/09 03:01:36	59.98	3704.777	350	-223.015732	16	744	10	0	-103	7991.04	1	0	1	-0.003	0.003	
10/12/09 03:01:38	59.979	3705.974	350	-223.015732	16	744.5	10	0	-103	7991.37	1	0	1	-0.001	0.001	
10/12/09 03:01:40	59.983	3705.968	350	-223.015732	16	745	10	0	-103	7991.7	1	0	1	0.004	0.004	
10/12/09 03:01:42	59.987	3705.356	350	-223.015732	16	745.5	10	0	-103	7992.03	1	0	1	0.004	0.004	
10/12/09 03:01:44	59.986	3704.683	350	-223.015732	16	746	10	0	-103	7992.36	1	0	1	-0.001	0.001	
10/12/09 03:01:46	59.984	3703.913	350	-223.015732	16	746.5	10	0	-103	7992.69	1	0	1	-0.002	0.002	
10/12/09 03:01:48	59.98	3704.361	350	-223.015732	16	747	10	0	-103	7993.02	1	0	1	-0.004	0.004	
10/12/09 03:01:50	59.982	3704.988	350	-223.015732	16	747.5	10	0	-103	7993.35	1	0	1	0.002	0.002	
10/12/09 03:01:52	59.984	3705.05	350	-223.015732	16	748	10	0	-103	7993.68	1	0	1	0.002	0.002	
10/12/09 03:01:54	59.985	3704.893	350	-223.015732	16	748.5	10	0	-103	7994.01	1	0	1	0.001	0.001	
10/12/09 03:01:56	59.987	3703.741	350	-223.015732	16	749	10	0	-103	7994.34	1	0	1	0.002	0.002	
10/12/09 03:01:58	59.989	3701.831	350	-223.015732	16	749.5	10	0	-103	7994.67	1	0	1	0.002	0.002	
10/12/09 03:02:00	59.992	3701.795	350	-223.015732	16	750	10	0	-103	7995	1	0	1	0.003	0.003	
10/12/09 03:02:02	59.996	3700.07	350	-223.015732	16	750.5	10	0	-103	7995.33	1	0	1	0.004	0.004	
10/12/09 03:02:04	59.999	3701.308	350	-223.015732	16	751	10	0	-103	7995.66	1	0	1	0.003	0.003	
10/12/09 03:02:06	59.997	3700.429	350	-223.015732	16	751.5	10	0	-103	7995.99	1	0	1	-0.002	0.002	
10/12/09 03:02:08	59.997	3700.913	350	-223.015732	16	752	10	0	-103	7996.32	1	0	1	0.000	0.000	
10/12/09 03:02:10	59.997	3700.541	350	-223.015732	16	752.5	10	0	-103	7996.65	1	0	1	0.000	0.000	
10/12/09 03:02:12	59.997	3699.927	350	-223.015732	16	753	10	0	-103	7996.98	1	0	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 03:02:14	59.996	3700.858	350	-223.015732	16	753.5	10	0	-103	7997.31	1	0	1	-0.001	0.001	
10/12/09 03:02:16	59.997	3700.549	350	-223.015732	16	754	10	0	-103	7997.64	1	0	1	0.001	0.001	
10/12/09 03:02:18	59.996	3700.614	350	-223.015732	16	754.5	10	0	-103	7997.97	1	0	1	-0.001	0.001	
10/12/09 03:02:20	59.998	3700.224	350	-223.015732	16	755	10	0	-103	7998.3	1	0	1	0.002	0.002	
10/12/09 03:02:22	60.003	3699.5	350	-223.015732	16	755.5	10	0	-103	7998.63	1	1	1	0.005	0.005	
10/12/09 03:02:24	60.009	3698.032	350	-223.015732	16	756	10	0	-103	7998.96	1	1	1	0.006	0.006	
10/12/09 03:02:26	60.01	3697.96	350	-223.015732	16	756.5	10	0	-103	7999.29	1	1	1	0.001	0.001	
10/12/09 03:02:28	60.008	3699.409	350	-223.015732	16	757	10	0	-103	7999.62	1	1	1	-0.002	0.002	
10/12/09 03:02:30	60.005	3699.241	350	-223.015732	16	757.5	10	0	-103	7999.95	1	1	1	-0.003	0.003	
10/12/09 03:02:32	60.004	3700.738	350	-223.015732	16	758	10	0	-103	8000.28	1	1	1	-0.001	0.001	
10/12/09 03:02:34	60.006	3701.11	350	-223.015732	16	758.5	10	0	-103	8000.61	1	1	1	0.002	0.002	
10/12/09 03:02:36	60.003	3701.238	350	-223.015732	16	759	10	0	-103	8000.94	1	1	1	-0.003	0.003	
10/12/09 03:02:38	60.001	3699.998	350	-223.015732	16	759.5	10	0	-103	8001.27	1	1	1	-0.002	0.002	
10/12/09 03:02:40	60.002	3700.22	350	-223.015732	16	760	10	0	-103	8001.6	1	1	1	0.001	0.001	
10/12/09 03:02:42	60.004	3701.823	350	-223.015732	16	760.5	10	0	-103	8001.93	1	1	1	0.002	0.002	
10/12/09 03:02:44	60.007	3702.554	350	-223.015732	16	761	10	0	-103	8002.26	1	1	1	0.003	0.003	
10/12/09 03:02:46	60.007	3702.276	350	-223.015732	16	761.5	10	0	-103	8002.59	1	1	1	0.000	0.000	
10/12/09 03:02:48	60.008	3701.026	350	-223.015732	16	762	10	0	-103	8002.92	1	1	1	0.001	0.001	
10/12/09 03:02:50	60.008	3701.923	350	-223.015732	16	762.5	10	0	-103	8003.25	1	1	1	0.000	0.000	
10/12/09 03:02:52	60.006	3702.943	350	-223.015732	16	763	10	0	-103	8003.58	1	1	1	-0.002	0.002	
10/12/09 03:02:54	60.006	3704.093	350	-223.015732	16	763.5	10	0	-103	8003.91	1	1	1	0.000	0.000	
10/12/09 03:02:56	60.006	3703.96	350	-223.015732	16	764	10	0	-103	8004.24	1	1	1	0.000	0.000	
10/12/09 03:02:58	60.005	3703.819	350	-223.015732	16	764.5	10	0	-103	8004.57	1	1	1	-0.001	0.001	
10/12/09 03:03:00	60	3704.455	350	-223.015732	16	765	10	0	-103	8004.9	1	0	1	-0.005	0.005	
10/12/09 03:03:02	59.999	3704.346	350	-223.015732	16	765.5	10	0	-103	8005.23	1	0	1	-0.001	0.001	
10/12/09 03:03:04	60	3705.329	350	-223.015732	16	766	10	0	-103	8005.56	1	0	1	0.001	0.001	
10/12/09 03:03:06	60	3704.93	350	-223.015732	16	766.5	10	0	-103	8005.89	1	0	1	0.000	0.000	
10/12/09 03:03:08	60.004	3704.405	350	-223.015732	16	767	10	0	-103	8006.22	1	1	1	0.004	0.004	
10/12/09 03:03:10	60.008	3703.675	350	-223.015732	16	767.5	10	0	-103	8006.55	1	1	1	0.004	0.004	
10/12/09 03:03:12	60.013	3702.748	350	-223.015732	16	768	10	0	-103	8006.88	1	1	1	0.005	0.005	
10/12/09 03:03:14	60.015	3702.669	350	-223.015732	16	768.5	10	0	-103	8007.21	1	1	1	0.002	0.002	
10/12/09 03:03:16	60.015	3703.017	350	-223.015732	16	769	10	0	-103	8007.54	1	1	1	0.000	0.000	
10/12/09 03:03:18	60.012	3703.416	350	-223.015732	16	769.5	10	0	-103	8007.87	1	1	1	-0.003	0.003	
10/12/09 03:03:20	60.009	3703.297	350	-223.015732	16	770	10	0	-103	8008.2	1	1	1	-0.003	0.003	
10/12/09 03:03:22	60.005	3705.189	350	-223.015732	16	770.5	10	0	-103	8008.53	1	1	1	-0.004	0.004	
10/12/09 03:03:24	60.008	3705.279	350	-223.015732	16	771	10	0	-103	8008.86	1	1	1	0.003	0.003	
10/12/09 03:03:26	60.011	3704.646	350	-223.015732	16	771.5	10	0	-103	8009.19	1	1	1	0.003	0.003	
10/12/09 03:03:28	60.011	3704.051	350	-223.015732	16	772	10	0	-103	8009.52	1	1	1	0.000	0.000	
10/12/09 03:03:30	60.013	3703.438	350	-223.015732	16	772.5	10	0	-103	8009.85	1	1	1	0.002	0.002	
10/12/09 03:03:32	60.016	3704.255	350	-223.015732	16	773	10	0	-103	8010.18	1	1	1	0.003	0.003	
10/12/09 03:03:34	60.018	3703.708	350	-223.015732	16	773.5	10	0	-103	8010.51	1	1	1	0.002	0.002	
10/12/09 03:03:36	60.018	3703.83	350	-223.015732	16	774	10	0	-103	8010.84	1	1	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 03:03:38	60.019	3704.524	350	-223.015732	16	774.5	10	0	-103	8011.17	1	1	1	0.001	0.001	
10/12/09 03:03:40	60.018	3704.139	350	-223.015732	16	775	10	0	-103	8011.5	1	1	1	-0.001	0.001	
10/12/09 03:03:42	60.013	3704.27	350	-223.015732	16	775.5	10	0	-103	8011.83	1	1	1	-0.005	0.005	
10/12/09 03:03:44	60.011	3705.429	350	-223.015732	16	776	10	0	-103	8012.16	1	1	1	-0.002	0.002	
10/12/09 03:03:46	60.009	3705.942	350	-223.015732	16	776.5	10	0	-103	8012.49	1	1	1	-0.002	0.002	
10/12/09 03:03:48	60.009	3705.54	350	-223.015732	16	777	10	0	-103	8012.82	1	1	1	0.000	0.000	
10/12/09 03:03:50	60.008	3705.634	350	-223.015732	16	777.5	10	0	-103	8013.15	1	1	1	-0.001	0.001	
10/12/09 03:03:52	60.009	3705.749	350	-223.015732	16	778	10	0	-103	8013.48	1	1	1	0.001	0.001	
10/12/09 03:03:54	60.011	3707.267	350	-223.015732	16	778.5	10	0	-103	8013.81	1	1	1	0.002	0.002	
10/12/09 03:03:56	60.015	3706.945	350	-223.015732	16	779	10	0	-103	8014.14	1	1	1	0.004	0.004	
10/12/09 03:03:58	60.02	3706.63	350	-223.015732	16	779.5	10	0	-103	8014.47	1	1	1	0.005	0.005	
10/12/09 03:04:00	60.021	3705.655	350	-223.015732	16	780	10	0	-103	8014.8	1	1	1	0.001	0.001	
10/12/09 03:04:02	60.018	3703.895	350	-223.015732	16	780.5	10	0	-103	8015.13	1	1	1	-0.003	0.003	
10/12/09 03:04:04	60.017	3704.224	350	-223.015732	16	781	10	0	-103	8015.46	1	1	1	-0.001	0.001	
10/12/09 03:04:06	60.019	3703.887	350	-223.015732	16	781.5	10	0	-103	8015.79	1	1	1	0.002	0.002	
10/12/09 03:04:08	60.019	3704.648	350	-223.015732	16	782	10	0	-103	8016.12	1	1	1	0.000	0.000	
10/12/09 03:04:10	60.021	3704.795	350	-223.015732	16	782.5	10	0	-103	8016.45	1	1	1	0.002	0.002	
10/12/09 03:04:12	60.022	3704.167	350	-223.015732	16	783	10	0	-103	8016.78	1	1	1	0.001	0.001	
10/12/09 03:04:14	60.025	3702.764	350	-223.015732	16	783.5	10	0	-103	8017.11	1	1	1	0.003	0.003	
10/12/09 03:04:16	60.027	3702.008	350	-223.015732	16	784	10	0	-103	8017.44	1	1	1	0.002	0.002	
10/12/09 03:04:18	60.03	3700.36	350	-223.015732	16	784.5	10	0	-103	8017.77	1	1	1	0.003	0.003	
10/12/09 03:04:20	60.027	3701.063	350	-223.015732	16	785	10	0	-103	8018.1	1	1	1	-0.003	0.003	
10/12/09 03:04:22	60.023	3700.34	350	-223.015732	16	785.5	10	0	-103	8018.43	1	1	1	-0.004	0.004	
10/12/09 03:04:24	60.021	3699.369	350	-223.015732	16	786	10	0	-103	8018.76	1	1	1	-0.002	0.002	
10/12/09 03:04:26	60.023	3701.568	350	-223.015732	16	786.5	10	0	-103	8019.09	1	1	1	0.002	0.002	
10/12/09 03:04:28	60.023	3702.959	350	-223.015732	16	787	10	0	-103	8019.42	1	1	1	0.000	0.000	
10/12/09 03:04:30	60.02	3704.25	350	-223.015732	16	787.5	10	0	-103	8019.75	1	1	1	-0.003	0.003	
10/12/09 03:04:32	60.024	3703.621	350	-223.015732	16	788	10	0	-103	8020.08	1	1	1	0.004	0.004	
10/12/09 03:04:34	60.024	3703.374	350	-223.015732	16	788.5	10	0	-103	8020.41	1	1	1	0.000	0.000	
10/12/09 03:04:36	60.022	3703.036	350	-223.015732	16	789	10	0	-103	8020.74	1	1	1	-0.002	0.002	
10/12/09 03:04:38	60.022	3703.931	350	-223.015732	16	789.5	10	0	-103	8021.07	1	1	1	0.000	0.000	
10/12/09 03:04:40	60.024	3704.947	350	-223.015732	16	790	10	0	-103	8021.4	1	1	1	0.002	0.002	
10/12/09 03:04:42	60.025	3704.208	350	-223.015732	16	790.5	10	0	-103	8021.73	1	1	1	0.001	0.001	
10/12/09 03:04:44	60.023	3703.541	350	-223.015732	16	791	10	0	-103	8022.06	1	1	1	-0.002	0.002	
10/12/09 03:04:46	60.024	3703.16	350	-223.015732	16	791.5	10	0	-103	8022.39	1	1	1	0.001	0.001	
10/12/09 03:04:48	60.02	3703.397	350	-223.015732	16	792	10	0	-103	8022.72	1	1	1	-0.004	0.004	
10/12/09 03:04:50	60.018	3704.376	350	-223.015732	16	792.5	10	0	-103	8023.05	1	1	1	-0.002	0.002	
10/12/09 03:04:52	60.013	3705.441	350	-223.015732	16	793	10	0	-103	8023.38	1	1	1	-0.005	0.005	
10/12/09 03:04:54	60.008	3706.995	350	-223.015732	16	793.5	10	0	-103	8023.71	1	1	1	-0.005	0.005	
10/12/09 03:04:56	60.012	3710.072	350	-223.015732	16	794	10	0	-103	8024.04	1	1	1	0.004	0.004	
10/12/09 03:04:58	60.017	3707.971	350	-223.015732	16	794.5	10	0	-103	8024.37	1	1	1	0.005	0.005	
10/12/09 03:05:00	60.019	3707.767	350	-223.015732	16	795	10	0	-103	8024.7	1	1	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26	t(0)			
											473	2:33:00	t(Recovery)	Delta Hz	Absolute Delta Hz	
											307	05:34	Event Length mm:ss			
10/12/09 03:05:02	60.019	3707.609	350	-223.015732	16	795.5	10	0	-103	8025.03	1	1	1	0.000	0.000	
10/12/09 03:05:04	60.015	3708.831	350	-223.015732	16	796	10	0	-103	8025.36	1	1	1	-0.004	0.004	
10/12/09 03:05:06	60.016	3709.465	350	-223.015732	16	796.5	10	0	-103	8025.69	1	1	1	0.001	0.001	
10/12/09 03:05:08	60.015	3709.813	350	-223.015732	16	797	10	0	-103	8026.02	1	1	1	-0.001	0.001	
10/12/09 03:05:10	60.016	3709.817	350	-223.015732	16	797.5	10	0	-103	8026.35	1	1	1	0.001	0.001	
10/12/09 03:05:12	60.014	3709.99	350	-223.015732	16	798	10	0	-103	8026.68	1	1	1	-0.002	0.002	
10/12/09 03:05:14	60.016	3709.094	350	-223.015732	16	798.5	10	0	-103	8027.01	1	1	1	0.002	0.002	
10/12/09 03:05:16	60.018	3709.642	350	-223.015732	16	799	10	0	-103	8027.34	1	1	1	0.002	0.002	
10/12/09 03:05:18	60.019	3709.812	350	-223.015732	16	799.5	10	0	-103	8027.67	1	1	1	0.001	0.001	
10/12/09 03:05:20	60.016	3709.933	350	-223.015732	16	800	10	0	-103	8028	1	1	1	-0.003	0.003	
10/12/09 03:05:22	60.014	3710.677	350	-223.015732	16	800.5	10	0	-103	8028.33	1	1	1	-0.002	0.002	
10/12/09 03:05:24	60.014	3710.591	350	-223.015732	16	801	10	0	-103	8028.66	1	1	1	0.000	0.000	
10/12/09 03:05:26	60.018	3709.354	350	-223.015732	16	801.5	10	0	-103	8028.99	1	1	1	0.004	0.004	
10/12/09 03:05:28	60.022	3707.696	350	-223.015732	16	802	10	0	-103	8029.32	1	1	1	0.004	0.004	
10/12/09 03:05:30	60.023	3707.38	350	-223.015732	16	802.5	10	0	-103	8029.65	1	1	1	0.001	0.001	
10/12/09 03:05:32	60.024	3707.12	350	-223.015732	16	803	10	0	-103	8029.98	1	1	1	0.001	0.001	
10/12/09 03:05:34	60.026	3706.99	350	-223.015732	16	803.5	10	0	-103	8030.31	1	1	1	0.002	0.002	
10/12/09 03:05:36	60.026	3705.848	350	-223.015732	16	804	10	0	-103	8030.64	1	1	1	0.000	0.000	
10/12/09 03:05:38	60.024	3704.185	350	-223.015732	16	804.5	10	0	-103	8030.97	1	1	1	-0.002	0.002	
10/12/09 03:05:40	60.022	3704.406	350	-223.015732	16	805	10	0	-103	8031.3	1	1	1	-0.002	0.002	
10/12/09 03:05:42	60.02	3704.963	350	-223.015732	16	805.5	10	0	-103	8031.63	1	1	1	-0.002	0.002	
10/12/09 03:05:44	60.019	3706.567	350	-223.015732	16	806	10	0	-103	8031.96	1	1	1	-0.001	0.001	
10/12/09 03:05:46	60.022	3705.516	350	-223.015732	16	806.5	10	0	-103	8032.29	1	1	1	0.003	0.003	
10/12/09 03:05:48	60.025	3704.869	350	-223.015732	16	807	10	0	-103	8032.62	1	1	1	0.003	0.003	
10/12/09 03:05:50	60.028	3704.428	350	-223.015732	16	807.5	10	0	-103	8032.95	1	1	1	0.003	0.003	
10/12/09 03:05:52	60.03	3704.773	350	-223.015732	16	808	10	0	-103	8033.28	1	1	1	0.002	0.002	
10/12/09 03:05:54	60.031	3703.532	350	-223.015732	16	808.5	10	0	-103	8033.61	1	1	1	0.001	0.001	
10/12/09 03:05:56	60.029	3702.686	350	-223.015732	16	809	10	0	-103	8033.94	1	1	1	-0.002	0.002	
10/12/09 03:05:58	60.026	3702.093	350	-223.015732	16	809.5	10	0	-103	8034.27	1	1	1	-0.003	0.003	
10/12/09 03:06:00	60.026	3703.169	350	-223.015732	16	810	10	0	-103	8034.6	1	1	1	0.000	0.000	
10/12/09 03:06:02	60.029	3703.676	350	-223.015732	16	810.5	10	0	-103	8034.93	1	1	1	0.003	0.003	
10/12/09 03:06:04	60.03	3701.52	350	-223.015732	16	811	10	0	-103	8035.26	1	1	1	0.001	0.001	
10/12/09 03:06:06	60.033	3700.106	350	-223.015732	16	811.5	10	0	-103	8035.59	1	1	1	0.003	0.003	
10/12/09 03:06:08	60.03	3698.222	350	-223.015732	16	812	10	0	-103	8035.92	1	1	1	-0.003	0.003	
10/12/09 03:06:10	60.022	3698.009	350	-223.015732	16	812.5	10	0	-103	8036.25	1	1	1	-0.008	0.008	
10/12/09 03:06:12	60.016	3700.28	350	-223.015732	16	813	10	0	-103	8036.58	1	1	1	-0.006	0.006	
10/12/09 03:06:14	60.019	3703.192	350	-223.015732	16	813.5	10	0	-103	8036.91	1	1	1	0.003	0.003	
10/12/09 03:06:16	60.03	3703.815	350	-223.015732	16	814	10	0	-103	8037.24	1	1	1	0.011	0.011	
10/12/09 03:06:18	60.028	3701.863	350	-223.015732	16	814.5	10	0	-103	8037.57	1	1	1	-0.002	0.002	
10/12/09 03:06:20	60.021	3699.956	350	-223.015732	16	815	10	0	-103	8037.9	1	1	1	-0.007	0.007	
10/12/09 03:06:22	60.015	3700.816	350	-223.015732	16	815.5	10	0	-103	8038.23	1	1	1	-0.006	0.006	
10/12/09 03:06:24	60.015	3703.802	350	-223.015732	16	816	10	0	-103	8038.56	1	1	1	0.000	0.000	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW					
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26 t(0)				
											473	2:33:00 t(Recovery)		Delta	Absolute	
											307	05:34 Event Length mm:ss		Hz	Delta Hz	
10/12/09 03:06:26	60.012	3706.943	350	-223.015732	16	816.5	10	0	-103	8038.89	1	1	1	-0.003	0.003	
10/12/09 03:06:28	60.011	3708.527	350	-223.015732	16	817	10	0	-103	8039.22	1	1	1	-0.001	0.001	
10/12/09 03:06:30	60.014	3707.49	350	-223.015732	16	817.5	10	0	-103	8039.55	1	1	1	0.003	0.003	
10/12/09 03:06:32	60.013	3707.647	350	-223.015732	16	818	10	0	-103	8039.88	1	1	1	-0.001	0.001	
10/12/09 03:06:34	60.014	3706.991	350	-223.015732	16	818.5	10	0	-103	8040.21	1	1	1	0.001	0.001	
10/12/09 03:06:36	60.016	3707.495	350	-223.015732	16	819	10	0	-103	8040.54	1	1	1	0.002	0.002	
10/12/09 03:06:38	60.016	3705.584	350	-223.015732	16	819.5	10	0	-103	8040.87	1	1	1	0.000	0.000	
10/12/09 03:06:40	60.015	3705.398	350	-223.015732	16	820	10	0	-103	8041.2	1	1	1	-0.001	0.001	
10/12/09 03:06:42	60.013	3707.12	350	-223.015732	16	820.5	10	0	-103	8041.53	1	1	1	-0.002	0.002	
10/12/09 03:06:44	60.007	3709.144	350	-223.015732	16	821	10	0	-103	8041.86	1	1	1	-0.006	0.006	
10/12/09 03:06:46	59.997	3708.99	350	-223.015732	16	821.5	10	0	-103	8042.19	1	0	1	-0.010	0.010	
10/12/09 03:06:48	59.994	3708.291	350	-223.015732	16	822	10	0	-103	8042.52	1	0	1	-0.003	0.003	
10/12/09 03:06:50	59.993	3706.193	350	-223.015732	16	822.5	10	0	-103	8042.85	1	0	1	-0.001	0.001	
10/12/09 03:06:52	59.99	3707.304	350	-223.015732	16	823	10	0	-103	8043.18	1	0	1	-0.003	0.003	
10/12/09 03:06:54	59.993	3707.903	350	-223.015732	16	823.5	10	0	-103	8043.51	1	0	1	0.003	0.003	
10/12/09 03:06:56	59.994	3706.76	350	-223.015732	16	824	10	0	-103	8043.84	1	0	1	0.001	0.001	
10/12/09 03:06:58	59.993	3706.921	350	-223.015732	16	824.5	10	0	-103	8044.17	1	0	1	-0.001	0.001	
10/12/09 03:07:00	59.994	3706.683	350	-223.015732	16	825	10	0	-103	8044.5	1	0	1	0.001	0.001	
10/12/09 03:07:02	59.993	3706.888	350	-223.015732	16	825.5	10	0	-103	8044.83	1	0	1	-0.001	0.001	
10/12/09 03:07:04	59.996	3704.934	350	-223.015732	16	826	10	0	-103	8045.16	1	0	1	0.003	0.003	
10/12/09 03:07:06	59.988	3705.678	350	-223.015732	16	826.5	10	0	-103	8045.49	1	0	1	-0.008	0.008	
10/12/09 03:07:08	59.985	3706.481	350	-223.015732	16	827	10	0	-103	8045.82	1	0	1	-0.003	0.003	
10/12/09 03:07:10	59.983	3707.071	350	-223.015732	16	827.5	10	0	-103	8046.15	1	0	1	-0.002	0.002	
10/12/09 03:07:12	59.982	3706.696	350	-223.015732	16	828	10	0	-103	8046.48	1	0	1	-0.001	0.001	
10/12/09 03:07:14	59.98	3707.479	350	-223.015732	16	828.5	10	0	-103	8046.81	1	0	1	-0.002	0.002	
10/12/09 03:07:16	59.977	3708.246	350	-223.015732	16	829	10	0	-103	8047.14	1	0	1	-0.003	0.003	
10/12/09 03:07:18	59.981	3709.436	350	-223.015732	16	829.5	10	0	-103	8047.47	1	0	1	0.004	0.004	
10/12/09 03:07:20	59.982	3710.419	350	-223.015732	16	830	10	0	-103	8047.8	1	0	1	0.001	0.001	
10/12/09 03:07:22	59.978	3710.134	350	-223.015732	16	830.5	10	0	-103	8048.13	1	0	1	-0.004	0.004	
10/12/09 03:07:24	59.98	3708.708	350	-223.015732	16	831	10	0	-103	8048.46	1	0	1	0.002	0.002	
10/12/09 03:07:26	59.98	3710.024	350	-223.015732	16	831.5	10	0	-103	8048.79	1	0	1	0.000	0.000	
10/12/09 03:07:28	59.977	3709.192	350	-223.015732	16	832	10	0	-103	8049.12	1	0	1	-0.003	0.003	
10/12/09 03:07:30	59.98	3708.335	350	-223.015732	16	832.5	10	0	-103	8049.45	1	0	1	0.003	0.003	
10/12/09 03:07:32	59.983	3709.399	350	-223.015732	16	833	10	0	-103	8049.78	1	0	1	0.003	0.003	
10/12/09 03:07:34	59.984	3707.911	350	-223.015732	16	833.5	10	0	-103	8050.11	1	0	1	0.001	0.001	
10/12/09 03:07:36	59.981	3709.004	350	-223.015732	16	834	10	0	-103	8050.44	1	0	1	-0.003	0.003	
10/12/09 03:07:38	59.981	3707.638	350	-223.015732	16	834.5	10	0	-103	8050.77	1	0	1	0.000	0.000	
10/12/09 03:07:40	59.98	3709.689	350	-223.015732	16	835	10	0	-103	8051.1	1	0	1	-0.001	0.001	
10/12/09 03:07:42	59.981	3708.945	350	-223.015732	16	835.5	10	0	-103	8051.43	1	0	1	0.001	0.001	
10/12/09 03:07:44	59.981	3706.541	350	-223.015732	16	836	10	0	-103	8051.76	1	0	1	0.000	0.000	
10/12/09 03:07:46	59.981	3711.256	350	-223.015732	16	836.5	10	0	-103	8052.09	1	0	1	0.000	0.000	
10/12/09 03:07:48	59.98	3711.362	350	-223.015732	16	837	10	0	-103	8052.42	1	0	1	-0.001	0.001	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 2:33:00 05:34	Max Absolute Delta Hz 0.126 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 03:07:50	59.978	3712.303	350	-223.015732	16	837.5	10	0	-103	8052.75	1	0	1	-0.002	0.002	
10/12/09 03:07:52	59.978	3712.012	350	-223.015732	16	838	10	0	-103	8053.08	1	0	1	0.000	0.000	
10/12/09 03:07:54	59.979	3711.703	350	-223.015732	16	838.5	10	0	-103	8053.41	1	0	1	0.001	0.001	
10/12/09 03:07:56	59.978	3712.093	350	-223.015732	16	839	10	0	-103	8053.74	1	0	1	-0.001	0.001	
10/12/09 03:07:58	59.976	3713.992	350	-223.015732	16				-103	8054.07	1	0	1	-0.002	0.002	
10/12/09 03:08:00	59.976	3714.612	350	-223.015732	16				-103	8054.4	1	0	1	0.000	0.000	
10/12/09 03:08:02	59.975	3715.083	350	-223.015732	16				-103	8054.73	1	0	1	-0.001	0.001	
10/12/09 03:08:04	59.976	3715.323	350	-223.015732	16				-103	8055.06	1	0	1	0.001	0.001	
10/12/09 03:08:06	59.975	3714.794	350	-223.015732	16				-103	8055.39	1	0	1	-0.001	0.001	
10/12/09 03:08:08	59.979	3714.717	350	-223.015732	16				-103	8055.72	1	0	1	0.004	0.004	
10/12/09 03:08:10	59.978	3715.161	350	-223.015732	16				-103	8056.05	1	0	1	-0.001	0.001	
10/12/09 03:08:12	59.975	3715.001	350	-223.015732	16				-103	8056.38	1	0	1	-0.003	0.003	
10/12/09 03:08:14	59.976	3713.996	350	-223.015732	16				-103	8056.71	1	0	1	0.001	0.001	
10/12/09 03:08:16	59.981	3714.063	350	-223.015732	16				-103	8057.04	1	0	1	0.005	0.005	
10/12/09 03:08:18	59.977	3714.335	350	-223.015732	16				-103	8057.37	1	0	1	-0.004	0.004	
10/12/09 03:08:20	59.975	3715.631	350	-223.015732	16				-103	8057.7	1	0	1	-0.002	0.002	
10/12/09 03:08:22	59.976	3715.688	350	-223.015732	16				-103	8058.03	1	0	1	0.001	0.001	
10/12/09 03:08:24	59.979	3715.567	350	-223.015732	16				-103	8058.36	1	0	1	0.003	0.003	
10/12/09 03:08:26	59.98	3715.725	350	-223.015732	16				-103	8058.69	1	0	1	0.001	0.001	
10/12/09 03:08:28	59.979	3714.848	350	-223.015732	16				-103	8059.02	1	0	1	-0.001	0.001	
10/12/09 03:08:30	59.978	3713.142	350	-223.015732	16				-103	8059.35	1	0	1	-0.001	0.001	
10/12/09 03:08:32	59.979	3713.358	350	-223.015732	16				-103	8059.68	1	0	1	0.001	0.001	
10/12/09 03:08:34	59.982	3712.275	350	-223.015732	16				-103	8060.01	1	0	1	0.003	0.003	
10/12/09 03:08:36	59.983	3712.619	350	-223.015732	16				-103	8060.34	1	0	1	0.001	0.001	
10/12/09 03:08:38	59.987	3712.153	350	-223.015732	16				-103	8060.67	1	0	1	0.004	0.004	
10/12/09 03:08:40	59.988	3710.05	350	-223.015732	16				-103	8061	1	0	1	0.001	0.001	
10/12/09 03:08:42	59.984	3709.082	350	-223.015732	16				-103	8061.33	1	0	1	-0.004	0.004	
10/12/09 03:08:44	59.98	3710.472	350	-223.015732	16				-103	8061.66	1	0	1	-0.004	0.004	
10/12/09 03:08:46	59.979	3710.624	350	-223.015732	16				-103	8061.99	1	0	1	-0.001	0.001	
10/12/09 03:08:48	59.98	3710.946	350	-223.015732	16				-103	8062.32	1	0	1	0.001	0.001	
10/12/09 03:08:50	59.979	3710.2	350	-223.015732	16				-103	8062.65	1	0	1	-0.001	0.001	
10/12/09 03:08:52	59.978	3710.475	350	-223.015732	16				-103	8062.98	1	0	1	-0.001	0.001	
10/12/09 03:08:54	59.975	3709.462	350	-223.015732	16				-103	8063.31	1	0	1	-0.003	0.003	
10/12/09 03:08:56	59.979	3710.803	350	-223.015732	16				-103	8063.64	1	0	1	0.004	0.004	
10/12/09 03:08:58	59.982	3709.286	350	-223.015732	16				-103	8063.97	1	0	1	0.003	0.003	
10/12/09 03:09:00	59.983	3710.573	350	-223.015732	16				-103	8064.3	1	0	1	0.001	0.001	
10/12/09 03:09:02	59.983	3709.525	350	-223.015732	16				-103	8064.63	1	0	1	0.000	0.000	
10/12/09 03:09:04	59.985	3708.371	350	-223.015732	16				-103	8064.96	1	0	1	0.002	0.002	
10/12/09 03:09:06	59.99	3708.527	350	-223.015732	16				-103	8065.29	1	0	1	0.005	0.005	
10/12/09 03:09:08	59.987	3706.512	350	-223.015732	16				-103	8065.62	1	0	1	-0.003	0.003	
10/12/09 03:09:10	59.984	3707.49	350	-223.015732	16				-103	8065.95	1	0	1	-0.003	0.003	
10/12/09 03:09:12	59.976	3708.962	350	-223.015732	16				-103	8066.28	1	0	1	-0.008	0.008	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW						
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26 t(0)				
											473	2:33:00 t(Recovery)		Delta	Absolute	
											307	05:34 Event Length mm:ss		Hz	Delta Hz	
10/12/09 03:09:14	59.979	3709.894	350	-223.015732	16				-103	8066.61	1	0	1	0.003	0.003	
10/12/09 03:09:16	59.985	3712.303	350	-223.015732	16				-103	8066.94	1	0	1	0.006	0.006	
10/12/09 03:09:18	59.983	3711.35	350	-223.015732	16				-103	8067.27	1	0	1	-0.002	0.002	
10/12/09 03:09:20	59.979	3711.627	350	-223.015732	16				-103	8067.6	1	0	1	-0.004	0.004	
10/12/09 03:09:22	59.981	3712.076	350	-223.015732	16				-103	8067.93	1	0	1	0.002	0.002	
10/12/09 03:09:24	59.978	3712.393	350	-223.015732	16				-103	8068.26	1	0	1	-0.003	0.003	
10/12/09 03:09:26	59.975	3712.999	350	-223.015732	16				-103	8068.59	1	0	1	-0.003	0.003	
10/12/09 03:09:28	59.978	3713.51	350	-223.015732	16				-103	8068.92	1	0	1	0.003	0.003	
10/12/09 03:09:30	59.989	3716.626	350	-223.015732	16				-103	8069.25	1	0	1	0.011	0.011	
10/12/09 03:09:32	59.999	3715.443	350	-223.015732	16				-103	8069.58	1	0	1	0.010	0.010	
10/12/09 03:09:34	59.994	3712.092	350	-223.015732	16				-103	8069.91	1	0	1	-0.005	0.005	
10/12/09 03:09:36	59.989	3713.906	350	-223.015732	16				-103	8070.24	1	0	1	-0.005	0.005	
10/12/09 03:09:38	59.986	3714.894	350	-223.015732	16				-103	8070.57	1	0	1	-0.003	0.003	
10/12/09 03:09:40	59.984	3714.953	350	-223.015732	16				-103	8070.9	1	0	1	-0.002	0.002	
10/12/09 03:09:42	59.983	3716.122	350	-223.015732	16				-103	8071.23	1	0	1	-0.001	0.001	
10/12/09 03:09:44	59.982	3716.308	350	-223.015732	16				-103	8071.56	1	0	1	-0.001	0.001	
10/12/09 03:09:46	59.98	3715.438	350	-223.015732	16				-103	8071.89	1	0	1	-0.002	0.002	
10/12/09 03:09:48	59.99	3714.764	350	-223.015732	16				-103	8072.22	1	0	1	0.010	0.010	
10/12/09 03:09:50	59.995	3714.714	350	-223.015732	16				-103	8072.55	1	0	1	0.005	0.005	
10/12/09 03:09:52	59.995	3715.068	350	-223.015732	16				-103	8072.88	1	0	1	0.000	0.000	
10/12/09 03:09:54	59.99	3715.927	350	-223.015732	16				-103	8073.21	1	0	1	-0.005	0.005	
10/12/09 03:09:56	59.989	3715.791	350	-223.015732	16				-103	8073.54	1	0	1	-0.001	0.001	
10/12/09 03:09:58	59.991	3716.285	350	-223.015732	16				-103	8073.87	1	0	1	0.002	0.002	
10/12/09 03:10:00	59.996	3715.324	350	-223.015732	16				-103	8074.2	1	0	1	0.005	0.005	
10/12/09 03:10:02	60	3714.46	350	-223.015732	16				-103	8074.53	1	0	1	0.004	0.004	
10/12/09 03:10:04	60.002	3711.708	350	-223.015732	16				-103	8074.86	1	1	1	0.002	0.002	
10/12/09 03:10:06	60.004	3712.698	350	-223.015732	16				-103	8075.19	1	1	1	0.002	0.002	
10/12/09 03:10:08	60.004	3712.851	350	-223.015732	16				-103	8075.52	1	1	1	0.000	0.000	
10/12/09 03:10:10	60.002	3713.362	350	-223.015732	16				-103	8075.85	1	1	1	-0.002	0.002	
10/12/09 03:10:12	59.999	3716.641	350	-223.015732	16				-103	8076.18	1	0	1	-0.003	0.003	
10/12/09 03:10:14	59.998	3718.292	350	-223.015732	16				-103	8076.51	1	0	1	-0.001	0.001	
10/12/09 03:10:16	59.995	3719.079	350	-223.015732	16				-103	8076.84	1	0	1	-0.003	0.003	
10/12/09 03:10:18	59.996	3718.233	350	-223.015732	16				-103	8077.17	1	0	1	0.001	0.001	
10/12/09 03:10:20	60.001	3717.815	350	-223.015732	16				-103	8077.5	1	1	1	0.005	0.005	
10/12/09 03:10:22	60.002	3717.889	350	-223.015732	16				-103	8077.83	1	1	1	0.001	0.001	
10/12/09 03:10:24	60.001	3718.56	350	-223.015732	16				-103	8078.16	1	1	1	-0.001	0.001	
10/12/09 03:10:26	60.003	3718.195	350	-223.015732	16				-103	8078.49	1	1	1	0.002	0.002	
10/12/09 03:10:28	60.005	3719.021	350	-223.015732	16				-103	8078.82	1	1	1	0.002	0.002	
10/12/09 03:10:30	60.004	3718.821	350	-223.015732	16				-103	8079.15	1	1	1	-0.001	0.001	
10/12/09 03:10:32	60.004	3719.897	350	-223.015732	16				-103	8079.48	1	1	1	0.000	0.000	
10/12/09 03:10:34	60.004	3719.299	350	-223.015732	16				-103	8079.81	1	1	1	0.000	0.000	
10/12/09 03:10:36	60.006	3719.643	350	-223.015732	16				-103	8080.14	1	1	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW						
											Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
											306	2:27:26 t(0)				
											473	2:33:00 t(Recovery)		Delta Hz	Absolute Delta Hz	
											307	05:34 Event Length mm:ss				
10/12/09 03:10:38	60.003	3719.527	350	-223.015732	16				-103	8080.47	1	1	1	-0.003	0.003	
10/12/09 03:10:40	60.005	3719.731	350	-223.015732	16				-103	8080.8	1	1	1	0.002	0.002	
10/12/09 03:10:42	60.006	3720.279	350	-223.015732	16				-103	8081.13	1	1	1	0.001	0.001	
10/12/09 03:10:44	60.009	3718.58	350	-223.015732	16				-103	8081.46	1	1	1	0.003	0.003	
10/12/09 03:10:46	60.009	3718.976	350	-223.015732	16				-103	8081.79	1	1	1	0.000	0.000	
10/12/09 03:10:48	60.01	3718.982	350	-223.015732	16				-103	8082.12	1	1	1	0.001	0.001	
10/12/09 03:10:50	60.009	3720.034	350	-223.015732	16				-103	8082.45	1	1	1	-0.001	0.001	
10/12/09 03:10:52	60.013	3720.609	350	-223.015732	16				-103	8082.78	1	1	1	0.004	0.004	
10/12/09 03:10:54	60.015	3720.811	350	-223.015732	16				-103	8083.11	1	1	1	0.002	0.002	
10/12/09 03:10:56	60.014	3721.239	350	-223.015732	16				-103	8083.44	1	1	1	-0.001	0.001	
10/12/09 03:10:58	60.009	3720.38	350	-223.015732	16				-103	8083.77	1	1	1	-0.005	0.005	
10/12/09 03:11:00	60.009	3719.447	350	-223.015732	16				-103	8084.1	1	1	1	0.000	0.000	
10/12/09 03:11:02	60.008	3720.807	350	-223.015732	16				-103	8084.43	1	1	1	-0.001	0.001	
10/12/09 03:11:04	60.011	3721.272	350	-223.015732	16				-103	8084.76	1	1	1	0.003	0.003	
10/12/09 03:11:06	60.01	3720.592	350	-223.015732	16				-103	8085.09	1	1	1	-0.001	0.001	
10/12/09 03:11:08	60.009	3721.245	350	-223.015732	16				-103	8085.42	1	1	1	-0.001	0.001	
10/12/09 03:11:10	60.013	3721.594	350	-223.015732	16				-103	8085.75	1	1	1	0.004	0.004	
10/12/09 03:11:12	60.013	3722.176	350	-223.015732	16				-103	8086.08	1	1	1	0.000	0.000	
10/12/09 03:11:14	60.014	3721.999	350	-223.015732	16				-103	8086.41	1	1	1	0.001	0.001	
10/12/09 03:11:16	60.014	3721.646	350	-223.015732	16				-103	8086.74	1	1	1	0.000	0.000	
10/12/09 03:11:18	60.012	3721.678	350	-223.015732	16				-103	8087.07	1	1	1	-0.002	0.002	
10/12/09 03:11:20	60.01	3720.86	350	-223.015732	16				-103	8087.4	1	1	1	-0.002	0.002	
10/12/09 03:11:22	60.011	3721.645	350	-223.015732	16				-103	8087.73	1	1	1	0.001	0.001	
10/12/09 03:11:24	60.007	3723.816	350	-223.015732	16				-103	8088.06	1	1	1	-0.004	0.004	
10/12/09 03:11:26	60.003	3725.07	350	-223.015732	16				-103	8088.39	1	1	1	-0.004	0.004	
10/12/09 03:11:28	60.001	3724.656	350	-223.015732	16				-103	8088.72	1	1	1	-0.002	0.002	
10/12/09 03:11:30	60	3724.869	350	-223.015732	16				-103	8089.05	1	0	1	-0.001	0.001	
10/12/09 03:11:32	59.998	3724.661	350	-223.015732	16				-103	8089.38	1	0	1	-0.002	0.002	
10/12/09 03:11:34	59.998	3723.696	350	-223.015732	16				-103	8089.71	1	0	1	0.000	0.000	
10/12/09 03:11:36	59.999	3723.58	350	-223.015732	16				-103	8090.04	1	0	1	0.001	0.001	
10/12/09 03:11:38	60.002	3723.405	350	-223.015732	16				-103	8090.37	1	1	1	0.003	0.003	
10/12/09 03:11:40	60.003	3721.879	350	-223.015732	16				-103	8090.7	1	1	1	0.001	0.001	
10/12/09 03:11:42	60.003	3722.401	350	-223.015732	16				-103	8091.03	1	1	1	0.000	0.000	
10/12/09 03:11:44	59.999	3722.906	350	-223.015732	16				-103	8091.36	1	0	1	-0.004	0.004	
10/12/09 03:11:46	59.998	3724.142	350	-223.015732	16				-103	8091.69	1	0	1	-0.001	0.001	
10/12/09 03:11:48	60.001	3723.65	350	-223.015732	16				-103	8092.02	1	1	1	0.003	0.003	
10/12/09 03:11:50	59.995	3723.201	350	-223.015732	16				-103	8092.35	1	0	1	-0.006	0.006	
10/12/09 03:11:52	59.989	3723.639	350	-223.015732	16				-103	8092.68	1	0	1	-0.006	0.006	
10/12/09 03:11:54	59.987	3723.881	350	-223.015732	16				-103	8093.01	1	0	1	-0.002	0.002	
10/12/09 03:11:56	59.988	3724.654	350	-223.015732	16				-103	8093.34	1	0	1	0.001	0.001	
10/12/09 03:11:58	59.988	3725.361	350	-223.015732	16				-103	8093.67	1	0	1	0.000	0.000	
10/12/09 03:12:00	59.99	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 05:34	Max Absolute Delta Hz 0.126 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 03:12:02	59.999	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.009	0.009	
10/12/09 03:12:04	60.001	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:12:06	60.003	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:12:08	60.0005	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.002	0.002	
10/12/09 03:12:10	59.998	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.002	0.002	
10/12/09 03:12:12	59.997	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:12:14	59.996	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:12:16	59.996	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:12:18	59.996	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:12:20	59.995	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:12:22	59.994	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:12:24	59.993	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:12:26	59.992	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:12:28	59.991	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:12:30	59.99	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:12:32	59.991	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:12:34	59.992	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:12:36	59.993	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:12:38	59.994	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:12:40	59.995	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:12:42	59.996	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:12:44	59.996	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:12:46	59.996	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:12:48	59.9965	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:12:50	59.997	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:12:52	59.997	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:12:54	59.997	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:12:56	59.997	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:12:58	59.997	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:13:00	59.999	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.002	0.002	
10/12/09 03:13:02	60.001	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:13:04	60.001	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:13:06	60.001	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:13:08	60.004	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.003	0.003	
10/12/09 03:13:10	60.007	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.003	0.003	
10/12/09 03:13:12	60.009	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:13:14	60.011	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:13:16	60.0085	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.003	0.003	
10/12/09 03:13:18	60.006	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.002	0.002	
10/12/09 03:13:20	60.007	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.001	0.001	
10/12/09 03:13:22	60.008	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.001	0.001	
10/12/09 03:13:24	60.01	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 03:13:26	60.012	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.002	0.002
10/12/09 03:13:28	60.012	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:30	60.012	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:32	60.01	3724.944	350	-223.015732	16				-103	8094		1	1	1	-0.002	0.002
10/12/09 03:13:34	60.008	3724.944	350	-223.015732	16				-103	8094		1	1	1	-0.002	0.002
10/12/09 03:13:36	60.008	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:38	60.008	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:40	60.008	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:42	60.008	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:44	60.008	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:46	60.008	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:48	60.007	3724.944	350	-223.015732	16				-103	8094		1	1	1	-0.001	0.001
10/12/09 03:13:50	60.006	3724.944	350	-223.015732	16				-103	8094		1	1	1	-0.001	0.001
10/12/09 03:13:52	60.005	3724.944	350	-223.015732	16				-103	8094		1	1	1	-0.001	0.001
10/12/09 03:13:54	60.004	3724.944	350	-223.015732	16				-103	8094		1	1	1	-0.001	0.001
10/12/09 03:13:56	60.004	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:13:58	60.004	3724.944	350	-223.015732	16				-103	8094		1	1	1	0.000	0.000
10/12/09 03:14:00	60.0025	3724.944	350	-223.015732	16				-103	8094		1	1	1	-0.001	0.001
10/12/09 03:14:02	60.001	3724.944	350	-223.015732	16				-103	8094		1	1	1	-0.002	0.002
10/12/09 03:14:04	59.9995	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.001	0.001
10/12/09 03:14:06	59.998	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.001	0.001
10/12/09 03:14:08	59.9965	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.002	0.002
10/12/09 03:14:10	59.995	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.001	0.001
10/12/09 03:14:12	59.995	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.000	0.000
10/12/09 03:14:14	59.995	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.000	0.000
10/12/09 03:14:16	59.996	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.001	0.001
10/12/09 03:14:18	59.997	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.001	0.001
10/12/09 03:14:20	59.995	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.002	0.002
10/12/09 03:14:22	59.993	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.002	0.002
10/12/09 03:14:24	59.9925	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.000	0.000
10/12/09 03:14:26	59.992	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.000	0.000
10/12/09 03:14:28	59.9905	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.001	0.001
10/12/09 03:14:30	59.989	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.002	0.002
10/12/09 03:14:32	59.99	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.001	0.001
10/12/09 03:14:34	59.991	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.001	0.001
10/12/09 03:14:36	59.989	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.002	0.002
10/12/09 03:14:38	59.987	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.002	0.002
10/12/09 03:14:40	59.9875	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.000	0.000
10/12/09 03:14:42	59.988	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.000	0.000
10/12/09 03:14:44	59.988	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.000	0.000
10/12/09 03:14:46	59.988	3724.944	350	-223.015732	16				-103	8094		1	0	1	0.000	0.000
10/12/09 03:14:48	59.987	3724.944	350	-223.015732	16				-103	8094		1	0	1	-0.001	0.001

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 t(0) 2:33:00 t(Recovery) 05:34 Event Length mm:ss	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 03:14:50	59.986	3724.944	350	-223.015732	16				-103	8094	1	0	1	-0.001	0.001	
10/12/09 03:14:52	59.9855	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:14:54	59.985	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:14:56	59.9845	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:14:58	59.984	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:15:00	59.984	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:15:02	59.984	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.000	0.000	
10/12/09 03:15:04	59.985	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:15:06	59.986	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:15:08	59.987	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:15:10	59.988	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:15:12	59.992	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.004	0.004	
10/12/09 03:15:14	59.996	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.004	0.004	
10/12/09 03:15:16	59.9975	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.001	0.001	
10/12/09 03:15:18	59.999	3724.944	350	-223.015732	16				-103	8094	1	0	1	0.002	0.002	
10/12/09 03:15:20	60.001	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:15:22	60.003	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:15:24	60.003	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:15:26	60.003	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:15:28	60.0055	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.003	0.003	
10/12/09 03:15:30	60.008	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:15:32	60.01	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:15:34	60.012	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.002	0.002	
10/12/09 03:15:36	60.0105	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.002	0.002	
10/12/09 03:15:38	60.009	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.001	0.001	
10/12/09 03:15:40	60.01	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.001	0.001	
10/12/09 03:15:42	60.011	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.001	0.001	
10/12/09 03:15:44	60.012	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.001	0.001	
10/12/09 03:15:46	60.013	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.001	0.001	
10/12/09 03:15:48	60.013	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:15:50	60.013	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:15:52	60.0145	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.001	0.001	
10/12/09 03:15:54	60.016	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.001	0.001	
10/12/09 03:15:56	60.0155	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:15:58	60.015	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:15:59	60.014	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.001	0.001	
10/12/09 03:16:01	60.013	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.001	0.001	
10/12/09 03:16:03	60.012	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.001	0.001	
10/12/09 03:16:05	60.011	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.001	0.001	
10/12/09 03:16:07	60.0105	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.001	0.001	
10/12/09 03:16:09	60.01	3724.944	350	-223.015732	16				-103	8094	1	1	1	0.000	0.000	
10/12/09 03:16:11	60.008	3724.944	350	-223.015732	16				-103	8094	1	1	1	-0.002	0.002	

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW
10/12/09 03:16:13	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:15	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:17	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:19	60.0045	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:21	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:23	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:25	60.003	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:27	60.0035	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:29	60.004	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:31	60.0025	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:33	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:35	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:37	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:39	59.9965	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:41	59.996	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:43	59.9965	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:45	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:47	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:49	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:51	59.998	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:53	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:55	59.9985	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:57	59.998	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:16:59	59.9985	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:01	59.999	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:03	59.998	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:05	59.997	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:07	59.9985	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:09	60	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:11	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:13	60.002	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:15	60.0015	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:17	60.001	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:19	60.0035	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:21	60.006	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:23	60.0055	3724.944	350	-223.015732	16				-103	8094
10/12/09 03:17:25	60.005	3724.944	350	-223.015732	16				-103	8094

Event Detection Row	Recovery Target Freq: 60.000	Max Absolute Delta Hz 0.126	Lowest Delta Hz -0.126	Highest Delta Hz 0.033	Rows of data to shift to align T(0) 1
306	2:27:26 t(0)				
473	2:33:00 t(Recovery)		Delta Hz	Absolute Delta Hz	
307	05:34 Event Length mm:ss				
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Balancing Authority Name: MyBA

MyBA_091012_0227_FRS_Form2.9.xlsm

Interconnection Prevailing UFLS First Step Relay trip point 59.500 Hz

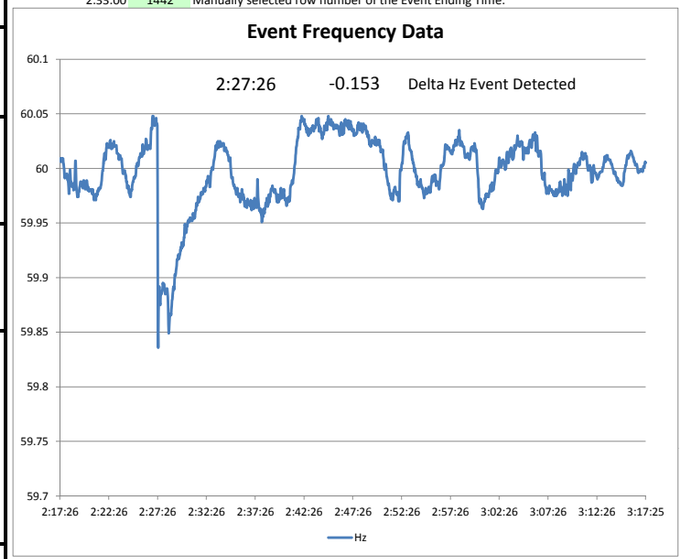
Interconnection High Relay trip point 60.500 Hz

004414

Note: See "Instruction" tab for more detailed instructions.

	Auto	**Event Detection**	
2:27:26	1245	Manually selected row number of the Event Starting Time.	Auto
2:33:00	1442	Manually selected row number of the Event Ending Time.	Manual

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



09/10/12 Date yymmdd

2:27 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_091012_0227_FRS_Form2.9.xlsm

Date:	Monday, October 12, 2009
Time of T(0)	2:27:26
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:00
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.042 Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.889 Hz
Pre to Post Perturbation Delta Frequency Actual	-0.153 Hz
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.73 MW
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	3788.35 MW
Pre to Post Perturbation Interchange Delta MW Actual	157.63 MW
Initial Performance Ramp Magnitude Adjustment	-15.40 MW
EPFR Pre-Perturbation Average	-43.39 MW
EPFR Post-Perturbation Average	114.21 MW
EPFR Delta	157.60 MW

Balancing Authority	MyBA
Grid Nominal Frequency	60.000 Hz
Droop Setting	5.00% 3.00000 Hz
Deadband Setting	0.000 Hz
Hz Span	3.00000 Hz
TC (frequency response filter constant)	0.350 Time Constant for delayed delivery of PFR during Sustained Measure

A Point	2:27:24	
FPointA	60.03900146	2:27:24
A Value	60.04212523	
C Value	59.83599854	
Delta FC		

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-")

Low Hz Delta Hz Event
3764.66 Actual Interchange MW Average during frequency recovery period
3804.23 Target Interchange MW Average during frequency recovery period
3719.84 Interchange Average Ramp MW during frequency recovery period
3640.68 Actual MW @ T(-4)
103.04 Starting and Ending Difference in Interchange MW during frequency recovery period (indicates ramp direction during recovery period)
0:05:34 Event Duration (h:mm:ss)
No Target MW Average minus MW @ T(-4) less than zero
163.55 Interchange Target Relative Average Change - MW (Low Frequency Event)
123.97 Interchange Actual Relative Average Change - MW (Low Frequency Event)
No Interchange Actual Average minus MW @ T(-4) less than zero
Yes Interchange Average MW minus MW @ T(-4) greater than zero
Yes Interchange Target MW Average minus MW @ T(-4) greater than zero
60.52 Interchange Target Relative Average Change - MW (High Frequency Event)
20.94 Interchange Actual Relative Average Change - MW (High Frequency Event)
Up Ramp Direction during frequency recovery period

EPFR = Expected Primary Frequency Response EPFR(Final) 142.20 MW
MW Response in right direction for frequency delta Yes

Initial Response P.U. Performance 1.109 P.U.
0.758 P.U. Sustianed Response P.U. Performance

	T	Frequency Hz	Interchange MW	Value B 20 to 52 sec Average Frequency	Average MW		Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW
T-72 sec	2:26:14	60.027	3671.189			3090	-27.810	-9.734							
T-70 sec	2:26:16	60.026	3668.611			3090	-26.781	-15.700							
T-68 sec	2:26:18	60.026	3665.232			3090	-26.781	-19.578							
T-66 sec	2:26:20	60.022	3664.495			3090	-22.659	-20.657							
T-64 sec	2:26:22	60.019	3666.062			3090	-19.571	-20.277							
T-62 sec	2:26:24	60.017	3666.821			3090	-17.508	-19.308							
T-60 sec	2:26:26	60.019	3666.787			3090	-19.571	-19.400		-0.102	3666.787				
T-58 sec	2:26:28	60.02	3670.454			3090	-20.600	-19.820		-0.102	3666.265				
T-56 sec	2:26:30	60.019	3670.267			3090	-19.571	-19.733		-0.102	3666.251				
T-54 sec	2:26:32	60.021	3671.668			3090	-21.630	-20.397		-0.102	3665.485				
T-52 sec	2:26:34	60.021	3672.493			3090	-21.630	-20.828		-0.102	3664.952				
T-50 sec	2:26:36	60.021	3672.685			3090	-21.630	-21.109		-0.102	3664.570				
T-48 sec	2:26:38	60.019	3672.857			3090	-19.571	-20.571		-0.102	3665.006				
T-46 sec	2:26:40	60.018	3672.164			3090	-18.542	-19.861		-0.102	3665.615				
T-44 sec	2:26:42	60.022	3671.413			3090	-22.659	-20.840		-0.102	3664.533				
T-42 sec	2:26:44	60.031	3669.983			3090	-31.928	-24.721		-0.102	3660.551				
T-40 sec	2:26:46	60.037	3666.467			3090	-38.109	-29.407		-0.102	3655.763				
T-38 sec	2:26:48	60.037	3663.758			3090	-38.109	-32.452		-0.102	3652.616				
T-36 sec	2:26:50	60.036	3661.599			3090	-37.079	-34.072		-0.102	3650.895				
T-34 sec	2:26:52	60.037	3660.672			3090	-38.109	-35.485		-0.102	3649.380				
T-32 sec	2:26:54	60.046	3651.492			3090	-47.381	-39.649		-0.102	3645.114				
T-30 sec	2:26:56	60.048	3649.190			3090	-49.440	-43.076		-0.102	3641.585				
T-28 sec	2:26:58	60.048	3650.025			3090	-49.440	-45.303		-0.102	3639.256				
T-26 sec	2:27:00	60.043	3648.246			3090	-44.289	-44.948		-0.102	3639.509				
T-24 sec	2:27:02	60.041	3649.512			3090	-42.230	-43.997		-0.102	3640.359				
T-22 sec	2:27:04	60.041	3654.294			3090	-42.230	-43.379		-0.102	3640.875				
T-20 sec	2:27:06	60.041	3655.007			3090	-42.230	-42.977		-0.102	3641.176				
T-18 sec	2:27:08	60.039	3651.874			3090	-40.172	-41.995		-0.102	3642.056				
T-16 sec	2:27:10	60.041	3651.059	60.042	3645.73	3090	-42.230	-42.077		-0.102	3641.872				
T-14 sec	2:27:12	60.043	3649.187	60.042	3645.73	3090	-44.289	-42.852		-0.102	3640.996				
T-12 sec	2:27:14	60.045	3648.236	60.042	3645.73	3090	-46.348	-44.075		-0.102	3639.670				
T-10 sec	2:27:16	60.046	3645.387	60.042	3645.73	3090	-47.381	-45.232		-0.102	3638.411				
T-08 sec	2:27:18	60.041	3644.628	60.042	3645.73	3090	-42.230	-44.182		-0.102	3639.360				
T-06 sec	2:27:20	60.041	3645.446	60.042	3645.73	3090	-42.230	-43.499		-0.102	3639.942				
T-04 sec	2:27:22	60.041	3640.682	60.042	3645.73	3090	-42.230	-43.055		-0.102	3640.284				
T-02 sec	2:27:24	60.039	3641.191	60.042	3645.73	3090	-40.172	-42.046		-0.102	3641.191				
T+0 sec	2:27:26	59.978	3659.465			3090	22.659	-19.399		0.000	3663.838				
T+02 sec	2:27:28	59.852	3696.362			3090	152.439	40.744		0.617	3724.598	3677.914	3694.218	3668.635	3668.635
T+04 sec	2:27:30	59.836	3734.904			3090	168.922	85.606		0.617	3770.077	3696.910	3719.504	3669.252	3668.944
T+06 sec	2:27:32	59.869	3734.673			3090	134.931	102.870		0.617	3787.958	3706.351	3736.618	3669.869	3669.252
T+08 sec	2:27:34	59.869	3734.673			3090	134.931	114.091		0.617	3799.796	3712.015	3749.253	3670.486	3669.561
T+10 sec	2:27:36	59.892	3737.157			3090	111.242	113.094		0.617	3799.415	3716.206	3757.614	3671.103	3669.869
T+12 sec	2:27:38	59.891	3761.250			3090	112.271	112.806		0.617	3799.745	3722.640	3763.632	3671.720	3670.178
T+14 sec	2:27:40	59.88	3766.113			3090	123.599	116.583		0.617	3804.139	3728.074	3768.696	3672.337	3670.486
T+16 sec	2:27:42	59.876	3766.194			3090	127.721	120.481		0.617	3808.654	3732.310	3773.136	3672.954	3670.795
T+18 sec	2:27:44	59.875	3768.877			3090	128.750	123.375		0.617	3812.165	3735.967	3777.038	3673.571	3671.103
T+20 sec	2:27:46	59.883	3769.925	59.889	3788.35	3090	120.511	122.373	3803.32	0.617	3811.779	3739.054	3780.197	3674.188	3671.412
T+22 sec	2:27:48	59.887	3780.621	59.889	3788.35	3090	116.389	120.278	3803.32	0.617	3810.302	3742.518	3782.705	3674.805	3671.720
T+24 sec	2:27:50	59.886	3781.592	59.889	3788.35	3090	117.418	119.277	3803.32	0.617	3809.918	3745.523	3784.799	3675.422	3672.029
T+26 sec	2:27:52	59.885	3782.500	59.889	3788.35	3090	118.452	118.988	3803.32	0.617	3810.246	3748.165	3786.616	3676.039	3672.337
T+28 sec	2:27:54	59.887	3784.962	59.889	3788.35	3090	116.389	118.079	3803.32	0.617	3809.953	3750.618	3788.172	3676.656	3672.646
T+30 sec	2:27:56	59.888	3784.730	59.889	3788.35	3090	115.359	117.127	3803.32	0.617	3809.618	3752.750	3789.513	3677.273	3672.954
T+32 sec	2:27:58	59.89	3784.419	59.889	3788.35	3090	113.301	115.788	3803.32	0.617	3808.896	3754.613	3790.653	3677.890	3673.263
T+34 sec	2:28:00	59.895	3788.072	59.889	3788.35	3090	108.150	113.114	3803.32	0.617	3806.840	3756.471	3791.552	3678.507	3673.571
T+36 sec	2:28:02	59.894	3788.328	59.889	3788.35	3090	109.179	111.737	3803.32	0.617	3806.079	3758.148	3792.317	3679.124	3673.879
T+38 sec	2:28:04	59.893	3788.868	59.889	3788.35	3090	110.208	111.202	3803.32	0.617	3806.161	3759.684	3793.009	3679.741	3674.188
T+40 sec	2:28:06	59.894	3788.472	59.889	3788.35	3090	109.179	110.494	3803.32	0.617	3806.070	3761.055	3793.631	3680.358	3674.496
T+42 sec	2:28:08	59.894	3792.276	59.889	3788.35	3090	109.179	110.034	3803.32	0.617	3806.227	3762.474	3794.203	3680.975	3674.805
T+44 sec	2:28:10	59.891	3793.074	59.889	3788.35	3090	112.271	110.817	3803.32	0.617	3807.627	3763.805	3794.787	3681.592	3675.113
T+46 sec	2:28:12	59.89	3794.374	59.889	3788.35	3090	113.301	111.686	3803.32	0.617	3809.113	3765.078	3795.384	3682.209	3675.422
T+48 sec	2:28:14	59.885	3799.428	59.889	3788.35	3090	118.452	114.054	3803.32	0.617	3812.098	3766.452	3796.053	3682.826	3675.730
T+50 sec	2:28:16	59.885	3800.427	59.889	3788.35	3090	118.452	115.593	3803.32	0.617	3814.254	3767.759	3796.753	3683.443	3676.039
T+52 sec	2:28:18	59.888	3799.959	59.889	3788.35	3090	115.359	115.511	3803.32	0.617	3814.790	3768.952	3797.421	3684.060	3676.347
T+54 sec	2:28:20	59.887	3803.625			3090	116.389	115.819		0.617	3815.714	3770.190	3798.074	3684.677	3676.656
T+56 sec	2:28:22	59.888	3802.925			3090	115.359	115.658		0.617	3816.170	3771.319	3798.698	3685.293	3676.964
T+58 sec	2:28:24	59.888	3802.951			3090	115.359	115.553		0.617	3816.682	3772.373	3799.297	3685.910	3677.273
T+60 sec	2:28:26	59.89	3804.388			3090	113.301	114.765		0.617	3816.511	3773.406	3799.853	3686.527	3677.581
T+62 sec	2:28:28	59.889	3805.496			3090	114.330	114.613		0.617	3816.976	3774.409	3800.388	3687.144	3677.890
T+64 sec	2:28:30	59.882	3805.617			3090	121.540	117.037		0.617	3820.017	3775.354	3800.983	3687.761	3678.198
T+66 sec	2:28:32	59.873	3809.237			3090	130.809	121.857		0.617	3825.454	3776.351	3801.702	3688.378	3678.507
T+68 sec	2:28:34	59.857	3811.503			3090	147.292	130.759		0.617	3834.973	3777.355	3802.653	3688.995	3678.815
T+70 sec	2:28:36	59.849	3814.862			3090	155.531	139.429		0.617	3844.260	3778.397	3803.809	3689.612	3679.124
T+72 sec	2:28:38	59.852	3815.889			3090	152.439	143.983		0.617	3849.431	3779.410	3805.042	3690.229	3679.432
T+74 sec	2:28:40	59.858	3825.643			3090	146.258	144.779		0.617	3850.844	3780.627	3806.247	3690.846	3679.741
T+76 sec	2:28:42	59.863	3826.053			3090	141.111	143.495		0.617	3850.177	3781.792	3807.373	3691.463	3680.049
T+78 sec	2:28:44	59.866	3826.002			3090	138.019	141.579		0.617	3848.877	3782.897	3808.411	3692.080	3680.358
T+80 sec	2:28:46	59.865	3827.524			3090	139.048	140.693		0.617	3848.609	3783.986	3809.392	3692.697	3680.666
T+82 sec	2:28:48	59.867	3826.753			3090	136.989	139.397		0.617	3847.929	3785.004	3810.309	3693.314	3680.975
T+84 sec	2:28:50	59.866	3826.783			3090	138.019	138.914		0.617	3848.064	3785.975	3811.187	3693.931	3681.283
T+86 sec	2:28:52	59.871	3826.454			3090	132.872	136.799		0.617	3846.566	3786.895	3811.991	3694.548	3681.592
T+88 sec	2:28:54	59.874	3825.713			3090	129.779	134.342		0.617	3844.726	3787.758	3812.719	3695.165	3681.900
T+90 sec	2:28:56	59.879	3823.826			3090	124.628	130.943		0.617	3841.943	3788.542	3813.354	3695.782	3682.209
T+92 sec	2:28:58	59.88	3822.505			3090	123.599	128.372		0.617	3839.990	3789.265	3813.921	3696.399	3682.517
T+94 sec	2:29:00	59.883	3819.081			3090	120.511	125.621		0.617	3837.855	3789.886	3814.419	3697.016	3682.826
T+96 sec	2:29:02	59.886	3818.055			3090	117.418	122.750		0.617	3835.601	3790.461	3814.852	3697.633	3683.134
T+98 sec	2:29:04	59.89	3816.815			3090	113.301	119.443		0.617	3832.911	3790.988	3815.213	3698.250	3683.443
T+100 sec	2:29:06	59.892	3815.010			3090	111.242	116.572		0.617	3830.658	3791.459	3815.516	3698.867	3683.751
T+102 sec	2:29:08	59.889	3813.783			3090	114.330	115.788		0.617	3830.490	3791.888	3815.804	3699.484	3684.060
T+104 sec	2:29:10	59.893	3811.838			3090	110.208	113.835		0.617	3829.154	3792.265	3816.055	3700.101	3684.368
T+106 sec	2:29:12	59.899	3809.652			3090	104.032	110.404		0.617	3826.340	3792.587	3816.246	3700.718	3684.677
T+108 sec	2:29:14	59.903	3806.972			3090	99.910	106.731		0.617	3823.284	3792.848	3816.374	3701.335	3684.985
T+110 sec	2:29:16	59.902	3805.593			3090	100.940	104.704		0.617	3821.874	3793.076	3816.472	3701.952	3685.293
T+112 sec	2:29:18	59.902	3804.188			3090	100.940	103.386		0.617	3821.174	3793.271	3816.555	3702.569	3685.602
T+114 sec	2:29:20	59.904	3796.078			3090	98.881	101.809		0.617	3820.214	3793.319	3816.618	3703.186	3685.910
T+116 sec	2:29:22	59.907	3793.975			3090	95.788	99.702		0.617	3818.723	3793.330	3816.653	3703.803	3686.219
T+118 sec	2:29:24	59.911	3792.169			3090	91.671	96.891		0.617	3816.529	3793.311	3816.651	3704.420	3686.527
T+120 sec	2:29:26	59.916	3791.502			3090	86.520	93.261		0.617	3813.516	3793.281	3816.600	3705.037	3686.836
T+122 sec	2:29:28	59.916	3789.534			3090	86.520	90.902		0.617	3811.774	3793.221	3816.522	3705.654	3687.144
T+124 sec	2:29:30	59.917	3788.132			3090	85.490	89.008		0.617	3810.497	3793.140	3816.426	3706.271	3687.453
T+126 sec	2:29:32	59.918	3784.563			3090	84.461	87.416		0.617	3809.522	3793.006	3816.319	3706.888	3687.761
T+128 sec	2:29:34	59.92	3783.028			3090	82.402	85.661		0.617	3808.384	3792.853	3816.197	3707.504	3688.070
T+130 sec	2:29:36	59.921	3781.701			3090	81.369	84.159		0.617	3807.499	3792.684	3816.065	3708.121	3688.378
T+132 sec	2:29:38	59.92	3776.358			3090	82.402	83.544		0.617	3807.501	3792.440	3815.937	3708.738	3688.687
T+134 sec	2:29:40	59.917	3775.635			3090	85.490	84.225		0.617	3808.799	3792.193	3815.832	3709.355	3688.995
T+136 sec	2:29:42	59.92	3774.604			3090	82.402	83.587		0.617	3808.778	3791.938	3815.730	3709.972	3689.304
T+138 sec	2:29:44	59.921	3773.334			3090	81.369	82.811		0.617	3808.618	3791.672	3815.628	3710.589	3689.612
T+140 sec	2:29:46	59.923	3773.958			3090	79.310	81.585		0.617	3808.010	3791.423	3815.521	3711.206	3689.921
T+142 sec	2:29:48	59.926	3772.722			3090	76.221	79.708		0.617	3806.750	3791.163	3815.399	3711.823	3690.229
T+144 sec	2:29:50	59.925	3771.670			3090	77.251	78.848		0.617	3806.507	3790.896	3815.277	3712.440	3690.538
T+146 sec	2:29:52	59.928	3769.630			3090	74.159	77.207		0.617	3805.482	3790.608	3815.145	3713.057	3690.846
T+148 sec	2:29:54	59.927	3768.707			3090	75.192	76.501		0.617	3805.394	3790.316	3815.015	3713.674	3691.155
T+150 sec	2:29:56	59.932	3767.643			3090	70.041	74.240		0.617	3803.750	3790.018	3814.867	3714.291	3691.463
T+152 sec	2:29:58	59.927	3767.021			3090	75.192	74.573		0.617	3804.700	3789.719	3814.735	3714.908	3691.772
T+154 sec	2:30:00	59.928	3767.408			3090	74.159	74.428		0.617	3805.172	3789.433	3814.612	3715.525	3692.080
T+156 sec	2:30:02	59.931	3766.788			3090	71.070	73.253		0.617	3804.614	3789.147	3814.485	3716.142	3692.389
T+158 sec	2:30:04	59.929	3766.259			3090	73.129	73.210		0.617	3805.187	3788.861	3814.369	3716.759	3692.697
T+160 sec	2:30:06	59.931	3765.672			3090	71.070	72.461		0.617	3805.055	3788.574	3814.254	3717.376	3693.006
T+162 sec	2:30:08	59.933	3766.123			3090	69.011	71.254		0.617	3804.465	3788.301	3814.135	3717.993	3693.314
T+164 sec	2:30:10	59.937	3764.243			3090	64.890	69.026		0.617	3802.855	3788.011	3813.999	3718.610	3693.623
T+166 sec	2:30:12	59.937	3765.105			3090	64.890	67.578		0.617	3802.024	3787.738	3813.856	3719.227	3693.931
T+168 sec	2:30:14	59.945	3762.935			3090	56.650	63.754		0.617	3798.816	3787.446	3813.679	3719.844	3694.240

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

	T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW
T-72 sec	2:26:14	60.027	3671.19	350.00	157.63	0.00	10.00	15.00	-103.00	7640.91	-27.810
T-70 sec	2:26:16	60.026	3668.61	350.00	155.53	0.00	10.00	15.00	-103.00	7641.24	-26.781
T-68 sec	2:26:18	60.026	3665.23	350.00	155.53	0.00	10.00	15.00	-103.00	7641.57	-26.781
T-66 sec	2:26:20	60.022	3664.50	350.00	155.53	0.00	10.00	15.00	-103.00	7641.90	-22.659
T-64 sec	2:26:22	60.019	3666.06	350.00	155.53	0.00	10.00	15.00	-103.00	7642.23	-19.571
T-62 sec	2:26:24	60.017	3666.82	350.00	155.53	0.00	10.00	15.00	-103.00	7642.56	-17.508
T-60 sec	2:26:26	60.019	3666.79	350.00	160.45	0.00	10.00	15.00	-103.00	7642.89	-19.571
T-58 sec	2:26:28	60.020	3670.45	350.00	160.45	0.00	10.00	15.00	-103.00	7643.22	-20.600
T-56 sec	2:26:30	60.019	3670.27	350.00	160.45	0.00	10.00	15.00	-103.00	7643.55	-19.571
T-54 sec	2:26:32	60.021	3671.67	350.00	160.45	0.00	10.00	15.00	-103.00	7643.88	-21.630
T-52 sec	2:26:34	60.021	3672.49	350.00	160.45	0.00	10.00	15.00	-103.00	7644.21	-21.630
T-50 sec	2:26:36	60.021	3672.69	350.00	163.96	0.00	10.00	15.00	-103.00	7644.54	-21.630
T-48 sec	2:26:38	60.019	3672.86	350.00	163.96	0.00	10.00	15.00	-103.00	7644.87	-19.571
T-46 sec	2:26:40	60.018	3672.16	350.00	163.96	0.00	10.00	15.00	-103.00	7645.20	-18.542
T-44 sec	2:26:42	60.022	3671.41	350.00	163.96	0.00	10.00	15.00	-103.00	7645.53	-22.659
T-42 sec	2:26:44	60.031	3669.98	350.00	163.96	0.00	10.00	15.00	-103.00	7645.86	-31.928
T-40 sec	2:26:46	60.037	3666.47	350.00	166.07	0.00	10.00	15.00	-103.00	7646.19	-38.109
T-38 sec	2:26:48	60.037	3663.76	350.00	166.07	0.00	10.00	15.00	-103.00	7646.52	-38.109
T-36 sec	2:26:50	60.036	3661.60	350.00	166.07	0.00	10.00	15.00	-103.00	7646.85	-37.079
T-34 sec	2:26:52	60.037	3660.67	350.00	166.07	0.00	10.00	15.00	-103.00	7647.18	-38.109
T-32 sec	2:26:54	60.046	3651.49	350.00	166.07	0.00	10.00	15.00	-103.00	7647.51	-47.381
T-30 sec	2:26:56	60.048	3649.19	350.00	163.77	0.00	10.00	15.00	-103.00	7647.84	-49.440
T-28 sec	2:26:58	60.048	3650.03	350.00	163.77	0.00	10.00	15.00	-103.00	7648.17	-49.440
T-26 sec	2:27:00	60.043	3648.25	350.00	163.77	0.00	10.00	15.00	-103.00	7648.50	-44.289
T-24 sec	2:27:02	60.041	3649.51	350.00	163.77	0.00	10.00	15.00	-103.00	7648.83	-42.230
T-22 sec	2:27:04	60.041	3654.29	350.00	163.77	0.00	10.00	15.00	-103.00	7649.16	-42.230
T-20 sec	2:27:06	60.041	3655.01	350.00	165.10	0.00	10.00	15.00	-103.00	7649.49	-42.230
T-18 sec	2:27:08	60.039	3651.87	350.00	165.10	0.00	10.00	15.00	-103.00	7649.82	-40.172
T-16 sec	2:27:10	60.041	3651.06	350.00	165.10	0.00	10.00	15.00	-103.00	7650.15	-42.230
T-14 sec	2:27:12	60.043	3649.19	350.00	165.10	0.00	10.00	15.00	-103.00	7650.48	-44.289
T-12 sec	2:27:14	60.045	3648.24	350.00	165.10	0.00	10.00	15.00	-103.00	7650.81	-46.348
T-10 sec	2:27:16	60.046	3645.39	350.00	165.48	0.00	10.00	15.00	-103.00	7651.14	-47.381
T-08 sec	2:27:18	60.041	3644.63	350.00	165.48	0.00	10.00	15.00	-103.00	7651.47	-42.230
T-06 sec	2:27:20	60.041	3645.45	350.00	165.48	0.00	10.00	15.00	-103.00	7651.80	-42.230
T-04 sec	2:27:22	60.041	3640.68	350.00	165.48	0.00	10.00	15.00	-103.00	7652.13	-42.230
T-02 sec	2:27:24	60.039	3641.19	350.00	165.48	0.00	10.00	15.00	-103.00	7652.46	-40.172
T+0 sec	2:27:26	59.978	3659.46	350.00	206.46	0.00	10.00	15.00	-103.00	7652.79	22.659
T+02 sec	2:27:28	59.852	3696.36	350.00	206.46	0.00	10.00	0.00	-103.00	7616.00	152.439
T+04 sec	2:27:30	59.836	3734.90	335.00	206.46	0.00	10.00	0.00	-103.00	7626.00	168.922
T+06 sec	2:27:32	59.869	3734.67	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	134.931
T+08 sec	2:27:34	59.869	3734.67	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	134.931
T+10 sec	2:27:36	59.892	3737.16	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	111.242
T+12 sec	2:27:38	59.891	3761.25	335.00	211.26	0.00	10.00	0.00	-103.00	7632.00	112.271
T+14 sec	2:27:40	59.880	3766.11	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	123.599
T+16 sec	2:27:42	59.876	3766.19	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	127.721
T+18 sec	2:27:44	59.875	3768.88	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	128.750
T+20 sec	2:27:46	59.883	3769.93	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	120.511
T+22 sec	2:27:48	59.887	3780.62	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	116.389
T+24 sec	2:27:50	59.886	3781.59	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	117.418
T+26 sec	2:27:52	59.885	3782.50	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	118.452
T+28 sec	2:27:54	59.887	3784.96	335.00	214.35	2.00	10.00	0.00	-103.00	7632.00	116.389
T+30 sec	2:27:56	59.888	3784.73	335.00	214.35	3.00	10.00	0.00	-103.00	7632.00	115.359
T+32 sec	2:27:58	59.890	3784.42	335.00	212.17	4.00	10.00	0.00	-103.00	7632.00	113.301
T+34 sec	2:28:00	59.895	3788.07	335.00	212.17	5.00	10.00	0.00	-103.00	7632.00	108.150
T+36 sec	2:28:02	59.894	3788.33	335.00	212.17	6.00	10.00	0.00	-103.00	7632.00	109.179
T+38 sec	2:28:04	59.893	3788.87	335.00	212.17	7.00	10.00	0.00	-103.00	7632.00	110.208
T+40 sec	2:28:06	59.894	3788.47	335.00	212.17	8.00	10.00	0.00	-103.00	7632.00	109.179
T+42 sec	2:28:08	59.894	3792.28	335.00	215.60	9.00	10.00	0.00	-103.00	7632.00	109.179
T+44 sec	2:28:10	59.891	3793.07	335.00	215.60	10.00	10.00	0.00	-103.00	7632.00	112.271
T+46 sec	2:28:12	59.890	3794.37	335.00	215.60	11.00	10.00	0.00	-103.00	7632.00	113.301
T+48 sec	2:28:14	59.885	3799.43	335.00	215.60	12.00	10.00	0.00	-103.00	7632.00	118.452
T+50 sec	2:28:16	59.885	3800.43	335.00	215.60	13.00	10.00	0.00	-103.00	7632.00	118.452
T+52 sec	2:28:18	59.888	3799.96	335.00	218.33	14.00	10.00	0.00	-103.00	7632.00	115.359
T+54 sec	2:28:20	59.887	3803.63	335.00	218.33	15.00	10.00	0.00	-103.00	7632.00	116.389
T+56 sec	2:28:22	59.888	3802.93	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	115.359
T+58 sec	2:28:24	59.888	3802.95	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	115.359
T+60 sec	2:28:26	59.890	3804.39	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	113.301
T+62 sec	2:28:28	59.889	3805.50	335.00	217.38	16.00	10.00	0.00	-103.00	7632.00	114.330
T+64 sec	2:28:30	59.882	3805.62	335.00	217.38	16.00	10.00	0.00	-103.00	7632.00	121.540
T+66 sec	2:28:32	59.873	3809.24	335.00	217.38	16.00	10.00	0.00	-103.00	7631.00	130.809
T+68 sec	2:28:34	59.857	3811.50	335.00	217.38	16.00	10.00	0.00	-103.00	7625.00	147.292
T+70 sec	2:28:36	59.849	3814.86	335.00	217.38	16.00	10.00	0.00	-103.00	7623.00	155.531
T+72 sec	2:28:38	59.852	3815.89	335.00	214.83	16.00	10.00	0.00	-103.00	7621.00	152.439
T+74 sec	2:28:40	59.858	3825.64	335.00	214.83	16.00	10.00	0.00	-103.00	7623.00	146.258
T+76 sec	2:28:42	59.863	3826.05	335.00	214.83	16.00	10.00	0.00	-103.00	7625.00	141.111
T+78 sec	2:28:44	59.866	3826.00	335.00	214.83	16.00	10.00	0.00	-103.00	7627.00	138.019
T+80 sec	2:28:46	59.865	3827.52	335.00	214.83	16.00	10.00	0.00	-103.00	7628.00	139.048
T+82 sec	2:28:48	59.867	3826.75	335.00	227.66	16.00	10.00	0.00	-103.00	7628.00	136.989
T+84 sec	2:28:50	59.866	3826.78	335.00	227.66	16.00	10.00	0.00	-103.00	7629.00	138.019
T+86 sec	2:28:52	59.871	3826.45	335.00	227.66	16.00	10.00	0.00	-103.00	7630.00	132.872
T+88 sec	2:28:54	59.874	3825.71	335.00	227.66	16.00	10.00	0.00	-103.00	7631.00	129.779
T+90 sec	2:28:56	59.879	3823.83	335.00	227.66	16.00	10.00	0.00	-103.00	7635.00	124.628
T+92 sec	2:28:58	59.880	3822.51	335.00	225.02	16.00	10.00	0.00	-103.00	7638.00	123.599
T+94 sec	2:29:00	59.883	3819.08	335.00	225.02	16.00	10.00	0.00	-103.00	7639.00	120.511
T+96 sec	2:29:02	59.886	3818.06	335.00	225.02	16.00	10.00	0.00	-103.00	7642.00	117.418
T+98 sec	2:29:04	59.890	3816.81	335.00	225.02	16.00	10.00	0.00	-103.00	7644.00	113.301
T+100 sec	2:29:06	59.892	3815.01	335.00	225.02	16.00	10.00	0.00	-103.00	7645.00	111.242
T+102 sec	2:29:08	59.889	3813.78	335.00	228.37	16.00	10.00	0.00	-103.00	7647.00	114.330
T+104 sec	2:29:10	59.893	3811.84	335.00	228.37	16.00	10.00	0.00	-103.00	7648.00	110.208
T+106 sec	2:29:12	59.899	3809.65	335.00	228.37	16.00	10.00	0.00	-103.00	7649.00	104.032
T+108 sec	2:29:14	59.903	3806.97	335.00	228.37	16.00	10.00	0.00	-103.00	7650.00	99.910
T+110 sec	2:29:16	59.902	3805.59	335.00	228.37	16.00	10.00	0.00	-103.00	7651.00	100.940
T+112 sec	2:29:18	59.902	3804.19	335.00	234.08	16.00	10.00	0.00	-103.00	7652.00	100.940
T+114 sec	2:29:20	59.904	3796.08	335.00	234.08	16.00	10.00	0.00	-103.00	7653.00	98.881
T+116 sec	2:29:22	59.907	3793.98	335.00	234.08	16.00	10.00	0.00	-103.00	7654.00	95.788
T+118 sec	2:29:24	59.911	3792.17	335.00	234.08	16.00	10.00	0.00	-103.00	7655.00	91.671
T+120 sec	2:29:26	59.916	3791.50	335.00	234.08	16.00	10.00	0.00	-103.00	7655.00	86.520
T+122 sec	2:29:28	59.916	3789.53	335.00	228.80	16.00	10.00	0.00	-103.00	7656.00	86.520
T+124 sec	2:29:30	59.917	3788.13	335.00	228.80	16.00	10.00	0.00	-103.00	7656.00	85.490
T+126 sec	2:29:32	59.918	3784.56	335.00	228.80	16.00	10.00	0.00	-103.00	7657.00	84.461
T+128 sec	2:29:34	59.920	3783.03	335.00	228.80	16.00	10.00	0.00	-103.00	7657.00	82.402
T+130 sec	2:29:36	59.921	3781.70	335.00	228.80	16.00	10.00	0.00	-103.00	7658.00	81.369
T+132 sec	2:29:38	59.920	3776.36	335.00	229.47	16.00	10.00	0.00	-103.00	7658.00	82.402
T+134 sec	2:29:40	59.917	3775.64	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	85.490
T+136 sec	2:29:42	59.920	3774.60	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	82.402
T+138 sec	2:29:44	59.921	3773.33	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	81.369
T+140 sec	2:29:46	59.923	3773.96	335.00	229.47	16.00	10.00	0.00	-103.00	7660.00	79.310
T+142 sec	2:29:48	59.926	3772.72	335.00	228.98	16.00	10.00	0.00	-103.00	7660.00	76.221
T+144 sec	2:29:50	59.925	3771.67	335.00	228.98	16.00	10.00	0.00	-103.00	7661.00	77.251
T+146 sec	2:29:52	59.928	3769.63	335.00	228.98	16.00	10.00	0.00	-103.00	7661.00	74.159
T+148 sec	2:29:54	59.927	3768.71	335.00	228.98	16.00	10.00	0.00	-103.00	7662.00	75.192
T+150 sec	2:29:56	59.932	3767.64	335.00	228.98	16.00	10.00	0.00	-103.00	7662.00	70.041
T+152 sec	2:29:58	59.927	3767.02	335.00	219.98	16.00	10.00	0.00	-103.00	7663.00	75.192
T+154 sec	2:30:00	59.928	3767.41	335.00	219.98	16.00	10.00	0.00	-103.00	7663.00	74.159
T+156 sec	2:30:02	59.931	3766.79	335.00	219.98	16.00	10.00	0.00	-103.00	7664.00	71.070
T+158 sec	2:30:04	59.929	3766.26	335.00	219.98	16.00	10.00	0.00	-103.00	7664.00	73.129
T+160 sec	2:30:06	59.931	3765.67	335.00	219.98	16.00	10.00	0.00	-103.00	7665.00	71.070
T+162 sec	2:30:08	59.933	3766.12	335.00	229.09	16.00	10.00	0.00	-103.00	7666.00	69.011
T+164 sec	2:30:10	59.937	3764.24	335.00	229.09	16.00	10.00	0.00	-103.00	7666.00	64.890
T+166 sec	2:30:12	59.937	3765.10	335.00	229.09	16.00	10.00	0.00	-103.00	7667.00	64.890
T+168 sec	2:30:14	59.945	3762.94	335.00	229.09	16.00	10.00	0.00	-103.00	7668.00	56.650

Date:	Monday, October 12, 2009
Time of T(0)	2:27:26
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:00
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.042 Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.889 Hz
Pre to Post Perturbation Delta Frequency Actual	-0.153 Hz
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.73 MW
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	3803.35 MW
Pre to Post Perturbation Interchange Delta MW Actual	157.63 MW
EPFR Pre-Perturbation Average	-43.39 MW
EPFR Post-Perturbation Average	114.21 MW
EPFR Unadjusted	157.60 MW
EPFR Adjusted	198.04 MW
Pre JOU Dynamic Schedules MW	350.00 MW
Pre Non-Conforming Load MW	165.34 MW
Pre Pumped Hydro MW	0.00 MW
Pre Transferred Frequency Response MW	-4.21 MW
Pre Contingent BA Lost Generation MW	15.00 MW
Sum of Pre Perturbation Adjustments	526.12 MW
Post JOU Dynamic Schedules MW	335.00 MW
Post Non-Conforming Load MW	214.13 MW
Post Pumped Hydro MW	6.35 MW
Post Transferred Frequency Response MW	11.09 MW
Post Contingent BA Lost Generation MW	0.00 MW
Sum of Post Perturbation Adjustments	566.57 MW
Net Total Adjustments MW	40.45 MW

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-103.00 MW/0.1 Hz
Post-Perturbation Bias Setting	-103.00 MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	-43.39 MW
EPFR for Bias Setting Post-Perturbation Average	114.21 MW
EPFR for Bias Setting Delta	157.60 MW
Primary Frequency Response Delivery % of Bias	100.02%
Pre-Perturbation BA Load	7651.3 MW
Post-Perturbation BA Load	7632.0 MW
Pre to Post Perturbation BA Load Change	-19.305 MW
Load Dampening Frequency Response	-12.617 MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	12.25%
Average Bias Setting when Hz is greater than +/-0.036 Hz	-103.00 MW/0.1 Hz

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

		Actual Primary Freq Response MW	Un-adjusted P.U. Performance	JOU Dynamic Schedules Adjustment	Non-Conforming Load Adjustment	Pumped Hydro Adjustment	Transferred Frequency Response Adjustment	Contingent BA Lost Generation Adjustment	Adjusted P.U. Performance
Frequency @ T(+46)	59.890 Hz								
Frequency @ T(+76)	59.863 Hz								
Frequency @ T(+106)	59.899 Hz								
Frequency @ T(+136)	59.920 Hz								
Frequency @ T(+166)	59.937 Hz								
EPFR @ T(+46)	113.30 MW	158.51	1.399	-15.00	50.26	11.00	15.21	-15.00	0.856
EPFR @ T(+76)	141.11 MW	182.41	1.293	-15.00	[illegible]	16.00	17.91	-15.00	0.808
EPFR @ T(+106)	104.03 MW	164.54	1.582	-15.00	[illegible]	16.00	14.31	-15.00	0.829
EPFR @ T(+136)	82.40 MW	129.49	1.571	-15.00	64.13	16.00	12.21	-15.00	0.633
EPFR @ T(+166)	64.89 MW	119.99	1.849	-15.00	63.75	16.00	10.51	-15.00	0.689

004415

20 to 52 second Average Period Evaluation

Initial P.U. Performance for FRO 1.000 P.U.
Initial P.U. Performance Adjusted for FRO 0.744 P.U.

	T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected Net Actual Interchange MW	Actual Primary Freq Response MW	Actual Primary Freq Response Beta MW/0.1 Hz		
T-72 sec	2:26:14														0.0270	
T-70 sec	2:26:16														0.0260	
T-68 sec	2:26:18														0.0260	
T-66 sec	2:26:20														0.0220	
T-64 sec	2:26:22														0.0190	
T-62 sec	2:26:24														0.0170	
T-60 sec	2:26:26														0.0190	
T-58 sec	2:26:28														0.0200	
T-56 sec	2:26:30														0.0190	
T-54 sec	2:26:32														0.0210	
T-52 sec	2:26:34														0.0210	
T-50 sec	2:26:36														0.0210	
T-48 sec	2:26:38														0.0190	
T-46 sec	2:26:40														0.0180	
T-44 sec	2:26:42														0.0220	
T-42 sec	2:26:44														0.0310	
T-40 sec	2:26:46														0.0370	-103
T-38 sec	2:26:48														0.0370	-103
T-36 sec	2:26:50														0.0360	
T-34 sec	2:26:52														0.0370	
T-32 sec	2:26:54														0.0460	-103
T-30 sec	2:26:56														0.0480	-103
T-28 sec	2:26:58														0.0480	-103
T-26 sec	2:27:00														0.0430	-103
T-24 sec	2:27:02														0.0410	-103
T-22 sec	2:27:04														0.0410	-103
T-20 sec	2:27:06														0.0410	-103
T-18 sec	2:27:08														0.0390	-103
T-16 sec	2:27:10	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0410	-103
T-14 sec	2:27:12	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0430	-103
T-12 sec	2:27:14	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0450	-103
T-10 sec	2:27:16	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0460	-103
T-08 sec	2:27:18	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0410	-103
T-06 sec	2:27:20	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0410	-103
T-04 sec	2:27:22	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0410	-103
T-02 sec	2:27:24	60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389				0.0390	-103
T+0 sec	2:27:26														0.0220	-103
T+02 sec	2:27:28												51.252	-26.96	0.1480	-103
T+04 sec	2:27:30												89.794	-43.56	0.1640	-103
T+06 sec	2:27:32												89.563	-51.73	0.1310	-103
T+08 sec	2:27:34												89.563	-51.73	0.1310	-103
T+10 sec	2:27:36												92.047	-61.31	0.1080	-103
T+12 sec	2:27:38												116.139	-76.85	0.1090	-103
T+14 sec	2:27:40												121.003	-74.64	0.1200	-103
T+16 sec	2:27:42												121.084	-72.89	0.1240	-103
T+18 sec	2:27:44												123.767	-74.06	0.1250	-103
T+20 sec	2:27:46	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	124.815	-78.44	0.1170	-103
T+22 sec	2:27:48	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	135.511	-87.36	0.1130	-103
T+24 sec	2:27:50	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	136.482	-87.42	0.1140	-103
T+26 sec	2:27:52	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	137.389	-87.44	0.1150	-103
T+28 sec	2:27:54	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.852	-90.15	0.1130	-103
T+30 sec	2:27:56	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.620	-90.59	0.1120	-103
T+32 sec	2:27:58	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.309	-91.57	0.1100	-103
T+34 sec	2:28:00	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	142.962	-97.17	0.1050	-103
T+36 sec	2:28:02	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.218	-96.69	0.1060	-103
T+38 sec	2:28:04	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.758	-96.40	0.1070	-103
T+40 sec	2:28:06	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.362	-96.78	0.1060	-103
T+42 sec	2:28:08	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	147.166	-99.35	0.1060	-103
T+44 sec	2:28:10	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	147.964	-97.91	0.1090	-103
T+46 sec	2:28:12	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	149.264	-98.12	0.1100	-103
T+48 sec	2:28:14	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	154.318	-98.21	0.1150	-103
T+50 sec	2:28:16	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	155.317	-98.85	0.1150	-103
T+52 sec	2:28:18	59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	154.849	-100.47	0.1120	-103
T+54 sec	2:28:20												158.515	-102.19	0.1130	-103
T+56 sec	2:28:22												157.815	-102.39	0.1120	-103
T+58 sec	2:28:24												157.841	-102.41	0.1120	-103
T+60 sec	2:28:26												159.278	-104.70	0.1100	-103
T+62 sec	2:28:28												160.386	-104.74	0.1110	-103
T+64 sec	2:28:30												160.507	-100.24	0.1180	-103
T+66 sec	2:28:32												164.127	-97.05	0.1270	-103
T+68 sec	2:28:34												166.393	-89.88	0.1430	-103
T+70 sec	2:28:36												169.752	-87.90	0.1510	-103
T+72 sec	2:28:38												170.779	-89.82	0.1480	-103
T+74 sec	2:28:40												180.532	-98.05	0.1420	-103
T+76 sec	2:28:42												180.943	-101.01	0.1370	-103
T+78 sec	2:28:44												180.892	-102.71	0.1340	-103
T+80 sec	2:28:46												182.414	-102.99	0.1350	-103
T+82 sec	2:28:48												181.643	-103.72	0.1330	-103
T+84 sec	2:28:50												181.673	-103.15	0.1340	-103
T+86 sec	2:28:52												181.344	-105.97	0.1290	-103
T+88 sec	2:28:54												180.603	-107.42	0.1260	-103
T+90 sec	2:28:56												178.716	-109.56	0.1210	-103
T+92 sec	2:28:58												177.395	-109.42	0.1200	-103
T+94 sec	2:29:00												173.971	-109.33	0.1170	-103
T+96 sec	2:29:02												172.945	-110.77	0.1140	-103
T+98 sec	2:29:04												171.705	-112.87	0.1100	-103
T+100 sec	2:29:06												169.900	-113.17	0.1080	-103
T+102 sec	2:29:08												168.673	-110.15	0.1110	-103
T+104 sec	2:29:10												166.728	-111.81	0.1070	-103
T+106 sec	2:29:12												164.542	-114.96	0.1010	-103
T+108 sec	2:29:14												161.862	-116.34	0.0970	-103
T+110 sec	2:29:16												160.483	-114.53	0.0980	-103
T+112 sec	2:29:18												159.078	-113.53	0.0980	-103
T+114 sec	2:29:20												150.968	-109.30	0.0960	-103
T+116 sec	2:29:22												148.865	-110.17	0.0930	-103
T+118 sec	2:29:24												147.059	-112.15	0.0890	-103
T+120 sec	2:29:26												146.392	-116.07	0.0840	-103
T+122 sec	2:29:28												144.424	-114.51	0.0840	-103
T+124 sec	2:29:30												143.022	-114.30	0.0830	-103
T+126 sec	2:29:32												139.453	-112.35	0.0820	-103
T+128 sec	2:29:34												137.918	-112.93	0.0800	-103
T+130 sec	2:29:36												136.591	-112.77	0.0790	-103
T+132 sec	2:29:38												131.248	-107.47	0.0800	-103
T+134 sec	2:29:40												130.525	-104.32	0.0830	-103
T+136 sec	2:29:42												129.494	-106.03	0.0800	-103
T+138 sec	2:29:44												128.224	-105.86	0.0790	-103
T+140 sec	2:29:46												128.848	-108.16	0.0770	-103
T+142 sec	2:29:48												127.612	-109.89	0.0740	-103
T+144 sec	2:29:50												126.560	-108.05	0.0750	-103
T+146 sec	2:29:52												124.520	-109.11	0.0720	-103
T+148 sec	2:29:54												123.597	-107.36	0.0730	-103
T+150 sec	2:29:56												122.533	-111.27	0.0680	-103
T+152 sec	2:29:58												121.911	-105.89	0.0730	-103
T+154 sec	2:30:00												122.298	-107.16	0.0720	-103
T+156 sec	2:30:02												121.678	-109.50	0.0690	-103
T+158 sec	2:30:04												121.149	-107.09	0.0710	-103
T+160 sec	2:30:06												120.562	-108.49	0.0690	-103
T+162 sec	2:30:08												121.012	-110.89	0.0670	-103
T+164 sec	2:30:10												119.133	-113.32	0.0630	-103
T+166 sec	2:30:12												119.995	-114.15	0.0630	-103
T+168 sec	2:30:14												117.825	-121.31	0.0550	-103

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2:41:12	59.987	3733.115	3090	13.391	16.443	0.000	3802.715	3766.677	3803.980	3771.053	3750.346	2:41:12	59.987	3733.12	350.00	223.02	16.00	10.00	0.00	-103.00	7788.75	13.391	87.388	0.0130	
2:41:14	59.989	3730.510	3090	11.332	14.654	0.000	3800.926	3766.590	3803.972	3771.053	3750.396	2:41:14	59.989	3730.51	350.00	223.02	16.00	10.00	0.00	-103.00	7789.08	11.332	84.783	0.0110	
2:41:16	59.989	3729.180	3090	11.332	13.491	0.000	3799.763	3766.500	3803.962	3771.053	3750.446	2:41:16	59.989	3729.18	350.00	223.02	16.00	10.00	0.00	-103.00	7789.41	11.332	83.453	0.0110	
2:41:18	59.986	3725.459	3090	14.420	13.816	0.000	3800.088	3766.401	3803.953	3771.053	3750.495	2:41:18	59.986	3725.46	350.00	223.02	16.00	10.00	0.00	-103.00	7789.74	14.420	79.732	0.0140	
2:41:20	59.987	3724.785	3090	13.391	13.667	0.000	3799.939	3766.302	3803.943	3771.053	3750.545	2:41:20	59.987	3724.78	350.00	223.02	16.00	10.00	0.00	-103.00	7790.07	13.391	79.058	0.0130	
2:41:22	59.99	3720.108	3090	10.298	12.488	0.000	3798.759	3766.192	3803.931	3771.053	3750.594	2:41:22	59.990	3720.11	350.00	223.02	16.00	10.00	0.00	-103.00	7790.40	10.298	74.381	0.0100	
2:41:24	59.994	3720.938	3090	6.181	10.280	0.000	3796.552	3766.084	3803.913	3771.053	3750.642	2:41:24	59.994	3720.94	350.00	223.02	16.00	10.00	0.00	-103.00	7790.73	6.181	75.211	0.0060	
2:41:26	59.996	3725.661	3090	4.122	8.125	0.000	3794.396	3765.988	3803.891	3771.053	3750.691	2:41:26	59.996	3725.66	350.00	223.02	16.00	10.00	0.00	-103.00	7791.06	4.122	79.934	0.0040	
2:41:28	60.001	3725.677	3090	-1.029	4.921	0.000	3791.192	3765.892	3803.861	3771.053	3750.739	2:41:28	60.001	3725.68	350.00	223.02	16.00	10.00	0.00	-103.00	7791.39	-1.029	79.950	0.0010	
2:41:30	60.003	3727.754	3090	-3.088	2.118	0.000	3788.389	3765.802	3803.824	3771.053	3750.788	2:41:30	60.003	3727.75	350.00	223.02	16.00	10.00	0.00	-103.00	7791.72	-3.088	82.027	0.0030	
2:41:32	60.004	3727.825	3090	-4.122	-0.066	0.000	3786.205	3765.713	3803.782	3771.053	3750.835	2:41:32	60.004	3727.82	350.00	223.02	16.00	10.00	0.00	-103.00	7792.05	-4.122	82.098	0.0040	
2:41:34	60.006	3727.683	3090	-6.181	-2.206	0.000	3784.065	3765.623	3803.736	3771.053	3750.883	2:41:34	60.006	3727.68	350.00	223.02	16.00	10.00	0.00	-103.00	7792.38	-6.181	81.956	0.0060	
2:41:36	60.012	3727.231	3090	-12.361	-5.760	0.000	3780.511	3765.533	3803.681	3771.053	3750.931	2:41:36	60.012	3727.23	350.00	223.02	16.00	10.00	0.00	-103.00	7792.71	-12.361	81.504	0.0120	
2:41:38	60.014	3725.012	3090	-14.420	-8.791	0.000	3777.480	3765.438	3803.620	3771.053	3750.978	2:41:38	60.014	3725.01	350.00	223.02	16.00	10.00	0.00	-103.00	7793.04	-14.420	79.285	0.0140	
2:41:40	60.019	3726.446	3090	-19.571	-12.564	0.000	3773.707	3765.347	3803.550	3771.053	3751.025	2:41:40	60.019	3726.45	350.00	223.02	16.00	10.00	0.00	-103.00	7793.37	-19.571	80.719	0.0190	
2:41:42	60.021	3726.016	3090	-21.630	-15.737	0.000	3770.534	3765.255	3803.473	3771.053	3751.072	2:41:42	60.021	3726.02	350.00	223.02	16.00	10.00	0.00	-103.00	7793.70	-21.630	80.289	0.0210	
2:41:44	60.025	3719.123	3090	-25.752	-19.242	0.000	3767.029	3765.148	3803.389	3771.053	3751.118	2:41:44	60.025	3719.12	350.00	223.02	16.00	10.00	0.00	-103.00	7794.03	-25.752	73.396	0.0250	
2:41:46	60.026	3716.375	3090	-26.781	-21.881	0.000	3764.390	3765.035	3803.298	3771.053	3751.165	2:41:46	60.026	3716.37	350.00	223.02	16.00	10.00	0.00	-103.00	7794.36	-26.781	70.647	0.0260	
2:41:48	60.027	3717.333	3090	-27.810	-23.956	0.000	3762.315	3764.924	3803.203	3771.053	3751.211	2:41:48	60.027	3717.33	350.00	223.02	16.00	10.00	0.00	-103.00	7794.69	-27.810	71.605	0.0270	
2:41:50	60.029	3717.560	3090	-29.869	-26.026	0.000	3760.245	3764.815	3803.104	3771.053	3751.257	2:41:50	60.029	3717.56	350.00	223.02	16.00	10.00	0.00	-103.00	7795.02	-29.869	71.833	0.0290	
2:41:52	60.029	3717.142	3090	-29.869	-27.371	0.000	3758.900	3764.705	3803.002	3771.053	3751.302	2:41:52	60.029	3717.14	350.00	223.02	16.00	10.00	0.00	-103.00	7795.35	-29.869	71.415	0.0290	
2:41:54	60.037	3715.166	3090	-38.109	-31.129	0.000	3755.142	3764.591	3802.892	3771.053	3751.348	2:41:54	60.037	3715.17	350.00	223.02	16.00	10.00	0.00	-103.00	7795.68	-38.109	69.439	0.0370	-103
2:41:56	60.036	3713.632	3090	-37.079	-33.212	0.000	3753.060	3764.474	3802.778	3771.053	3751.393	2:41:56	60.036	3713.63	350.00	223.02	16.00	10.00	0.00	-103.00	7796.01	-37.079	67.905	0.0360	
2:41:58	60.037	3710.283	3090	-38.109	-34.926	0.000	3751.346	3764.350	3802.660	3771.053	3751.438	2:41:58	60.037	3710.28	350.00	223.02	16.00	10.00	0.00	-103.00	7796.34	-38.109	64.556	0.0370	-103
2:42:00	60.037	3710.158	3090	-38.109	-36.040	0.000	3750.231	3764.227	3802.540	3771.053	3751.483	2:42:00	60.037	3710.16	350.00	223.02	16.00	10.00	0.00	-103.00	7796.67	-38.109	64.431	0.0370	-103
2:42:02	60.036	3699.356	3090	-37.079	-36.404	0.000	3749.868	3764.079	3802.420	3771.053	3751.528	2:42:02	60.036	3699.36	350.00	223.02	16.00	10.00	0.00	-103.00	7797.00	-37.079	53.629	0.0360	
2:42:04	60.041	3698.591	3090	-42.230	-38.443	0.000	3747.828	3763.930	3802.296	3771.053	3751.572	2:42:04	60.041	3698.59	350.00	223.02	16.00	10.00	0.00	-103.00	7797.33	-42.230	52.864	0.0410	-103
2:42:06	60.043	3704.591	3090	-44.289	-40.489	0.000	3745.782	3763.796	3802.168	3771.053	3751.617	2:42:06	60.043	3704.59	350.00	223.02	16.00	10.00	0.00	-103.00	7797.66	-44.289	58.864	0.0430	-103
2:42:08	60.044	3703.275	3090	-45.319	-42.179	0.000	3744.092	3763.659	3802.037	3771.053	3751.661	2:42:08	60.044	3703.28	350.00	223.02	16.00	10.00	0.00	-103.00	7797.99	-45.319	57.548	0.0440	-103
2:42:10	60.043	3702.482	3090	-44.289	-42.918	0.000	3743.353	3763.521	3801.904	3771.053	3751.705	2:42:10	60.043	3702.48	350.00	223.02	16.00	10.00	0.00	-103.00	7798.32	-44.289	56.755	0.0430	-103
2:42:12	60.046	3701.316	3090	-47.381	-44.480	0.000	3741.791	3763.380	3801.769	3771.053	3751.748	2:42:12	60.046	3701.32	350.00	223.02	16.00	10.00	0.00	-103.00	7798.65	-47.381	55.589	0.0460	-103
2:42:14	60.048	3700.826	3090	-49.440	-46.216	0.000	3740.055	3763.240	3801.630	3771.053	3751.792	2:42:14	60.048	3700.83	350.00	223.02	16.00	10.00	0.00	-103.00	7798.98	-49.440	55.099	0.0480	-103
2:42:16	60.046	3699.529	3090	-47.381	-46.624	0.000	3739.647	3763.097	3801.491	3771.053	3751.835	2:42:16	60.046	3699.53	350.00	223.02	16.00	10.00	0.00	-103.00	7799.31	-47.381	53.802	0.0460	-103
2:42:18	60.046	3699.726	3090	-47.381	-46.889	0.000	3739.382	3762.955	3801.352	3771.053	3751.878	2:42:18	60.046	3699.73	350.00	223.02	16.00	10.00	0.00	-103.00	7799.64	-47.381	53.999	0.0460	-103
2:42:20	60.043	3690.100	3090	-44.289	-45.979	0.000	3740.292	3762.793	3801.216	3771.053	3751.921	2:42:20	60.043	3690.10	350.00	223.02	16.00	10.00	0.00	-103.00	7799.97	-44.289	44.373	0.0430	-103
2:42:22	60.043	3690.477	3090	-44.289	-45.388	0.000	3740.884	3762.632	3801.082	3771.053	3751.964	2:42:22	60.043	3690.48	350.00	223.02	16.00	10.00	0.00	-103.00	7800.30	-44.289	44.750	0.0430	-103
2:42:24	60.044	3696.865	3090	-45.319	-45.364	0.000	3740.908	3762.485	3800.948	3771.053	3752.006	2:42:24	60.044	3696.86	350.00	223.02	16.00	10.00	0.00	-103.00	7800.63	-45.319	51.137	0.0440	-103
2:42:26	60.043	3696.877	3090	-44.289	-44.988	0.000	3741.284	3762.340	3800.816	3771.053	3752.049	2:42:26	60.043	3696.88	350.00	223.02	16.00	10.00	0.00	-103.00	7800.96	-44.289	51.150	0.0430	-103

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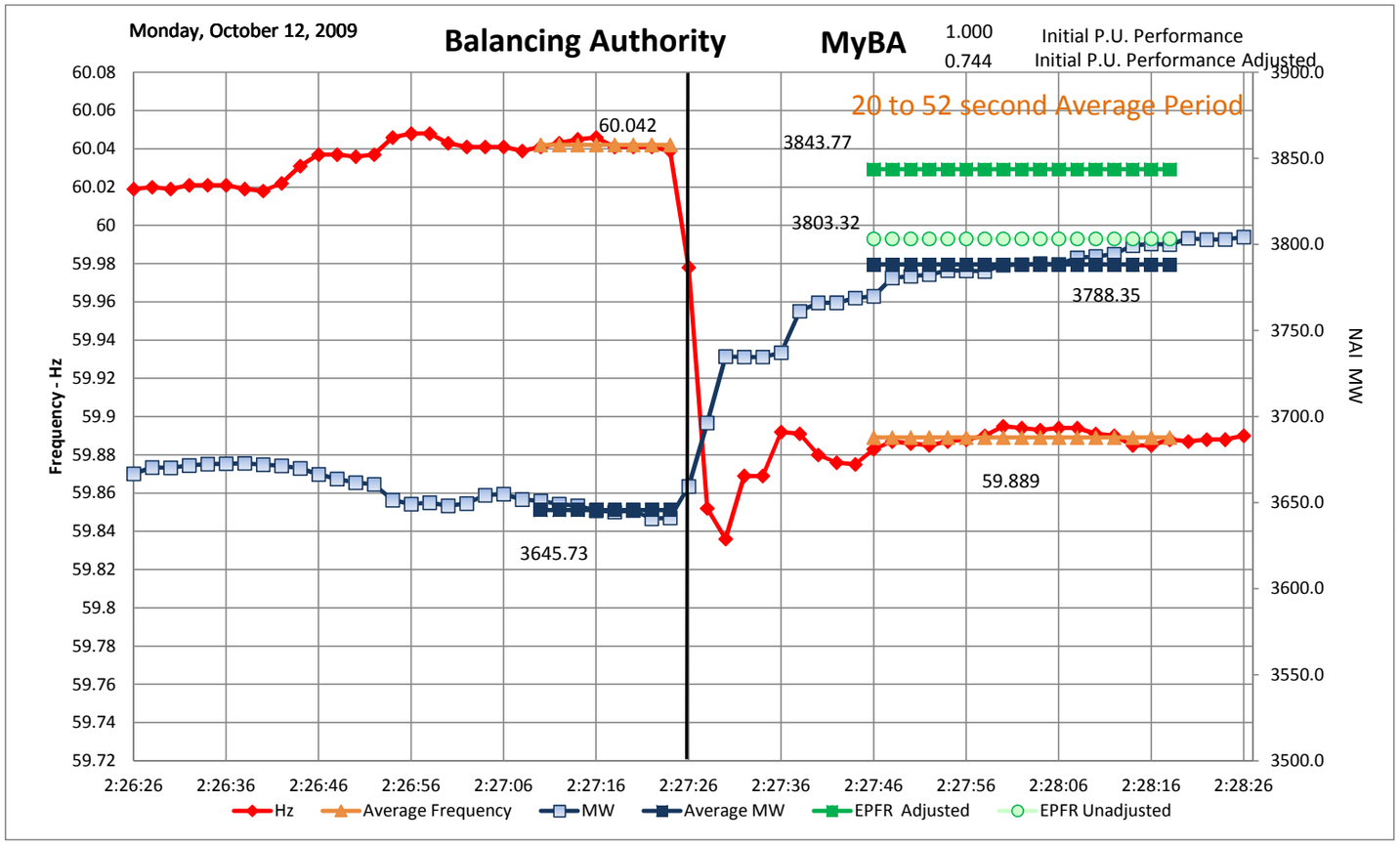

T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

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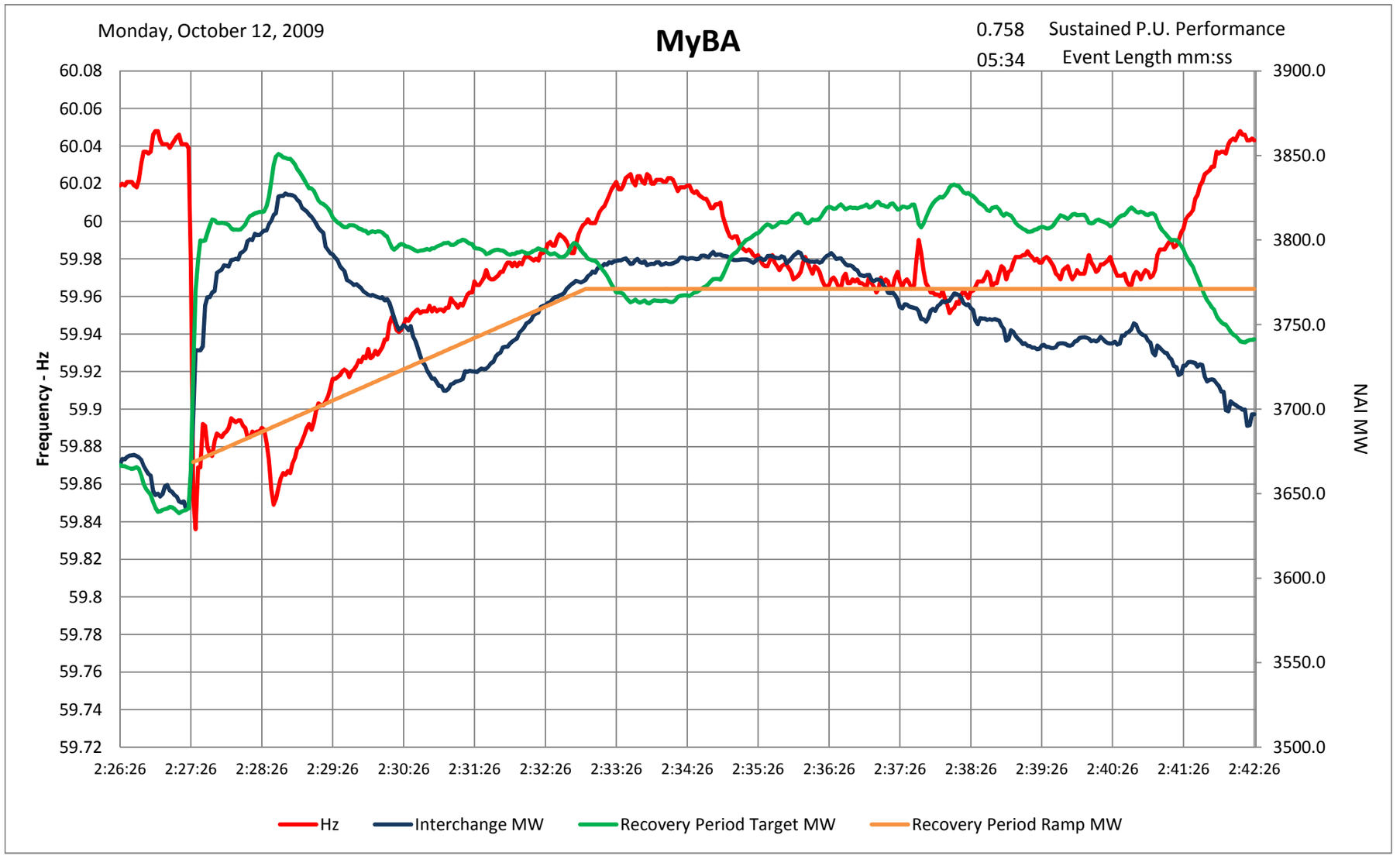
# of rows to shift T(0)

1

A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

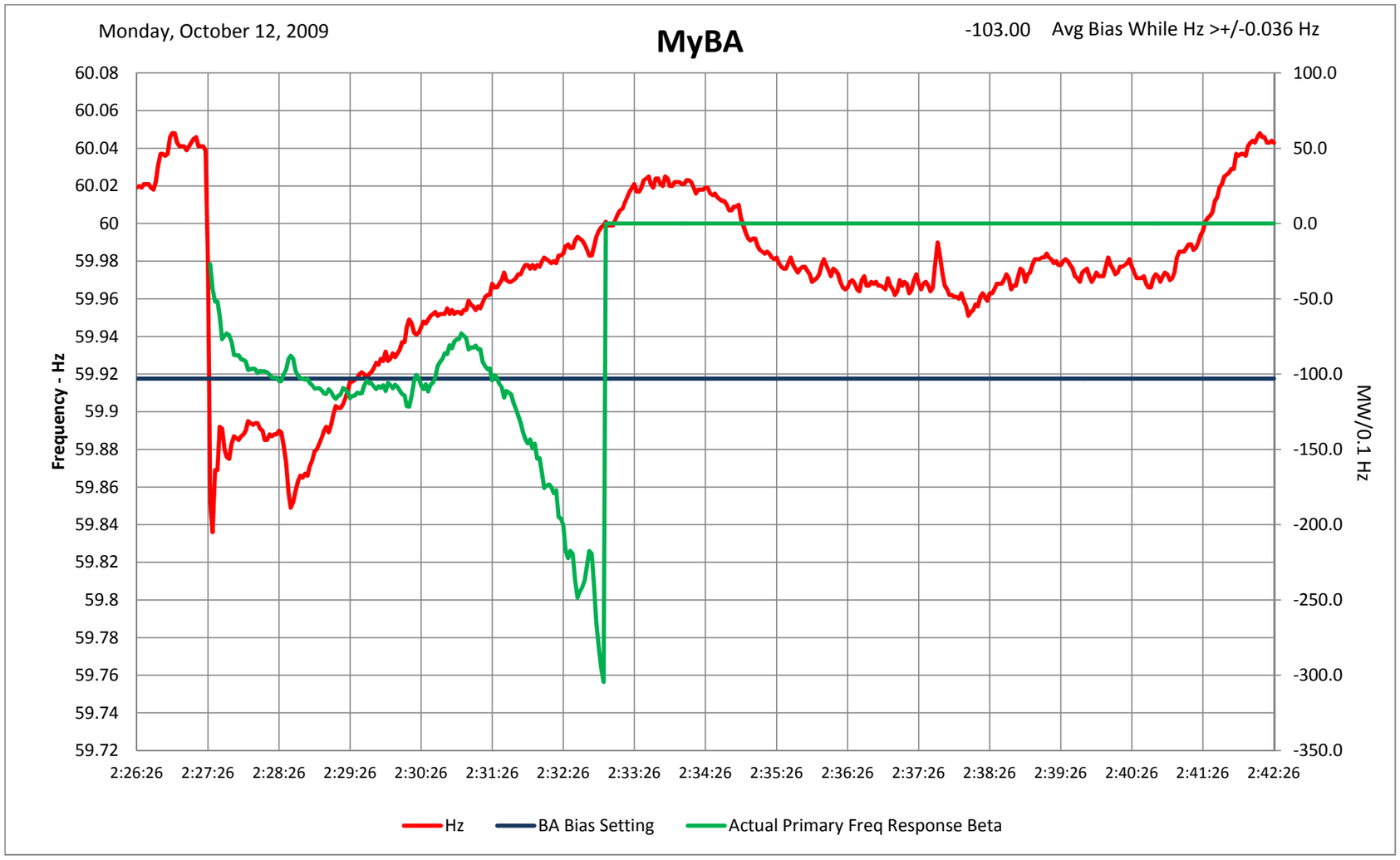
Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.


Monday, October 12, 2009
MyBA
0.758 Sustained P.U. Performance
05:34 Event Length mm:ss
Frequency - Hz
NAI MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
3900.0
3850.0
3800.0
3750.0
3700.0
3650.0
3600.0
3550.0
3500.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Interchange MW
Recovery Period Target MW
Recovery Period Ramp MW

Monday, October 12, 2009

MyBA

-103.00 Avg Bias While Hz >+/-0.036 Hz



						Value A Data	BA Performance										Value B	20 to 52 second Average Period Evaluation					
Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used
Monday, October 12, 2009	2:27:26	60.039	60.042	2:27:26	59.836	60.042	3645.73	350.00	165.34	0.00	0.00	-4.21	15.00	-103.00	7651.305	-43.39	59.889	3803.35	335.00	165.34	6.35	0.00

									Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
11.09	0.00	0.744	1.000	0.758	-103.00	7632.00	114.21	-103.00	1.399	1.293	1.582	1.571	1.849	0.856	0.808	0.829	0.633	0.689	-103.00	-103.00

Steps	To be completed for each event evaluated.	
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order:	
	Column A: Date and Time in this format, mm/dd/yy HH:MM:SS	004424
	Column B: Frequency Hz	
	Column C: Net Actual Interchange	
	Column D: Joint Owned Unit dynamic schedule	
	Column E: Non Conforming Load	
	Column F: Pumped Hydro	
	Column G: Not Used	
	Column H: Transferred Frequency Response	
	Column I: Contingent BA Lost load or generation	
	Column J: BA Bias Setting	
	Column K: BA Load	
2	Note: Columns D, E, F and H are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.	
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.	
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data.	
	Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time.	
	If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.	
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet.	
	If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should	
	you have to use the "Manual" process.	
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary.	
	To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).	
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.	
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events)	
	This value controls the end of the "Sustained Frequency Response" evaluation period.	
	Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.	
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized	
	in the correct order on worksheet "Form 1 Summary Data".	
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.	
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.	

Steps	To be completed the first time you use Form 2 for your BA.
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "NYISO".
B	For informational and educational purposes, a "Sustained" performance evaluation is provided in the "Evaluation" worksheet and in the "Sustained" Graph. This evaluation uses a Time Constant (TC) to model the frequency response of your BA
	The time constant is located in cell "L13" of the "Evaluation" spreadsheet and should be edited for the types of generators in your BA. Presently this time constant is set at 0.35.
	The higher the value of the time constant, the faster the delivery of frequency response is expected. Setting the TC to 1.0 effectively turns off the delay and instantaneous frequency response will be modeled. Do not set higher than 1.0.
	This time constant is only used in the "Sustained" evaluation and is not used for the Field Trial evaluation of performance to the FRO.
	A typical setting for this time constant is 0.08 to 0.15 for hydro units, 0.10 to 0.20 for large steam turbines and 0.20 to 0.40 for combustion turbines.
	By observing the slope of your "Interchange Actual" on the "Sustained" Graph, adjust the time constant until the initial slope of the "Target" is similar to the slope of the NAI data.
	When set appropriately, the "Target" trend on the "Sustained" graph will model what the Net Actua Interchange should have done during the event recovery period based on your Bias setting during the event.

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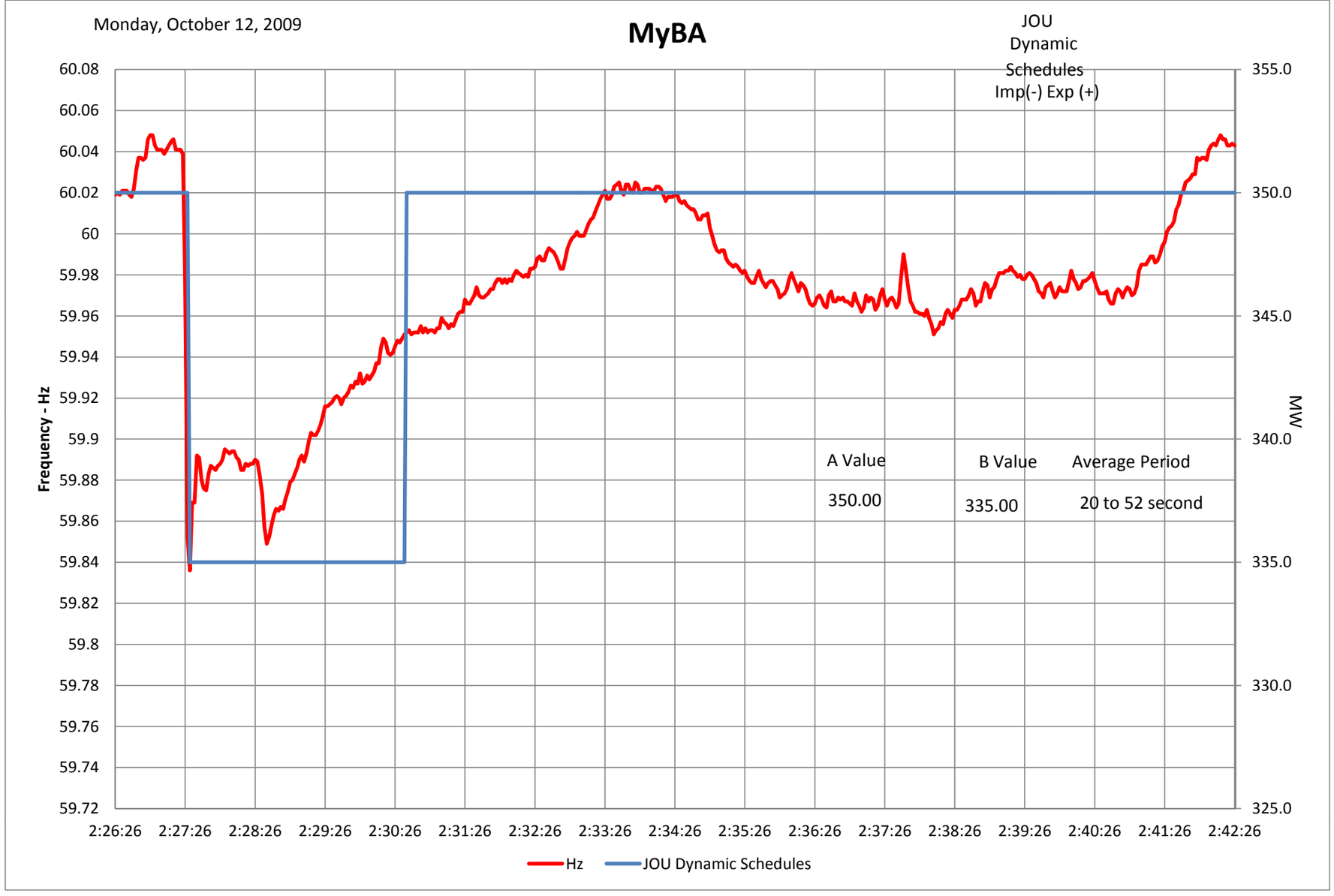
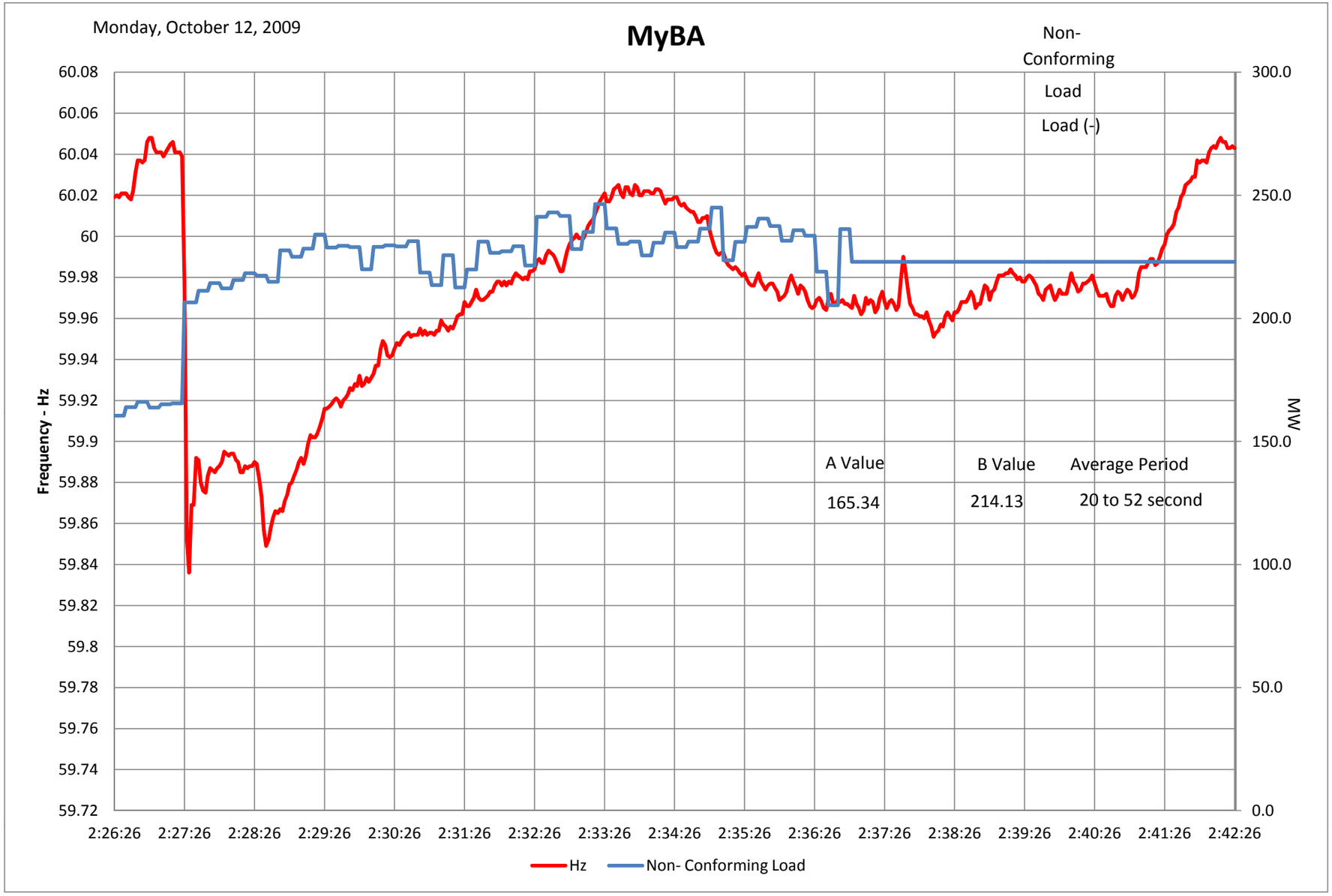
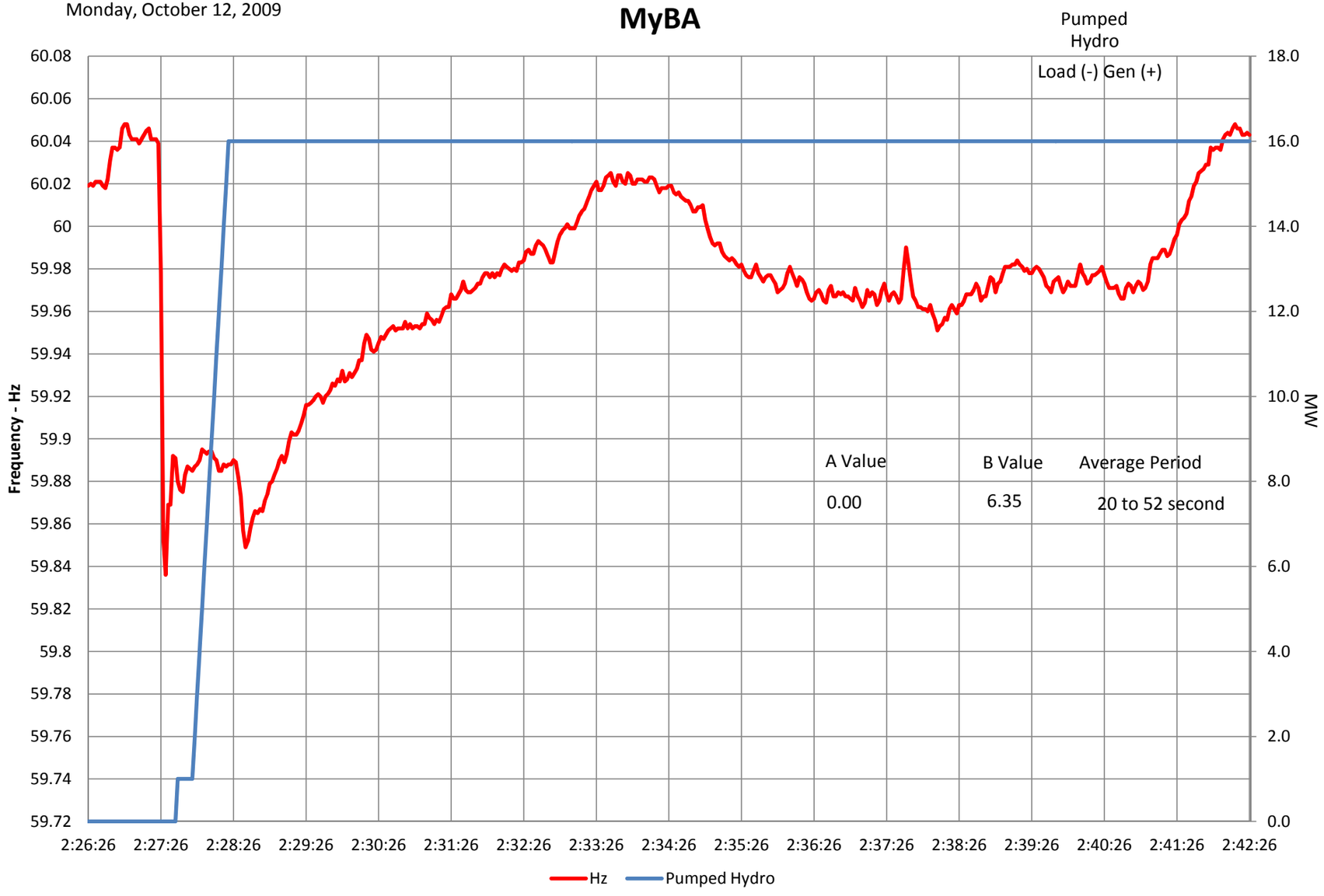

Monday, October 12, 2009
MyBA
JOU Dynamic Schedules Imp(-) Exp (+)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
355.0
350.0
345.0
340.0
335.0
330.0
325.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
350.00
B Value
335.00
Average Period
20 to 52 second
Hz
JOU Dynamic Schedules


Monday, October 12, 2009
MyBA
Non-Conforming Load
Load (-)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
300.0
250.0
200.0
150.0
100.0
50.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
165.34
B Value
214.13
Average Period
20 to 52 second
Hz
Non- Conforming Load

Monday, October 12, 2009

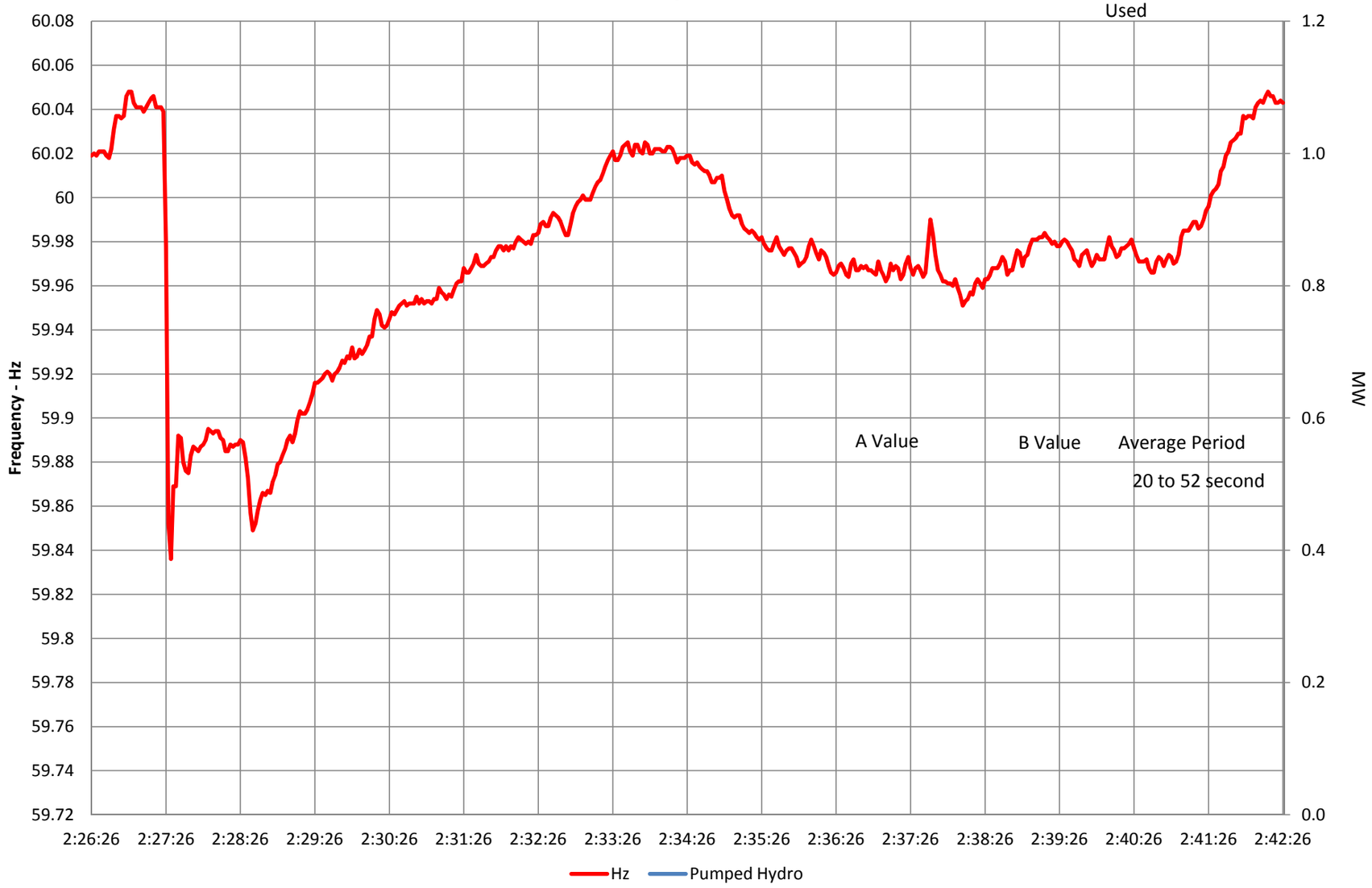
MyBA



Monday, October 12, 2009

MyBA

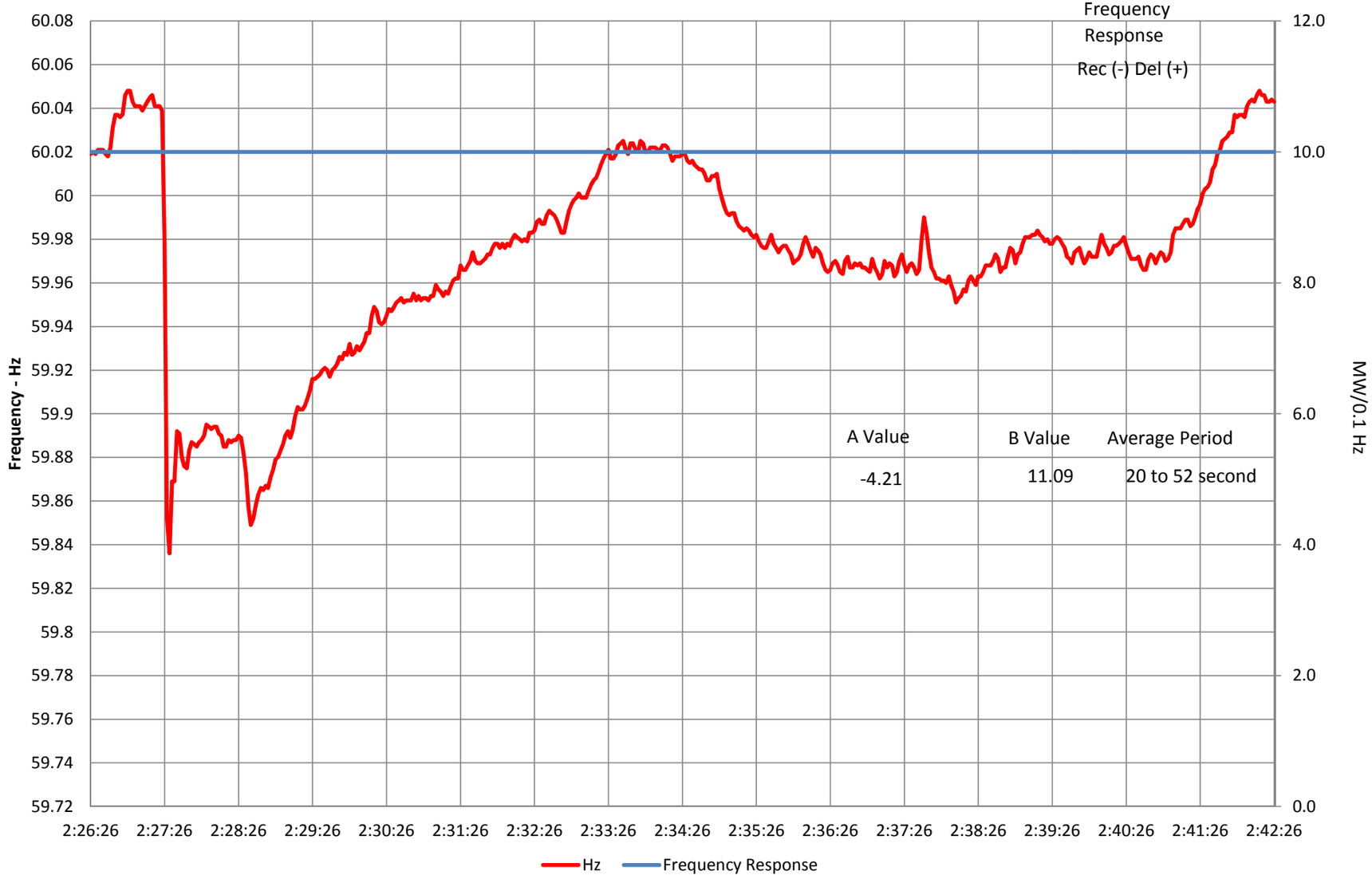
Not Used

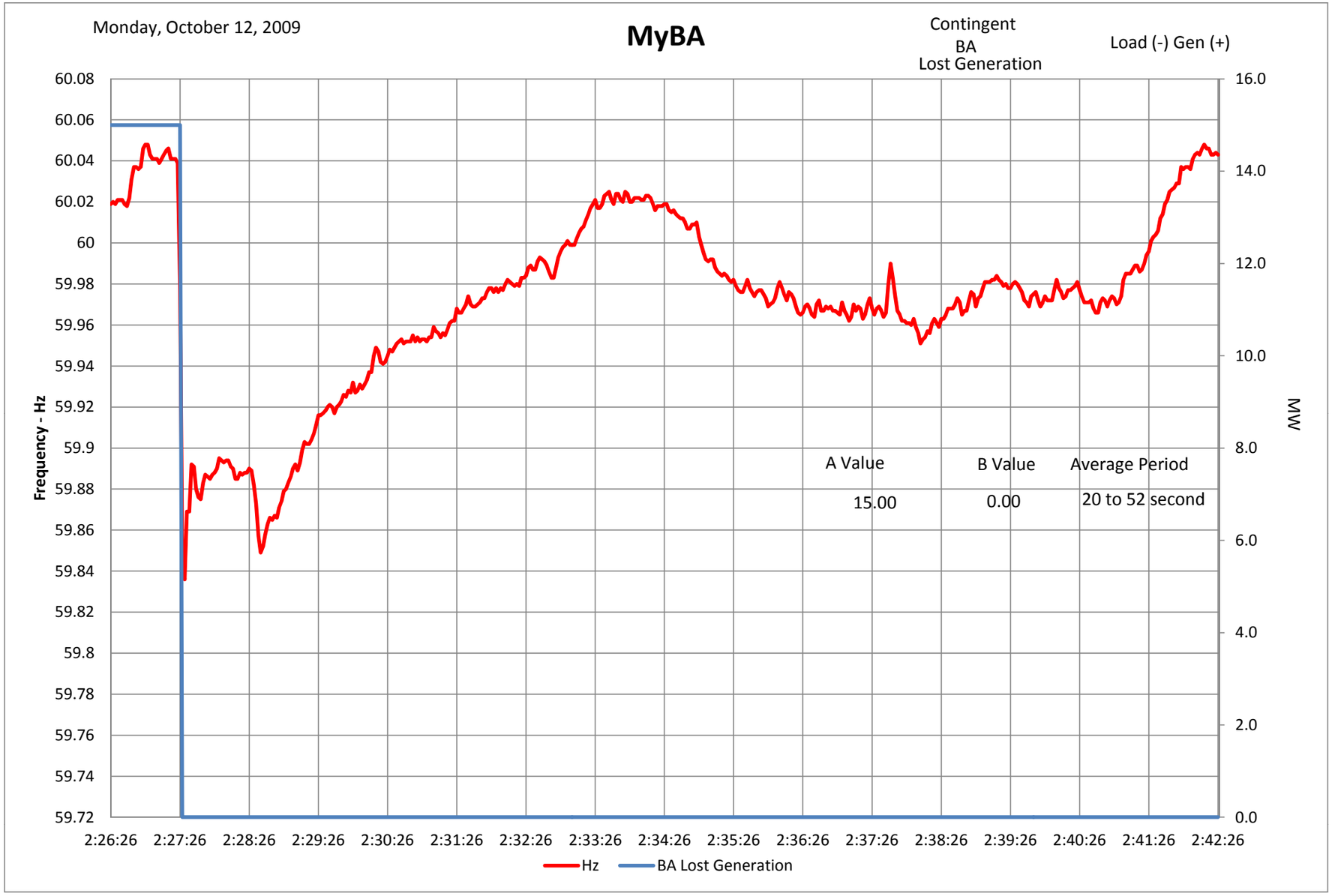


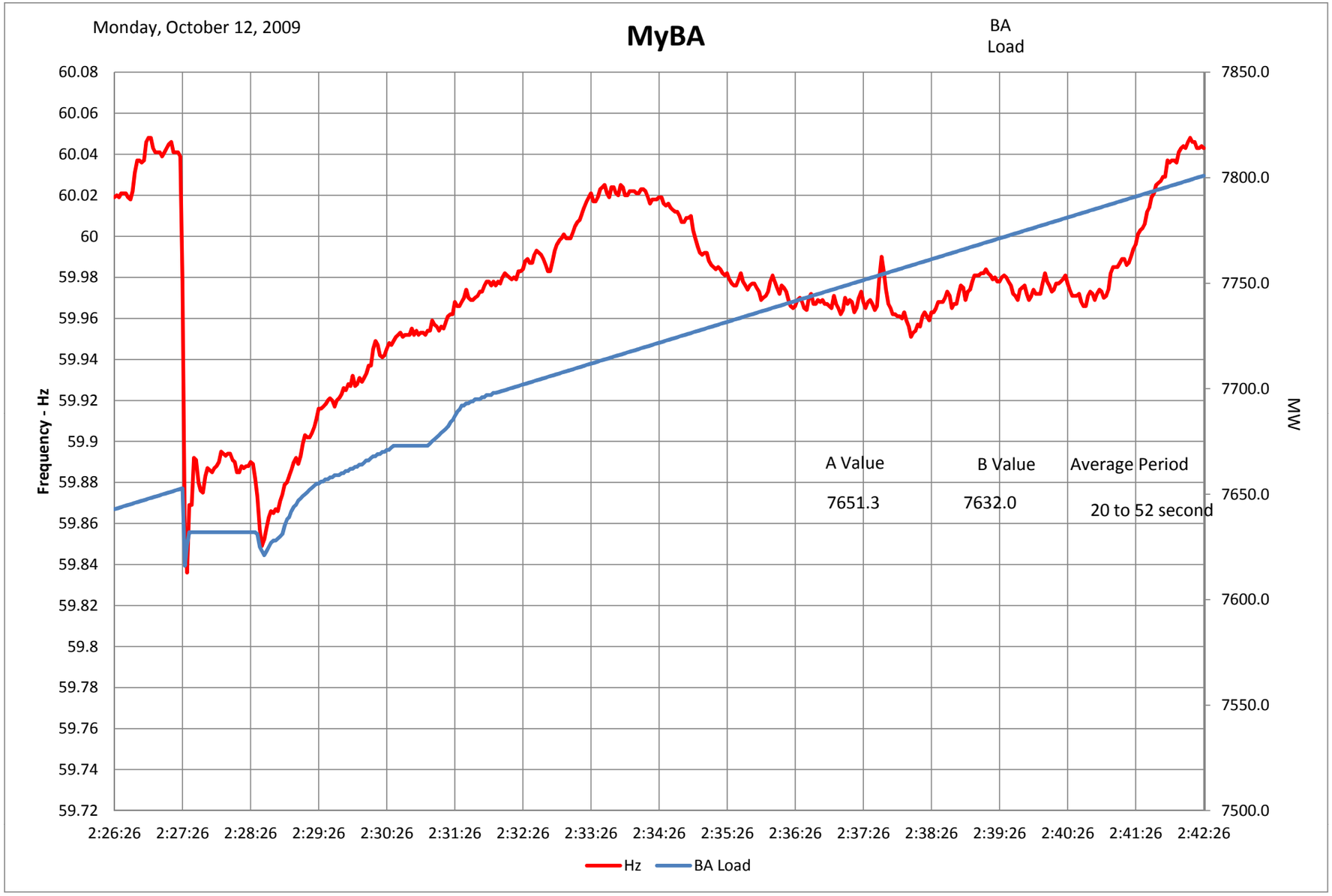
Monday, October 12, 2009

MyBA

Transferred Frequency Response Rec (-) Del (+)



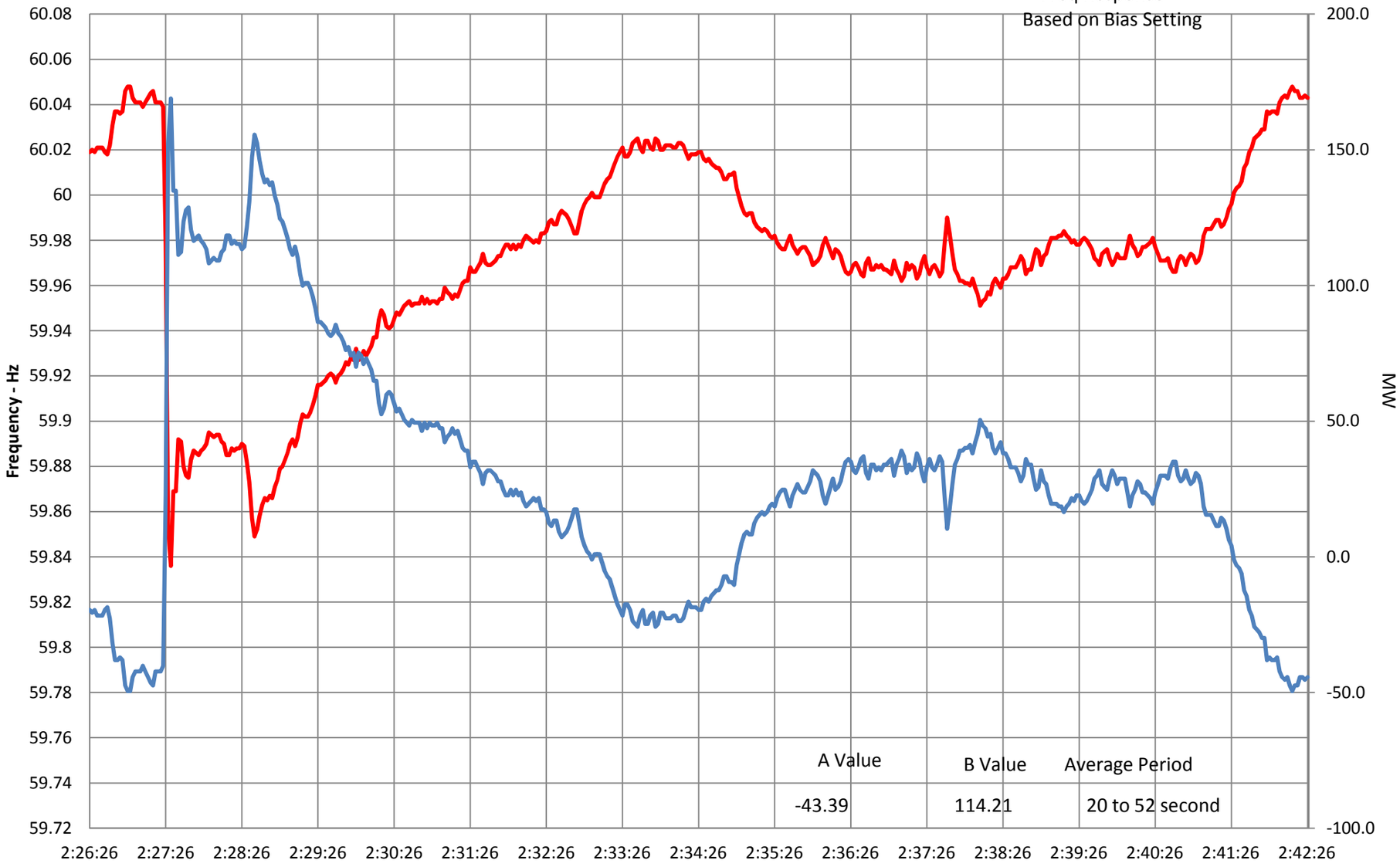

Monday, October 12, 2009
MyBA
Contingent
BA
Lost Generation
Load (-) Gen (+)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
15.00
B Value
0.00
Average Period
20 to 52 second
Hz
BA Lost Generation


Monday, October 12, 2009
MyBA
BA Load
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
7850.0
7800.0
7750.0
7700.0
7650.0
7600.0
7550.0
7500.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
7651.3
B Value
7632.0
Average Period
20 to 52 second
Hz
BA Load

Monday, October 12, 2009

MyBA

Expected Primary
Freq Response
Based on Bias Setting



Steps	To be completed for each event evaluated.
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order: Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Contingent Resouce Lost MW or Lost Load Column D: Load Resources tripped during the event. Column E: Non Conforming Load Column F: Spare Column G: Not Used Column H: Spare Column I: Spare Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D & E are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data. Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time. If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary. To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events) This value controls the end of the "Sustained Frequency Response" evaluation period. Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is sum in the correct order on worksheet "Form 1 Summary Data".
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

Steps	To be completed the first time you use Form 2 for your BA.
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "ERCOT".

004434

ımarized

Steps	To be completed for each event evaluated.
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order: Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Contingent Resouce Lost MW or Lost Load Column D: Load Resources tripped during the event. Column E: Non Conforming Load Column F: Spare Column G: Not Used Column H: Spare Column I: Spare Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D & E are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data. Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time. If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary. To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events) This value controls the end of the "Sustained Frequency Response" evaluation period. Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

Steps	To be completed the first time you use Form 2 for your BA.
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "ERCOT".

Time (T)	Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 306 473 307	Recovery Target Freq: 60.000 2:27:26 2:33:00 05:34	Max Absolute Delta Hz 0.126 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.126 Delta Hz	Highest Delta Hz 0.033 Absolute Delta Hz	Rows of data to shift to align T(0) 1
10/12/09 02:17:26	60.007	3679.946	350	-331.852966	0	81.5	10	15	-103	7553.79		0				
10/12/09 02:17:28	60.009	3679.44	350	-331.852966	0	82	10	15	-103	7554.12	0	0	0	0.002	0.002	
10/12/09 02:17:30	60.009	3679.912	350	-331.852966	0	82.5	10	15	-103	7554.45	0	0	0	0.000	0.000	
10/12/09 02:17:32	60.006	3679.517	350	-331.852966	0	83	10	15	-103	7554.78	0	0	0	-0.003	0.003	
10/12/09 02:17:34	60.006	3679.888	350	-331.852966	0	83.5	10	15	-103	7555.11	0	0	0	0.000	0.000	
10/12/09 02:17:36	60.009	3679.608	350	-329.98822	0	84	10	15	-103	7555.44	0	0	0	0.003	0.003	
10/12/09 02:17:38	60.009	3679.06	350	-329.98822	0	84.5	10	15	-103	7555.77	0	0	0	0.000	0.000	
10/12/09 02:17:40	60.008	3679.261	350	-329.98822	0	85	10	15	-103	7556.1	0	0	0	-0.001	0.001	
10/12/09 02:17:42	60.009	3679.164	350	-329.98822	0	85.5	10	15	-103	7556.43	0	0	0	0.001	0.001	
10/12/09 02:17:44	60.009	3679.025	350	-329.98822	0	86	10	15	-103	7556.76	0	0	0	0.000	0.000	
10/12/09 02:17:46	60.005	3679.152	350	-255.444168	0	86.5	10	15	-103	7557.09	0	0	0	-0.004	0.004	
10/12/09 02:17:48	60.004	3678.572	350	-255.444168	0	87	10	15	-103	7557.42	0	0	0	-0.001	0.001	
10/12/09 02:17:50	60.001	3678.295	350	-255.444168	0	87.5	10	15	-103	7557.75	0	0	0	-0.003	0.003	
10/12/09 02:17:52	59.999	3678.249	350	-255.444168	0	88	10	15	-103	7558.08	0	0	0	-0.002	0.002	
10/12/09 02:17:54	59.993	3678.236	350	-255.444168	0	88.5	10	15	-103	7558.41	0	0	0	-0.006	0.006	
10/12/09 02:17:56	59.991	3677.83	350	-254.838303	0	89	10	15	-103	7558.74	0	0	0	-0.002	0.002	
10/12/09 02:17:58	59.994	3677.955	350	-254.838303	0	89.5	10	15	-103	7559.07	0	0	0	0.003	0.003	
10/12/09 02:18:00	59.992	3677.772	350	-254.838303	0	90	10	15	-103	7559.4	0	0	0	-0.002	0.002	
10/12/09 02:18:02	59.994	3676.666	350	-254.838303	0	90.5	10	15	-103	7559.73	0	0	0	0.002	0.002	
10/12/09 02:18:04	59.992	3677.093	350	-254.838303	0	91	10	15	-103	7560.06	0	0	0	-0.002	0.002	
10/12/09 02:18:06	59.994	3677.141	350	-257.146973	0	91.5	10	15	-103	7560.39	0	0	0	0.002	0.002	
10/12/09 02:18:08	59.995	3676.401	350	-257.146973	0	92	10	15	-103	7560.72	0	0	0	0.001	0.001	
10/12/09 02:18:10	59.993	3678.516	350	-257.146973	0	92.5	10	15	-103	7561.05	0	0	0	-0.002	0.002	
10/12/09 02:18:12	59.99	3679.872	350	-257.146973	0	93	10	15	-103	7561.38	0	0	0	-0.003	0.003	
10/12/09 02:18:14	59.99	3680.197	350	-257.146973	0	93.5	10	15	-103	7561.71	0	0	0	0.000	0.000	
10/12/09 02:18:16	59.987	3678.743	350	-262.289368	0	94	10	15	-103	7562.04	0	0	0	-0.003	0.003	
10/12/09 02:18:18	59.983	3678.428	350	-262.289368	0	94.5	10	15	-103	7562.37	0	0	0	-0.004	0.004	
10/12/09 02:18:20	59.977	3677.921	350	-262.289368	0	95	10	15	-103	7562.7	0	0	0	-0.006	0.006	
10/12/09 02:18:22	59.977	3680.254	350	-262.289368	0	95.5	10	15	-103	7563.03	0	0	0	0.000	0.000	
10/12/09 02:18:24	59.989	3682.07	350	-262.289368	0	96	10	15	-103	7563.36	0	0	0	0.012	0.012	
10/12/09 02:18:26	59.995	3681.329	350	-256.647949	0	96.5	10	15	-103	7563.69	0	0	0	0.006	0.006	
10/12/09 02:18:28	59.999	3678.656	350	-256.647949	0	97	10	15	-103	7564.02	0	0	0	0.004	0.004	
10/12/09 02:18:30	59.994	3678.077	350	-256.647949	0	97.5	10	15	-103	7564.35	0	0	0	-0.005	0.005	
10/12/09 02:18:32	59.989	3677.78	350	-256.647949	0	98	10	15	-103	7564.68	0	0	0	-0.005	0.005	
10/12/09 02:18:34	59.987	3678.427	350	-256.647949	0	98.5	10	15	-103	7565.01	0	0	0	-0.002	0.002	
10/12/09 02:18:36	59.986	3678.473	350	-256.307251	0	99	10	15	-103	7565.34	0	0	0	-0.001	0.001	
10/12/09 02:18:38	59.984	3678.278	350	-256.307251	0	99.5	10	15	-103	7565.67	0	0	0	-0.002	0.002	
10/12/09 02:18:40	59.983	3677.822	350	-256.307251	0	100	10	15	-103	7566	0	0	0	-0.001	0.001	
10/12/09 02:18:42	59.985	3676.615	350	-256.307251	0	100.5	10	15	-103	7566.33	0	0	0	0.002	0.002	
10/12/09 02:18:44	59.986	3677.397	350	-256.307251	0	101	10	15	-103	7566.66	0	0	0	0.001	0.001	
10/12/09 02:18:46	59.985	3677.917	350	-249.086395	0	101.5	10	15	-103	7566.99	0	0	0	-0.001	0.001	

10/12/09 02:18:48	59.986	3677.95	350	-249.086395	0	102	10	15	-103	7567.32	0	0	0	0.001	0.001
10/12/09 02:18:50	59.98	3678.617	350	-249.086395	0	102.5	10	15	-103	7567.65	0	0	0	-0.006	0.006
10/12/09 02:18:52	59.981	3678.963	350	-249.086395	0	103	10	15	-103	7567.98	0	0	0	0.001	0.001
10/12/09 02:18:54	59.981	3681.252	350	-249.086395	0	103.5	10	15	-103	7568.31	0	0	0	0.000	0.000
10/12/09 02:18:56	59.989	3680.737	350	-253.742477	0	104	10	15	-103	7568.64	0	0	0	0.008	0.008
10/12/09 02:18:58	59.998	3680.045	350	-253.742477	0	104.5	10	15	-103	7568.97	0	0	0	0.009	0.009
10/12/09 02:19:00	60.007	3678.161	350	-253.742477	0	105	10	15	-103	7569.3	0	0	0	0.009	0.009
10/12/09 02:19:02	60.007	3674.076	350	-253.742477	0	105.5	10	15	-103	7569.63	0	0	0	0.000	0.000
10/12/09 02:19:04	59.997	3676.222	350	-253.742477	0	106	10	15	-103	7569.96	0	0	0	-0.010	0.010
10/12/09 02:19:06	59.986	3676.669	350	-257.421204	0	106.5	10	15	-103	7570.29	0	0	0	-0.011	0.011
10/12/09 02:19:08	59.981	3677.497	350	-257.421204	0	107	10	15	-103	7570.62	0	0	0	-0.005	0.005
10/12/09 02:19:10	59.977	3677.49	350	-257.421204	0	107.5	10	15	-103	7570.95	0	0	0	-0.004	0.004
10/12/09 02:19:12	59.974	3675.186	350	-257.421204	0	108	10	15	-103	7571.28	0	0	0	-0.003	0.003
10/12/09 02:19:14	59.976	3675.437	350	-257.421204	0	108.5	10	15	-103	7571.61	0	0	0	0.002	0.002
10/12/09 02:19:16	59.974	3680.451	350	-261.73822	0	109	10	15	-103	7571.94	0	0	0	-0.002	0.002
10/12/09 02:19:18	59.974	3682.032	350	-261.73822	0	109.5	10	15	-103	7572.27	0	0	0	0.000	0.000
10/12/09 02:19:20	59.977	3683.829	350	-261.73822	0	110	10	15	-103	7572.6	0	0	0	0.003	0.003
10/12/09 02:19:22	59.979	3682.843	350	-261.73822	0	110.5	10	15	-103	7572.93	0	0	0	0.002	0.002
10/12/09 02:19:24	59.979	3681.108	350	-261.73822	0	111	10	15	-103	7573.26	0	0	0	0.000	0.000
10/12/09 02:19:26	59.982	3680.566	350	-271.875977	0	111.5	10	15	-103	7573.59	0	0	0	0.003	0.003
10/12/09 02:19:28	59.984	3678.229	350	-271.875977	0	112	10	15	-103	7573.92	0	0	0	0.002	0.002
10/12/09 02:19:30	59.987	3676.752	350	-271.875977	0	112.5	10	15	-103	7574.25	0	0	0	0.003	0.003
10/12/09 02:19:32	59.988	3675.759	350	-271.875977	0	113	10	15	-103	7574.58	0	0	0	0.001	0.001
10/12/09 02:19:34	59.988	3671.942	350	-271.875977	0	113.5	10	15	-103	7574.91	0	0	0	0.000	0.000
10/12/09 02:19:36	59.987	3671.166	350	-262.073486	0	114	10	15	-103	7575.24	0	0	0	-0.001	0.001
10/12/09 02:19:38	59.987	3670.476	350	-262.073486	0	114.5	10	15	-103	7575.57	0	0	0	0.000	0.000
10/12/09 02:19:40	59.987	3670.129	350	-262.073486	0	115	10	15	-103	7575.9	0	0	0	0.000	0.000
10/12/09 02:19:42	59.985	3671.542	350	-262.073486	0	115.5	10	15	-103	7576.23	0	0	0	-0.002	0.002
10/12/09 02:19:44	59.984	3672.048	350	-262.073486	0	116	10	15	-103	7576.56	0	0	0	-0.001	0.001
10/12/09 02:19:46	59.982	3671.576	350	-260.36441	0	116.5	10	15	-103	7576.89	0	0	0	-0.002	0.002
10/12/09 02:19:48	59.983	3672.104	350	-260.36441	0	117	10	15	-103	7577.22	0	0	0	0.001	0.001
10/12/09 02:19:50	59.989	3672.414	350	-260.36441	0	117.5	10	15	-103	7577.55	0	0	0	0.006	0.006
10/12/09 02:19:52	59.989	3671.882	350	-260.36441	0	118	10	15	-103	7577.88	0	0	0	0.000	0.000
10/12/09 02:19:54	59.988	3671.837	350	-260.36441	0	118.5	10	15	-103	7578.21	0	0	0	-0.001	0.001
10/12/09 02:19:56	59.984	3671.336	350	-352.644379	0	119	10	15	-103	7578.54	0	0	0	-0.004	0.004
10/12/09 02:19:58	59.982	3670.726	350	-352.644379	0	119.5	10	15	-103	7578.87	0	0	0	-0.002	0.002
10/12/09 02:20:00	59.983	3670.372	350	-352.644379	0	120	10	15	-103	7579.2	0	0	0	0.001	0.001
10/12/09 02:20:02	59.981	3671.364	350	-352.644379	0	120.5	10	15	-103	7579.53	0	0	0	-0.002	0.002
10/12/09 02:20:04	59.982	3671.401	350	-352.644379	0	121	10	15	-103	7579.86	0	0	0	0.001	0.001
10/12/09 02:20:06	59.983	3672.156	350	-354.89566	0	121.5	10	15	-103	7580.19	0	0	0	0.001	0.001
10/12/09 02:20:08	59.986	3672.181	350	-354.89566	0	122	10	15	-103	7580.52	0	0	0	0.003	0.003
10/12/09 02:20:10	59.989	3670.296	350	-354.89566	0	122.5	10	15	-103	7580.85	0	0	0	0.003	0.003
10/12/09 02:20:12	59.987	3668.071	350	-354.89566	0	123	10	15	-103	7581.18	0	0	0	-0.002	0.002
10/12/09 02:20:14	59.985	3668.59	350	-354.89566	0	123.5	10	15	-103	7581.51	0	0	0	-0.002	0.002
10/12/09 02:20:16	59.98	3669.908	350	-340.46936	0	124	10	15	-103	7581.84	0	0	0	-0.005	0.005
10/12/09 02:20:18	59.98	3670.399	350	-340.46936	0	124.5	10	15	-103	7582.17	0	0	0	0.000	0.000
10/12/09 02:20:20	59.983	3670.263	350	-340.46936	0	125	10	15	-103	7582.5	0	0	0	0.003	0.003
10/12/09 02:20:22	59.98	3669.382	350	-340.46936	0	125.5	10	15	-103	7582.83	0	0	0	-0.003	0.003
10/12/09 02:20:24	59.979	3670.102	350	-340.46936	0	126	10	15	-103	7583.16	0	0	0	-0.001	0.001

10/12/09 02:20:26	59.979	3670.438	350	-337.642914	0	126.5	10	15	-103	7583.49	0	0	0	0.000	0.000
10/12/09 02:20:28	59.981	3671.403	350	-337.642914	0	127	10	15	-103	7583.82	0	0	0	0.002	0.002
10/12/09 02:20:30	59.981	3672.442	350	-337.642914	0	127.5	10	15	-103	7584.15	0	0	0	0.000	0.000
10/12/09 02:20:32	59.98	3672.372	350	-337.642914	0	128	10	15	-103	7584.48	0	0	0	-0.001	0.001
10/12/09 02:20:34	59.98	3671.947	350	-337.642914	0	128.5	10	15	-103	7584.81	0	0	0	0.000	0.000
10/12/09 02:20:36	59.981	3670.938	350	-284.36084	0	129	10	15	-103	7585.14	0	0	0	0.001	0.001
10/12/09 02:20:38	59.98	3670.705	350	-284.36084	0	129.5	10	15	-103	7585.47	0	0	0	-0.001	0.001
10/12/09 02:20:40	59.98	3670.137	350	-284.36084	0	130	10	15	-103	7585.8	0	0	0	0.000	0.000
10/12/09 02:20:42	59.977	3669.279	350	-284.36084	0	130.5	10	15	-103	7586.13	0	0	0	-0.003	0.003
10/12/09 02:20:44	59.979	3672.391	350	-284.36084	0	131	10	15	-103	7586.46	0	0	0	0.002	0.002
10/12/09 02:20:46	59.981	3672.558	350	-260.467987	0	131.5	10	15	-103	7586.79	0	0	0	0.002	0.002
10/12/09 02:20:48	59.979	3674.052	350	-260.467987	0	132	10	15	-103	7587.12	0	0	0	-0.002	0.002
10/12/09 02:20:50	59.976	3672.626	350	-260.467987	0	132.5	10	15	-103	7587.45	0	0	0	-0.003	0.003
10/12/09 02:20:52	59.977	3671.8	350	-260.467987	0	133	10	15	-103	7587.78	0	0	0	0.001	0.001
10/12/09 02:20:54	59.972	3673.183	350	-260.467987	0	133.5	10	15	-103	7588.11	0	0	0	-0.005	0.005
10/12/09 02:20:56	59.971	3673.874	350	-253.141541	0	134	10	15	-103	7588.44	0	0	0	-0.001	0.001
10/12/09 02:20:58	59.973	3676.263	350	-253.141541	0	134.5	10	15	-103	7588.77	0	0	0	0.002	0.002
10/12/09 02:21:00	59.973	3676.623	350	-253.141541	0	135	10	15	-103	7589.1	0	0	0	0.000	0.000
10/12/09 02:21:02	59.973	3676.87	350	-253.141541	0	135.5	10	15	-103	7589.43	0	0	0	0.000	0.000
10/12/09 02:21:04	59.974	3676.543	350	-253.141541	0	136	10	15	-103	7589.76	0	0	0	0.001	0.001
10/12/09 02:21:06	59.971	3675.464	350	-251.929871	0	136.5	10	15	-103	7590.09	0	0	0	-0.003	0.003
10/12/09 02:21:08	59.975	3675.752	350	-251.929871	0	137	10	15	-103	7590.42	0	0	0	0.004	0.004
10/12/09 02:21:10	59.977	3675.256	350	-251.929871	0	137.5	10	15	-103	7590.75	0	0	0	0.002	0.002
10/12/09 02:21:12	59.977	3674.87	350	-251.929871	0	138	10	15	-103	7591.08	0	0	0	0.000	0.000
10/12/09 02:21:14	59.975	3671.277	350	-251.929871	0	138.5	10	15	-103	7591.41	0	0	0	-0.002	0.002
10/12/09 02:21:16	59.976	3671.593	350	-250.674194	0	139	10	15	-103	7591.74	0	0	0	0.001	0.001
10/12/09 02:21:18	59.98	3670.587	350	-250.674194	0	139.5	10	15	-103	7592.07	0	0	0	0.004	0.004
10/12/09 02:21:20	59.979	3669.963	350	-250.674194	0	140	10	15	-103	7592.4	0	0	0	-0.001	0.001
10/12/09 02:21:22	59.981	3669.54	350	-250.674194	0	140.5	10	15	-103	7592.73	0	0	0	0.002	0.002
10/12/09 02:21:24	59.982	3669.497	350	-250.674194	0	141	10	15	-103	7593.06	0	0	0	0.001	0.001
10/12/09 02:21:26	59.982	3668.706	350	-253.631866	0	141.5	10	15	-103	7593.39	0	0	0	0.000	0.000
10/12/09 02:21:28	59.982	3667.677	350	-253.631866	0	142	10	15	-103	7593.72	0	0	0	0.000	0.000
10/12/09 02:21:30	59.982	3666.482	350	-253.631866	0	142.5	10	15	-103	7594.05	0	0	0	0.000	0.000
10/12/09 02:21:32	59.981	3666.599	350	-253.631866	0	143	10	15	-103	7594.38	0	0	0	-0.001	0.001
10/12/09 02:21:34	59.982	3666.911	350	-253.631866	0	143.5	10	15	-103	7594.71	0	0	0	0.001	0.001
10/12/09 02:21:36	59.984	3666.442	350	-246.957306	0	144	10	15	-103	7595.04	0	0	0	0.002	0.002
10/12/09 02:21:38	59.985	3666.405	350	-246.957306	0	144.5	10	15	-103	7595.37	0	0	0	0.001	0.001
10/12/09 02:21:40	59.987	3667.456	350	-246.957306	0	145	10	15	-103	7595.7	0	0	0	0.002	0.002
10/12/09 02:21:42	59.989	3666.38	350	-246.957306	0	145.5	10	15	-103	7596.03	0	0	0	0.002	0.002
10/12/09 02:21:44	59.993	3665.262	350	-246.957306	0	146	10	15	-103	7596.36	0	0	0	0.004	0.004
10/12/09 02:21:46	59.996	3664.031	350	-254.541779	0	146.5	10	15	-103	7596.69	0	0	0	0.003	0.003
10/12/09 02:21:48	59.998	3663.825	350	-254.541779	0	147	10	15	-103	7597.02	0	0	0	0.002	0.002
10/12/09 02:21:50	59.998	3663.229	350	-254.541779	0	147.5	10	15	-103	7597.35	0	0	0	0.000	0.000
10/12/09 02:21:52	60.004	3662.055	350	-254.541779	0	148	10	15	-103	7597.68	0	0	0	0.006	0.006
10/12/09 02:21:54	60.007	3661.695	350	-254.541779	0	148.5	10	15	-103	7598.01	0	0	0	0.003	0.003
10/12/09 02:21:56	60.01	3662.076	350	-256.571594	0	149	10	15	-103	7598.34	0	0	0	0.003	0.003
10/12/09 02:21:58	60.013	3662.224	350	-256.571594	0	149.5	10	15	-103	7598.67	0	0	0	0.003	0.003
10/12/09 02:22:00	60.014	3662.959	350	-256.571594	0	150	10	15	-103	7599	0	0	0	0.001	0.001
10/12/09 02:22:02	60.013	3663.794	350	-256.571594	0	150.5	10	15	-103	7599.33	0	0	0	-0.001	0.001

10/12/09 02:22:04	60.008	3664.139	350	-256.571594	0	151	10	15	-103	7599.66	0	0	0	-0.005	0.005
10/12/09 02:22:06	60.008	3665.278	350	-258.37262	0	151.5	10	15	-103	7599.99	0	0	0	0.000	0.000
10/12/09 02:22:08	60.01	3664.159	350	-258.37262	0	152	10	15	-103	7600.32	0	0	0	0.002	0.002
10/12/09 02:22:10	60.019	3663.265	350	-258.37262	0	152.5	10	15	-103	7600.65	0	0	0	0.009	0.009
10/12/09 02:22:12	60.019	3663.184	350	-258.37262	0	153	10	15	-103	7600.98	0	0	0	0.000	0.000
10/12/09 02:22:14	60.023	3661.929	350	-258.37262	0	153.5	10	15	-103	7601.31	0	0	0	0.004	0.004
10/12/09 02:22:16	60.021	3661.512	350	-263.047363	0	154	10	15	-103	7601.64	0	0	0	-0.002	0.002
10/12/09 02:22:18	60.02	3659.172	350	-263.047363	0	154.5	10	15	-103	7601.97	0	0	0	-0.001	0.001
10/12/09 02:22:20	60.021	3658.661	350	-263.047363	0	155	10	15	-103	7602.3	0	0	0	0.001	0.001
10/12/09 02:22:22	60.021	3656.785	350	-263.047363	0	155.5	10	15	-103	7602.63	0	0	0	0.000	0.000
10/12/09 02:22:24	60.02	3657.571	350	-263.047363	0	156	10	15	-103	7602.96	0	0	0	-0.001	0.001
10/12/09 02:22:26	60.019	3658.126	350	-260.984375	0	156.5	10	15	-103	7603.29	0	0	0	-0.001	0.001
10/12/09 02:22:28	60.019	3657.71	350	-260.984375	0	157	10	15	-103	7603.62	0	0	0	0.000	0.000
10/12/09 02:22:30	60.022	3658.015	350	-260.984375	0	157.5	10	15	-103	7603.95	0	0	0	0.003	0.003
10/12/09 02:22:32	60.025	3660.228	350	-260.984375	0	158	10	15	-103	7604.28	0	0	0	0.003	0.003
10/12/09 02:22:34	60.025	3659.224	350	-260.984375	0	158.5	10	15	-103	7604.61	0	0	0	0.000	0.000
10/12/09 02:22:36	60.026	3658.698	350	-261.318329	0	159	10	15	-103	7604.94	0	0	0	0.001	0.001
10/12/09 02:22:38	60.02	3658.669	350	-261.318329	0	159.5	10	15	-103	7605.27	0	0	0	-0.006	0.006
10/12/09 02:22:40	60.02	3658.155	350	-261.318329	0	160	10	15	-103	7605.6	0	0	0	0.000	0.000
10/12/09 02:22:42	60.018	3659.13	350	-261.318329	0	160.5	10	15	-103	7605.93	0	0	0	-0.002	0.002
10/12/09 02:22:44	60.018	3659.778	350	-261.318329	0	161	10	15	-103	7606.26	0	0	0	0.000	0.000
10/12/09 02:22:46	60.02	3660.82	350	-262.1026	0	161.5	10	15	-103	7606.59	0	0	0	0.002	0.002
10/12/09 02:22:48	60.019	3662.531	350	-262.1026	0	162	10	15	-103	7606.92	0	0	0	-0.001	0.001
10/12/09 02:22:50	60.019	3662.387	350	-262.1026	0	162.5	10	15	-103	7607.25	0	0	0	0.000	0.000
10/12/09 02:22:52	60.023	3662.079	350	-262.1026	0	163	10	15	-103	7607.58	0	0	0	0.004	0.004
10/12/09 02:22:54	60.022	3662.39	350	-262.1026	0	163.5	10	15	-103	7607.91	0	0	0	-0.001	0.001
10/12/09 02:22:56	60.022	3662.678	350	-262.71701	0	164	10	15	-103	7608.24	0	0	0	0.000	0.000
10/12/09 02:22:58	60.025	3663.577	350	-262.71701	0	164.5	10	15	-103	7608.57	0	0	0	0.003	0.003
10/12/09 02:23:00	60.02	3663.539	350	-262.71701	0	165	10	15	-103	7608.9	0	0	0	-0.005	0.005
10/12/09 02:23:02	60.02	3662.959	350	-262.71701	0	165.5	10	15	-103	7609.23	0	0	0	0.000	0.000
10/12/09 02:23:04	60.02	3662.552	350	-262.71701	0	166	10	15	-103	7609.56	0	0	0	0.000	0.000
10/12/09 02:23:06	60.02	3662.543	350	-260.016479	0	166.5	10	15	-103	7609.89	0	0	0	0.000	0.000
10/12/09 02:23:08	60.02	3663.601	350	-260.016479	0	167	10	15	-103	7610.22	0	0	0	0.000	0.000
10/12/09 02:23:10	60.021	3663.91	350	-260.016479	0	167.5	10	15	-103	7610.55	0	0	0	0.001	0.001
10/12/09 02:23:12	60.021	3663.69	350	-260.016479	0	168	10	15	-103	7610.88	0	0	0	0.000	0.000
10/12/09 02:23:14	60.018	3662.791	350	-260.016479	0	168.5	10	15	-103	7611.21	0	0	0	-0.003	0.003
10/12/09 02:23:16	60.014	3663.396	350	-263.87323	0	169	10	15	-103	7611.54	0	0	0	-0.004	0.004
10/12/09 02:23:18	60.014	3663.698	350	-263.87323	0	169.5	10	15	-103	7611.87	0	0	0	0.000	0.000
10/12/09 02:23:20	60.014	3664.315	350	-263.87323	0	170	10	15	-103	7612.2	0	0	0	0.000	0.000
10/12/09 02:23:22	60.013	3665.313	350	-263.87323	0	170.5	10	15	-103	7612.53	0	0	0	-0.001	0.001
10/12/09 02:23:24	60.013	3665.798	350	-263.87323	0	171	10	15	-103	7612.86	0	0	0	0.000	0.000
10/12/09 02:23:26	60.01	3666.141	350	-264.5979	0	171.5	10	15	-103	7613.19	0	0	0	-0.003	0.003
10/12/09 02:23:28	60.008	3666.726	350	-264.5979	0	172	10	15	-103	7613.52	0	0	0	-0.002	0.002
10/12/09 02:23:30	60.011	3667.677	350	-264.5979	0	172.5	10	15	-103	7613.85	0	0	0	0.003	0.003
10/12/09 02:23:32	60.011	3667.545	350	-264.5979	0	173	10	15	-103	7614.18	0	0	0	0.000	0.000
10/12/09 02:23:34	60.012	3666.688	350	-264.5979	0	173.5	10	15	-103	7614.51	0	0	0	0.001	0.001
10/12/09 02:23:36	60.012	3666.449	350	-262.415924	0	174	10	15	-103	7614.84	0	0	0	0.000	0.000
10/12/09 02:23:38	60.009	3666.71	350	-262.415924	0	174.5	10	15	-103	7615.17	0	0	0	-0.003	0.003
10/12/09 02:23:40	60.009	3667.696	350	-262.415924	0	175	10	15	-103	7615.5	0	0	0	0.000	0.000

10/12/09 02:23:42	60.009	3667.398	350	-262.415924	0	175.5	10	15	-103	7615.83	0	0	0	0.000	0.000
10/12/09 02:23:44	60.009	3667.043	350	-262.415924	0	176	10	15	-103	7616.16	0	0	0	0.000	0.000
10/12/09 02:23:46	60.005	3666.624	350	-259.685242	0	176.5	10	15	-103	7616.49	0	0	0	-0.004	0.004
10/12/09 02:23:48	60.002	3666.223	350	-259.685242	0	177	10	15	-103	7616.82	0	0	0	-0.003	0.003
10/12/09 02:23:50	59.999	3665.88	350	-259.685242	0	177.5	10	15	-103	7617.15	0	0	0	-0.003	0.003
10/12/09 02:23:52	59.996	3665.403	350	-259.685242	0	178	10	15	-103	7617.48	0	0	0	-0.003	0.003
10/12/09 02:23:54	59.995	3665.802	350	-259.685242	0	178.5	10	15	-103	7617.81	0	0	0	-0.001	0.001
10/12/09 02:23:56	59.997	3665.68	350	-255.911011	0	179	10	15	-103	7618.14	0	0	0	0.002	0.002
10/12/09 02:23:58	59.998	3665.352	350	-255.911011	0	179.5	10	15	-103	7618.47	0	0	0	0.001	0.001
10/12/09 02:24:00	59.998	3664.948	350	-255.911011	0	180	10	15	-103	7618.8	0	0	0	0.000	0.000
10/12/09 02:24:02	59.998	3665.065	350	-255.911011	0	180.5	10	15	-103	7619.13	0	0	0	0.000	0.000
10/12/09 02:24:04	59.998	3666.133	350	-255.911011	0	181	10	15	-103	7619.46	0	0	0	0.000	0.000
10/12/09 02:24:06	59.995	3666.64	350	-258.148193	0	181.5	10	15	-103	7619.79	0	0	0	-0.003	0.003
10/12/09 02:24:08	59.995	3666.735	350	-258.148193	0	182	10	15	-103	7620.12	0	0	0	0.000	0.000
10/12/09 02:24:10	59.992	3667.084	350	-258.148193	0	182.5	10	15	-103	7620.45	0	0	0	-0.003	0.003
10/12/09 02:24:12	59.993	3667.557	350	-258.148193	0	183	10	15	-103	7620.78	0	0	0	0.001	0.001
10/12/09 02:24:14	59.988	3667.337	350	-258.148193	0	183.5	10	15	-103	7621.11	0	0	0	-0.005	0.005
10/12/09 02:24:16	59.988	3667.853	350	-258.873596	0	184	10	15	-103	7621.44	0	0	0	0.000	0.000
10/12/09 02:24:18	59.982	3668.116	350	-258.873596	0	184.5	10	15	-103	7621.77	0	0	0	-0.006	0.006
10/12/09 02:24:20	59.982	3668.691	350	-258.873596	0	185	10	15	-103	7622.1	0	0	0	0.000	0.000
10/12/09 02:24:22	59.982	3669.399	350	-258.873596	0	185.5	10	15	-103	7622.43	0	0	0	0.000	0.000
10/12/09 02:24:24	59.982	3669.606	350	-258.873596	0	186	10	15	-103	7622.76	0	0	0	0.000	0.000
10/12/09 02:24:26	59.984	3671.228	350	-249.33757	0	186.5	10	15	-103	7623.09	0	0	0	0.002	0.002
10/12/09 02:24:28	59.982	3670.25	350	-249.33757	0	187	10	15	-103	7623.42	0	0	0	-0.002	0.002
10/12/09 02:24:30	59.978	3670.265	350	-249.33757	0	187.5	10	15	-103	7623.75	0	0	0	-0.004	0.004
10/12/09 02:24:32	59.978	3671.549	350	-249.33757	0	188	10	15	-103	7624.08	0	0	0	0.000	0.000
10/12/09 02:24:34	59.976	3673.243	350	-249.33757	0	188.5	10	15	-103	7624.41	0	0	0	-0.002	0.002
10/12/09 02:24:36	59.975	3674.263	350	-258.278168	0	189	10	15	-103	7624.74	0	0	0	-0.001	0.001
10/12/09 02:24:38	59.974	3675.824	350	-258.278168	0	189.5	10	15	-103	7625.07	0	0	0	-0.001	0.001
10/12/09 02:24:40	59.974	3676.418	350	-258.278168	0	190	10	15	-103	7625.4	0	0	0	0.000	0.000
10/12/09 02:24:42	59.979	3676.306	350	-258.278168	0	190.5	10	15	-103	7625.73	0	0	0	0.005	0.005
10/12/09 02:24:44	59.98	3674.637	350	-258.278168	0	191	10	15	-103	7626.06	0	0	0	0.001	0.001
10/12/09 02:24:46	59.981	3675.329	350	-258.406372	0	191.5	10	15	-103	7626.39	0	0	0	0.001	0.001
10/12/09 02:24:48	59.98	3675.226	350	-258.406372	0	192	10	15	-103	7626.72	0	0	0	-0.001	0.001
10/12/09 02:24:50	59.984	3674.768	350	-258.406372	0	192.5	10	15	-103	7627.05	0	0	0	0.004	0.004
10/12/09 02:24:52	59.987	3674.399	350	-258.406372	0	193	10	15	-103	7627.38	0	0	0	0.003	0.003
10/12/09 02:24:54	59.988	3673.514	350	-258.406372	0	193.5	10	15	-103	7627.71	0	0	0	0.001	0.001
10/12/09 02:24:56	59.988	3673.04	350	-260.538879	0	194	10	15	-103	7628.04	0	0	0	0.000	0.000
10/12/09 02:24:58	59.99	3672.442	350	-260.538879	0	194.5	10	15	-103	7628.37	0	0	0	0.002	0.002
10/12/09 02:25:00	59.992	3673.056	350	-260.538879	0	195	10	15	-103	7628.7	0	0	0	0.002	0.002
10/12/09 02:25:02	59.991	3671.68	350	-260.538879	0	195.5	10	15	-103	7629.03	0	0	0	-0.001	0.001
10/12/09 02:25:04	59.991	3671.493	350	-260.538879	0	196	10	15	-103	7629.36	0	0	0	0.000	0.000
10/12/09 02:25:06	59.991	3669.53	350	-257.88208	0	196.5	10	15	-103	7629.69	0	0	0	0.000	0.000
10/12/09 02:25:08	59.993	3670.066	350	-257.88208	0	197	10	15	-103	7630.02	0	0	0	0.002	0.002
10/12/09 02:25:10	59.993	3670.028	350	-257.88208	0	197.5	10	15	-103	7630.35	0	0	0	0.000	0.000
10/12/09 02:25:12	59.996	3671.744	350	-257.88208	0	198	10	15	-103	7630.68	0	0	0	0.003	0.003
10/12/09 02:25:14	60.002	3671.578	350	-257.88208	0	198.5	10	15	-103	7631.01	0	0	0	0.006	0.006
10/12/09 02:25:16	60.002	3672.625	350	-258.588654	0	199	10	15	-103	7631.34	0	0	0	0.000	0.000
10/12/09 02:25:18	60.003	3672.674	350	-258.588654	0	199.5	10	15	-103	7631.67	0	0	0	0.001	0.001

10/12/09 02:25:20	60.004	3673.819	350	-258.588654	0	200	10	15	-103	7632	0	0	0	0.001	0.001
10/12/09 02:25:22	60.005	3673.25	350	-258.588654	0	200.5	10	15	-103	7632.33	0	0	0	0.001	0.001
10/12/09 02:25:24	60.004	3673.182	350	-258.588654	0	201	10	15	-103	7632.66	0	0	0	-0.001	0.001
10/12/09 02:25:26	60.002	3673.496	350	-261.906158	0	201.5	10	15	-103	7632.99	0	0	0	-0.002	0.002
10/12/09 02:25:28	60.004	3672.418	350	-261.906158	0	202	10	15	-103	7633.32	0	0	0	0.002	0.002
10/12/09 02:25:30	60.008	3672.363	350	-261.906158	0	202.5	10	15	-103	7633.65	0	0	0	0.004	0.004
10/12/09 02:25:32	60.01	3672.217	350	-261.906158	0	203	10	15	-103	7633.98	0	0	0	0.002	0.002
10/12/09 02:25:34	60.01	3672.261	350	-261.906158	0	203.5	10	15	-103	7634.31	0	0	0	0.000	0.000
10/12/09 02:25:36	60.01	3673.182	350	-256.747803	0	204	10	15	-103	7634.64	0	0	0	0.000	0.000
10/12/09 02:25:38	60.011	3673.603	350	-256.747803	0	204.5	10	15	-103	7634.97	0	0	0	0.001	0.001
10/12/09 02:25:40	60.013	3673.553	350	-256.747803	0	205	10	15	-103	7635.3	0	0	0	0.002	0.002
10/12/09 02:25:42	60.014	3674.312	350	-256.747803	0	205.5	10	15	-103	7635.63	0	0	0	0.001	0.001
10/12/09 02:25:44	60.013	3674.537	350	-256.747803	0	206	10	15	-103	7635.96	0	0	0	-0.001	0.001
10/12/09 02:25:46	60.012	3673.813	350	-167.431976	0	206.5	10	15	-103	7636.29	0	0	0	-0.001	0.001
10/12/09 02:25:48	60.011	3673.204	350	-167.431976	0	207	10	15	-103	7636.62	0	0	0	-0.001	0.001
10/12/09 02:25:50	60.011	3672.563	350	-167.431976	0	207.5	10	15	-103	7636.95	0	0	0	0.000	0.000
10/12/09 02:25:52	60.017	3673.068	350	-167.431976	0	208	10	15	-103	7637.28	0	0	0	0.006	0.006
10/12/09 02:25:54	60.022	3672.388	350	-167.431976	0	208.5	10	15	-103	7637.61	0	0	0	0.005	0.005
10/12/09 02:25:56	60.017	3672.52	350	-164.973404	0	209	10	15	-103	7637.94	0	0	0	-0.005	0.005
10/12/09 02:25:58	60.014	3671.25	350	-164.973404	0	209.5	10	15	-103	7638.27	0	0	0	-0.003	0.003
10/12/09 02:26:00	60.013	3671.288	350	-164.973404	0	210	10	15	-103	7638.6	0	0	0	-0.001	0.001
10/12/09 02:26:02	60.014	3672.989	350	-164.973404	0	210.5	10	15	-103	7638.93	0	0	0	0.001	0.001
10/12/09 02:26:04	60.017	3672.982	350	-164.973404	0	211	10	15	-103	7639.26	0	0	0	0.003	0.003
10/12/09 02:26:06	60.017	3672.915	350	-157.628082	0	211.5	10	15	-103	7639.59	0	0	0	0.000	0.000
10/12/09 02:26:08	60.019	3671.952	350	-157.628082	0	212	10	15	-103	7639.92	0	0	0	0.002	0.002
10/12/09 02:26:10	60.019	3671.193	350	-157.628082	0	212.5	10	15	-103	7640.25	0	0	0	0.000	0.000
10/12/09 02:26:12	60.019	3671.627	350	-157.628082	0	213	10	15	-103	7640.58	0	0	0	0.000	0.000
10/12/09 02:26:14	60.027	3671.189	350	-157.628082	0	213.5	10	15	-103	7640.91	0	0	0	0.008	0.008
10/12/09 02:26:16	60.026	3668.611	350	-155.531708	0	214	10	15	-103	7641.24	0	0	0	-0.001	0.001
10/12/09 02:26:18	60.026	3665.232	350	-155.531708	0	214.5	10	15	-103	7641.57	0	0	0	0.000	0.000
10/12/09 02:26:20	60.022	3664.495	350	-155.531708	0	215	10	15	-103	7641.9	0	0	0	-0.004	0.004
10/12/09 02:26:22	60.019	3666.062	350	-155.531708	0	215.5	10	15	-103	7642.23	0	0	0	-0.003	0.003
10/12/09 02:26:24	60.017	3666.821	350	-155.531708	0	216	10	15	-103	7642.56	0	0	0	-0.002	0.002
10/12/09 02:26:26	60.019	3666.787	350	-160.447235	0	216.5	10	15	-103	7642.89	0	0	0	0.002	0.002
10/12/09 02:26:28	60.02	3670.454	350	-160.447235	0	217	10	15	-103	7643.22	0	0	0	0.001	0.001
10/12/09 02:26:30	60.019	3670.267	350	-160.447235	0	217.5	10	15	-103	7643.55	0	0	0	-0.001	0.001
10/12/09 02:26:32	60.021	3671.668	350	-160.447235	0	218	10	15	-103	7643.88	0	0	0	0.002	0.002
10/12/09 02:26:34	60.021	3672.493	350	-160.447235	0	218.5	10	15	-103	7644.21	0	0	0	0.000	0.000
10/12/09 02:26:36	60.021	3672.685	350	-163.958603	0	219	10	15	-103	7644.54	0	0	0	0.000	0.000
10/12/09 02:26:38	60.019	3672.857	350	-163.958603	0	219.5	10	15	-103	7644.87	0	0	0	-0.002	0.002
10/12/09 02:26:40	60.018	3672.164	350	-163.958603	0	220	10	15	-103	7645.2	0	0	0	-0.001	0.001
10/12/09 02:26:42	60.022	3671.413	350	-163.958603	0	220.5	10	15	-103	7645.53	0	0	0	0.004	0.004
10/12/09 02:26:44	60.031	3669.983	350	-163.958603	0	221	10	15	-103	7645.86	0	0	0	0.009	0.009
10/12/09 02:26:46	60.037	3666.467	350	-166.072449	0	221.5	10	15	-103	7646.19	0	0	0	0.006	0.006
10/12/09 02:26:48	60.037	3663.758	350	-166.072449	0	222	10	15	-103	7646.52	0	0	0	0.000	0.000
10/12/09 02:26:50	60.036	3661.599	350	-166.072449	0	222.5	10	15	-103	7646.85	0	0	0	-0.001	0.001
10/12/09 02:26:52	60.037	3660.672	350	-166.072449	0	223	10	15	-103	7647.18	0	0	0	0.001	0.001
10/12/09 02:26:54	60.046	3651.492	350	-166.072449	0	223.5	10	15	-103	7647.51	0	0	0	0.009	0.009
10/12/09 02:26:56	60.048	3649.19	350	-163.766586	0	224	10	15	-103	7647.84	0	0	0	0.002	0.002

10/12/09 02:26:58	60.048	3650.025	350	-163.766586	0	224.5	10	15	-103	7648.17	0	0	0	0.000	0.000
10/12/09 02:27:00	60.043	3648.246	350	-163.766586	0	225	10	15	-103	7648.5	0	0	0	-0.005	0.005
10/12/09 02:27:02	60.041	3649.512	350	-163.766586	0	225.5	10	15	-103	7648.83	0	0	0	-0.002	0.002
10/12/09 02:27:04	60.041	3654.294	350	-163.766586	0	226	10	15	-103	7649.16	0	0	0	0.000	0.000
10/12/09 02:27:06	60.041	3655.007	350	-165.101685	0	226.5	10	15	-103	7649.49	0	0	0	0.000	0.000
10/12/09 02:27:08	60.039	3651.874	350	-165.101685	0	227	10	15	-103	7649.82	0	0	0	-0.002	0.002
10/12/09 02:27:10	60.041	3651.059	350	-165.101685	0	227.5	10	15	-103	7650.15	0	0	0	0.002	0.002
10/12/09 02:27:12	60.043	3649.187	350	-165.101685	0	228	10	15	-103	7650.48	0	0	0	0.002	0.002
10/12/09 02:27:14	60.045	3648.236	350	-165.101685	0	228.5	10	15	-103	7650.81	0	0	0	0.002	0.002
10/12/09 02:27:16	60.046	3645.387	350	-165.476395	0	229	10	15	-103	7651.14	0	0	0	0.001	0.001
10/12/09 02:27:18	60.041	3644.628	350	-165.476395	0	229.5	10	15	-103	7651.47	0	0	0	-0.005	0.005
10/12/09 02:27:20	60.041	3645.446	350	-165.476395	0	230	10	15	-103	7651.8	0	0	0	0.000	0.000
10/12/09 02:27:22	60.041	3640.682	350	-165.476395	0	230.5	10	15	-103	7652.13	0	0	0	0.000	0.000
10/12/09 02:27:24	60.039	3641.191	350	-165.476395	0	231	10	15	-103	7652.46	0	0	0	-0.002	0.002
10/12/09 02:27:26	59.978	3659.465	350	-206.459106	0	231.5	10	15	-103	7652.79	0	0	1	-0.061	0.061
10/12/09 02:27:28	59.852	3696.362	350	-206.459106	0	232	10	0	-103	7616	1	0	1	-0.126	0.126
10/12/09 02:27:30	59.836	3734.904	335	-206.459106	0	232.5	10	0	-103	7626	1	0	1	-0.016	0.016
10/12/09 02:27:32	59.869	3734.673	335	-206.459106	0	233	10	0	-103	7632	1	0	1	0.033	0.033
10/12/09 02:27:34	59.892	3737.157	335	-206.459106	0	233.5	10	0	-103	7632	1	0	1	0.023	0.023
10/12/09 02:27:36	59.891	3761.25	335	-211.256042	0	234	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:27:38	59.88	3766.113	335	-211.256042	1	234.5	10	0	-103	7632	1	0	1	-0.011	0.011
10/12/09 02:27:40	59.876	3766.194	335	-211.256042	1	235	10	0	-103	7632	1	0	1	-0.004	0.004
10/12/09 02:27:42	59.875	3768.877	335	-211.256042	1	235.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:27:44	59.883	3769.925	335	-211.256042	1	236	10	0	-103	7632	1	0	1	0.008	0.008
10/12/09 02:27:46	59.887	3780.621	335	-214.346695	1	236.5	10	0	-103	7632	1	0	1	0.004	0.004
10/12/09 02:27:48	59.886	3781.592	335	-214.346695	1	237	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:27:50	59.885	3782.5	335	-214.346695	1	237.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:27:52	59.887	3784.962	335	-214.346695	2	238	10	0	-103	7632	1	0	1	0.002	0.002
10/12/09 02:27:54	59.888	3784.73	335	-214.346695	3	238.5	10	0	-103	7632	1	0	1	0.001	0.001
10/12/09 02:27:56	59.89	3784.419	335	-212.172699	4	239	10	0	-103	7632	1	0	1	0.002	0.002
10/12/09 02:27:58	59.895	3788.072	335	-212.172699	5	239.5	10	0	-103	7632	1	0	1	0.005	0.005
10/12/09 02:28:00	59.894	3788.328	335	-212.172699	6	240	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:02	59.893	3788.868	335	-212.172699	7	240.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:04	59.894	3788.472	335	-212.172699	8	241	10	0	-103	7632	1	0	1	0.001	0.001
10/12/09 02:28:06	59.894	3792.276	335	-215.598175	9	241.5	10	0	-103	7632	1	0	1	0.000	0.000
10/12/09 02:28:08	59.891	3793.074	335	-215.598175	10	242	10	0	-103	7632	1	0	1	-0.003	0.003
10/12/09 02:28:10	59.89	3794.374	335	-215.598175	11	242.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:12	59.885	3799.428	335	-215.598175	12	243	10	0	-103	7632	1	0	1	-0.005	0.005
10/12/09 02:28:14	59.885	3800.427	335	-215.598175	13	243.5	10	0	-103	7632	1	0	1	0.000	0.000
10/12/09 02:28:16	59.888	3799.959	335	-218.327255	14	244	10	0	-103	7632	1	0	1	0.003	0.003
10/12/09 02:28:18	59.887	3803.625	335	-218.327255	15	244.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:20	59.888	3802.925	335	-218.327255	16	245	10	0	-103	7632	1	0	1	0.001	0.001
10/12/09 02:28:22	59.888	3802.951	335	-218.327255	16	245.5	10	0	-103	7632	1	0	1	0.000	0.000
10/12/09 02:28:24	59.89	3804.388	335	-218.327255	16	246	10	0	-103	7632	1	0	1	0.002	0.002
10/12/09 02:28:26	59.889	3805.496	335	-217.379425	16	246.5	10	0	-103	7632	1	0	1	-0.001	0.001
10/12/09 02:28:28	59.882	3805.617	335	-217.379425	16	247	10	0	-103	7632	1	0	1	-0.007	0.007
10/12/09 02:28:30	59.873	3809.237	335	-217.379425	16	247.5	10	0	-103	7631	1	0	1	-0.009	0.009
10/12/09 02:28:32	59.857	3811.503	335	-217.379425	16	248	10	0	-103	7625	1	0	1	-0.016	0.016
10/12/09 02:28:34	59.849	3814.862	335	-217.379425	16	248.5	10	0	-103	7623	1	0	1	-0.008	0.008

10/12/09 02:28:36	59.852	3815.889	335	-214.830353	16	249	10	0	-103	7621	1	0	1	0.003	0.003
10/12/09 02:28:38	59.858	3825.643	335	-214.830353	16	249.5	10	0	-103	7623	1	0	1	0.006	0.006
10/12/09 02:28:40	59.863	3826.053	335	-214.830353	16	250	10	0	-103	7625	1	0	1	0.005	0.005
10/12/09 02:28:42	59.866	3826.002	335	-214.830353	16	250.5	10	0	-103	7627	1	0	1	0.003	0.003
10/12/09 02:28:44	59.865	3827.524	335	-214.830353	16	251	10	0	-103	7628	1	0	1	-0.001	0.001
10/12/09 02:28:46	59.867	3826.753	335	-227.655914	16	251.5	10	0	-103	7628	1	0	1	0.002	0.002
10/12/09 02:28:48	59.866	3826.783	335	-227.655914	16	252	10	0	-103	7629	1	0	1	-0.001	0.001
10/12/09 02:28:50	59.871	3826.454	335	-227.655914	16	252.5	10	0	-103	7630	1	0	1	0.005	0.005
10/12/09 02:28:52	59.874	3825.713	335	-227.655914	16	253	10	0	-103	7631	1	0	1	0.003	0.003
10/12/09 02:28:54	59.879	3823.826	335	-227.655914	16	253.5	10	0	-103	7635	1	0	1	0.005	0.005
10/12/09 02:28:56	59.88	3822.505	335	-225.018082	16	254	10	0	-103	7638	1	0	1	0.001	0.001
10/12/09 02:28:58	59.883	3819.081	335	-225.018082	16	254.5	10	0	-103	7639	1	0	1	0.003	0.003
10/12/09 02:29:00	59.886	3818.055	335	-225.018082	16	255	10	0	-103	7642	1	0	1	0.003	0.003
10/12/09 02:29:02	59.89	3816.815	335	-225.018082	16	255.5	10	0	-103	7644	1	0	1	0.004	0.004
10/12/09 02:29:04	59.892	3815.01	335	-225.018082	16	256	10	0	-103	7645	1	0	1	0.002	0.002
10/12/09 02:29:06	59.889	3813.783	335	-228.365158	16	256.5	10	0	-103	7647	1	0	1	-0.003	0.003
10/12/09 02:29:08	59.893	3811.838	335	-228.365158	16	257	10	0	-103	7648	1	0	1	0.004	0.004
10/12/09 02:29:10	59.899	3809.652	335	-228.365158	16	257.5	10	0	-103	7649	1	0	1	0.006	0.006
10/12/09 02:29:12	59.903	3806.972	335	-228.365158	16	258	10	0	-103	7650	1	0	1	0.004	0.004
10/12/09 02:29:14	59.902	3805.593	335	-228.365158	16	258.5	10	0	-103	7651	1	0	1	-0.001	0.001
10/12/09 02:29:16	59.902	3804.188	335	-234.075333	16	259	10	0	-103	7652	1	0	1	0.000	0.000
10/12/09 02:29:18	59.904	3796.078	335	-234.075333	16	259.5	10	0	-103	7653	1	0	1	0.002	0.002
10/12/09 02:29:20	59.907	3793.975	335	-234.075333	16	260	10	0	-103	7654	1	0	1	0.003	0.003
10/12/09 02:29:22	59.911	3792.169	335	-234.075333	16	260.5	10	0	-103	7655	1	0	1	0.004	0.004
10/12/09 02:29:24	59.916	3791.502	335	-234.075333	16	261	10	0	-103	7655	1	0	1	0.005	0.005
10/12/09 02:29:26	59.916	3789.534	335	-228.798157	16	261.5	10	0	-103	7656	1	0	1	0.000	0.000
10/12/09 02:29:28	59.917	3788.132	335	-228.798157	16	262	10	0	-103	7656	1	0	1	0.001	0.001
10/12/09 02:29:30	59.918	3784.563	335	-228.798157	16	262.5	10	0	-103	7657	1	0	1	0.001	0.001
10/12/09 02:29:32	59.92	3783.028	335	-228.798157	16	263	10	0	-103	7657	1	0	1	0.002	0.002
10/12/09 02:29:34	59.921	3781.701	335	-228.798157	16	263.5	10	0	-103	7658	1	0	1	0.001	0.001
10/12/09 02:29:36	59.92	3776.358	335	-229.466965	16	264	10	0	-103	7658	1	0	1	-0.001	0.001
10/12/09 02:29:38	59.917	3775.635	335	-229.466965	16	264.5	10	0	-103	7659	1	0	1	-0.003	0.003
10/12/09 02:29:40	59.92	3774.604	335	-229.466965	16	265	10	0	-103	7659	1	0	1	0.003	0.003
10/12/09 02:29:42	59.921	3773.334	335	-229.466965	16	265.5	10	0	-103	7659	1	0	1	0.001	0.001
10/12/09 02:29:44	59.923	3773.958	335	-229.466965	16	266	10	0	-103	7660	1	0	1	0.002	0.002
10/12/09 02:29:46	59.926	3772.722	335	-228.980164	16	266.5	10	0	-103	7660	1	0	1	0.003	0.003
10/12/09 02:29:48	59.925	3771.67	335	-228.980164	16	267	10	0	-103	7661	1	0	1	-0.001	0.001
10/12/09 02:29:50	59.928	3769.63	335	-228.980164	16	267.5	10	0	-103	7661	1	0	1	0.003	0.003
10/12/09 02:29:52	59.927	3768.707	335	-228.980164	16	268	10	0	-103	7662	1	0	1	-0.001	0.001
10/12/09 02:29:54	59.932	3767.643	335	-228.980164	16	268.5	10	0	-103	7662	1	0	1	0.005	0.005
10/12/09 02:29:56	59.927	3767.021	335	-219.975555	16	269	10	0	-103	7663	1	0	1	-0.005	0.005
10/12/09 02:29:58	59.928	3767.408	335	-219.975555	16	269.5	10	0	-103	7663	1	0	1	0.001	0.001
10/12/09 02:30:00	59.931	3766.788	335	-219.975555	16	270	10	0	-103	7664	1	0	1	0.003	0.003
10/12/09 02:30:02	59.929	3766.259	335	-219.975555	16	270.5	10	0	-103	7664	1	0	1	-0.002	0.002
10/12/09 02:30:04	59.931	3765.672	335	-219.975555	16	271	10	0	-103	7665	1	0	1	0.002	0.002
10/12/09 02:30:06	59.933	3766.123	335	-229.089249	16	271.5	10	0	-103	7666	1	0	1	0.002	0.002
10/12/09 02:30:08	59.937	3764.243	335	-229.089249	16	272	10	0	-103	7666	1	0	1	0.004	0.004
10/12/09 02:30:10	59.937	3765.105	335	-229.089249	16	272.5	10	0	-103	7667	1	0	1	0.000	0.000
10/12/09 02:30:12	59.945	3762.935	335	-229.089249	16	273	10	0	-103	7668	1	0	1	0.008	0.008

10/12/09 02:30:14	59.949	3758.387	335	-229.089249	16	273.5	10	0	-103	7668	1	0	1	0.004	0.004
10/12/09 02:30:16	59.947	3753.922	335	-229.663269	16	274	10	0	-103	7669	1	0	1	-0.002	0.002
10/12/09 02:30:18	59.942	3749.867	335	-229.663269	16	274.5	10	0	-103	7669	1	0	1	-0.005	0.005
10/12/09 02:30:20	59.941	3746.889	335	-229.663269	16	275	10	0	-103	7670	1	0	1	-0.001	0.001
10/12/09 02:30:22	59.942	3747.875	335	-229.663269	16	275.5	10	0	-103	7670	1	0	1	0.001	0.001
10/12/09 02:30:24	59.945	3749.593	335	-229.663269	16	276	10	0	-103	7671	1	0	1	0.003	0.003
10/12/09 02:30:26	59.948	3748.661	335	-229.233856	16	276.5	10	0	-103	7671	1	0	1	0.003	0.003
10/12/09 02:30:28	59.947	3746.706	335	-229.233856	16	277	10	0	-103	7672	1	0	1	-0.001	0.001
10/12/09 02:30:30	59.949	3749.077	335	-229.233856	16	277.5	10	0	-103	7673	1	0	1	0.002	0.002
10/12/09 02:30:32	59.951	3742.741	335	-229.233856	16	278	10	0	-103	7673	1	0	1	0.002	0.002
10/12/09 02:30:34	59.952	3740.259	350	-229.233856	16	278.5	10	0	-103	7673	1	0	1	0.001	0.001
10/12/09 02:30:36	59.953	3736.139	350	-231.409882	16	279	10	0	-103	7673	1	0	1	0.001	0.001
10/12/09 02:30:38	59.951	3731.382	350	-231.409882	16	279.5	10	0	-103	7673	1	0	1	-0.002	0.002
10/12/09 02:30:40	59.952	3727.838	350	-231.409882	16	280	10	0	-103	7673	1	0	1	0.001	0.001
10/12/09 02:30:42	59.952	3725.952	350	-231.409882	16	280.5	10	0	-103	7673	1	0	1	0.000	0.000
10/12/09 02:30:44	59.952	3722.649	350	-231.409882	16	281	10	0	-103	7673	1	0	1	0.000	0.000
10/12/09 02:30:46	59.955	3720.578	350	-218.622284	16	281.5	10	0	-103	7673	1	0	1	0.003	0.003
10/12/09 02:30:48	59.952	3717.996	350	-218.622284	16	282	10	0	-103	7673	1	0	1	-0.003	0.003
10/12/09 02:30:50	59.954	3718.142	350	-218.622284	16	282.5	10	0	-103	7673	1	0	1	0.002	0.002
10/12/09 02:30:52	59.952	3715.753	350	-218.622284	16	283	10	0	-103	7673	1	0	1	-0.002	0.002
10/12/09 02:30:54	59.953	3713.694	350	-218.622284	16	283.5	10	0	-103	7673	1	0	1	0.001	0.001
10/12/09 02:30:56	59.953	3713.484	350	-213.535858	16	284	10	0	-103	7673	1	0	1	0.000	0.000
10/12/09 02:30:58	59.952	3710.848	350	-213.535858	16	284.5	10	0	-103	7673	1	0	1	-0.001	0.001
10/12/09 02:31:00	59.954	3710.81	350	-213.535858	16	285	10	0	-103	7673	1	0	1	0.002	0.002
10/12/09 02:31:02	59.954	3712.092	350	-213.535858	16	285.5	10	0	-103	7674	1	0	1	0.000	0.000
10/12/09 02:31:04	59.959	3714.623	350	-213.535858	16	286	10	0	-103	7675	1	0	1	0.005	0.005
10/12/09 02:31:06	59.957	3715.13	350	-225.651855	16	286.5	10	0	-103	7676	1	0	1	-0.002	0.002
10/12/09 02:31:08	59.956	3716.168	350	-225.651855	16	287	10	0	-103	7677	1	0	1	-0.001	0.001
10/12/09 02:31:10	59.954	3716.461	350	-225.651855	16	287.5	10	0	-103	7678	1	0	1	-0.002	0.002
10/12/09 02:31:12	59.956	3716.98	350	-225.651855	16	288	10	0	-103	7679	1	0	1	0.002	0.002
10/12/09 02:31:14	59.955	3717.759	350	-225.651855	16	288.5	10	0	-103	7680	1	0	1	-0.001	0.001
10/12/09 02:31:16	59.958	3722.361	350	-212.573639	16	289	10	0	-103	7681	1	0	1	0.003	0.003
10/12/09 02:31:18	59.961	3721.973	350	-212.573639	16	289.5	10	0	-103	7682	1	0	1	0.003	0.003
10/12/09 02:31:20	59.962	3722.658	350	-212.573639	16	290	10	0	-103	7684	1	0	1	0.001	0.001
10/12/09 02:31:22	59.962	3722.267	350	-212.573639	16	290.5	10	0	-103	7685	1	0	1	0.000	0.000
10/12/09 02:31:24	59.968	3722.278	350	-212.573639	16	291	10	0	-103	7687	1	0	1	0.006	0.006
10/12/09 02:31:26	59.966	3721.787	350	-219.897293	16	291.5	10	0	-103	7689	1	0	1	-0.002	0.002
10/12/09 02:31:28	59.966	3723.091	350	-219.897293	16	292	10	0	-103	7690	1	0	1	0.000	0.000
10/12/09 02:31:30	59.968	3723.984	350	-219.897293	16	292.5	10	0	-103	7692	1	0	1	0.002	0.002
10/12/09 02:31:32	59.97	3723.435	350	-219.897293	16	293	10	0	-103	7692	1	0	1	0.002	0.002
10/12/09 02:31:34	59.974	3723.893	350	-219.897293	16	293.5	10	0	-103	7693	1	0	1	0.004	0.004
10/12/09 02:31:36	59.97	3725.403	350	-231.1754	16	294	10	0	-103	7693	1	0	1	-0.004	0.004
10/12/09 02:31:38	59.969	3727.121	350	-231.1754	16	294.5	10	0	-103	7694	1	0	1	-0.001	0.001
10/12/09 02:31:40	59.969	3728.053	350	-231.1754	16	295	10	0	-103	7694	1	0	1	0.000	0.000
10/12/09 02:31:42	59.97	3731.13	350	-231.1754	16	295.5	10	0	-103	7695	1	0	1	0.001	0.001
10/12/09 02:31:44	59.971	3732.53	350	-231.1754	16	296	10	0	-103	7695	1	0	1	0.001	0.001
10/12/09 02:31:46	59.973	3733.327	350	-226.634125	16	296.5	10	0	-103	7695	1	0	1	0.002	0.002
10/12/09 02:31:48	59.973	3736.535	350	-226.634125	16	297	10	0	-103	7696	1	0	1	0.000	0.000
10/12/09 02:31:50	59.976	3736.907	350	-226.634125	16	297.5	10	0	-103	7696	1	0	1	0.003	0.003

10/12/09 02:31:52	59.978	3736.822	350	-226.634125	16	298	10	0	-103	7697	1	0	1	0.002	0.002
10/12/09 02:31:54	59.978	3738.699	350	-226.634125	16	298.5	10	0	-103	7697	1	0	1	0.000	0.000
10/12/09 02:31:56	59.976	3739.944	350	-227.255066	16	299	10	0	-103	7697	1	0	1	-0.002	0.002
10/12/09 02:31:58	59.978	3740.877	350	-227.255066	16	299.5	10	0	-103	7698	1	0	1	0.002	0.002
10/12/09 02:32:00	59.976	3741.794	350	-227.255066	16	300	10	0	-103	7698	1	0	1	-0.002	0.002
10/12/09 02:32:02	59.978	3745.234	350	-227.255066	16	300.5	10	0	-103	7698.33	1	0	1	0.002	0.002
10/12/09 02:32:04	59.977	3746.608	350	-227.255066	16	301	10	0	-103	7698.66	1	0	1	-0.001	0.001
10/12/09 02:32:06	59.98	3748.3	350	-229.290222	16	301.5	10	0	-103	7698.99	1	0	1	0.003	0.003
10/12/09 02:32:08	59.982	3750.716	350	-229.290222	16	302	10	0	-103	7699.32	1	0	1	0.002	0.002
10/12/09 02:32:10	59.981	3751.558	350	-229.290222	16	302.5	10	0	-103	7699.65	1	0	1	-0.001	0.001
10/12/09 02:32:12	59.98	3752.748	350	-229.290222	16	303	10	0	-103	7699.98	1	0	1	-0.001	0.001
10/12/09 02:32:14	59.979	3755.599	350	-229.290222	16	303.5	10	0	-103	7700.31	1	0	1	-0.001	0.001
10/12/09 02:32:16	59.98	3756.407	350	-221.461365	16	304	10	0	-103	7700.64	1	0	1	0.001	0.001
10/12/09 02:32:18	59.979	3756.975	350	-221.461365	16	304.5	10	0	-103	7700.97	1	0	1	-0.001	0.001
10/12/09 02:32:20	59.983	3760.405	350	-221.461365	16	305	10	0	-103	7701.3	1	0	1	0.004	0.004
10/12/09 02:32:22	59.983	3760.982	350	-221.461365	16	305.5	10	0	-103	7701.63	1	0	1	0.000	0.000
10/12/09 02:32:24	59.984	3761.407	350	-221.461365	16	306	10	0	-103	7701.96	1	0	1	0.001	0.001
10/12/09 02:32:26	59.988	3762.737	350	-241.274368	16	306.5	10	0	-103	7702.29	1	0	1	0.004	0.004
10/12/09 02:32:28	59.989	3763.212	350	-241.274368	16	307	10	0	-103	7702.62	1	0	1	0.001	0.001
10/12/09 02:32:30	59.987	3764.958	350	-241.274368	16	307.5	10	0	-103	7702.95	1	0	1	-0.002	0.002
10/12/09 02:32:32	59.987	3766.085	350	-241.274368	16	308	10	0	-103	7703.28	1	0	1	0.000	0.000
10/12/09 02:32:34	59.991	3766.433	350	-241.274368	16	308.5	10	0	-103	7703.61	1	0	1	0.004	0.004
10/12/09 02:32:36	59.993	3767.251	350	-243.071854	16	309	10	0	-103	7703.94	1	0	1	0.002	0.002
10/12/09 02:32:38	59.992	3767.792	350	-243.071854	16	309.5	10	0	-103	7704.27	1	0	1	-0.001	0.001
10/12/09 02:32:40	59.991	3768.634	350	-243.071854	16	310	10	0	-103	7704.6	1	0	1	-0.001	0.001
10/12/09 02:32:42	59.989	3771.146	350	-243.071854	16	310.5	10	0	-103	7704.93	1	0	1	-0.002	0.002
10/12/09 02:32:44	59.986	3772.445	350	-243.071854	16	311	10	0	-103	7705.26	1	0	1	-0.003	0.003
10/12/09 02:32:46	59.983	3773.695	350	-241.670212	16	311.5	10	0	-103	7705.59	1	0	1	-0.003	0.003
10/12/09 02:32:48	59.983	3774.668	350	-241.670212	16	312	10	0	-103	7705.92	1	0	1	0.000	0.000
10/12/09 02:32:50	59.988	3775.841	350	-241.670212	16	312.5	10	0	-103	7706.25	1	0	1	0.005	0.005
10/12/09 02:32:52	59.993	3775.363	350	-241.670212	16	313	10	0	-103	7706.58	1	0	1	0.005	0.005
10/12/09 02:32:54	59.996	3774.866	350	-241.670212	16	313.5	10	0	-103	7706.91	1	0	1	0.003	0.003
10/12/09 02:32:56	59.998	3775.492	350	-228.149307	16	314	10	0	-103	7707.24	1	0	1	0.002	0.002
10/12/09 02:32:58	59.999	3776.42	350	-228.149307	16	314.5	10	0	-103	7707.57	1	0	1	0.001	0.001
10/12/09 02:33:00	60.001	3778.554	350	-228.149307	16	315	10	0	-103	7707.9	1	1	1	0.002	0.002
10/12/09 02:33:02	59.999	3779.692	350	-228.149307	16	315.5	10	0	-103	7708.23	1	0	1	-0.002	0.002
10/12/09 02:33:04	59.999	3781.256	350	-228.149307	16	316	10	0	-103	7708.56	1	0	1	0.000	0.000
10/12/09 02:33:06	59.999	3780.595	350	-235.128983	16	316.5	10	0	-103	7708.89	1	0	1	0.000	0.000
10/12/09 02:33:08	60.002	3783.092	350	-235.128983	16	317	10	0	-103	7709.22	1	1	1	0.003	0.003
10/12/09 02:33:10	60.005	3783.896	350	-235.128983	16	317.5	10	0	-103	7709.55	1	1	1	0.003	0.003
10/12/09 02:33:12	60.007	3784.421	350	-235.128983	16	318	10	0	-103	7709.88	1	1	1	0.002	0.002
10/12/09 02:33:14	60.008	3785.768	350	-235.128983	16	318.5	10	0	-103	7710.21	1	1	1	0.001	0.001
10/12/09 02:33:16	60.011	3785.463	350	-246.433136	16	319	10	0	-103	7710.54	1	1	1	0.003	0.003
10/12/09 02:33:18	60.014	3786.85	350	-246.433136	16	319.5	10	0	-103	7710.87	1	1	1	0.003	0.003
10/12/09 02:33:20	60.017	3786.304	350	-246.433136	16	320	10	0	-103	7711.2	1	1	1	0.003	0.003
10/12/09 02:33:22	60.019	3787.259	350	-246.433136	16	320.5	10	0	-103	7711.53	1	1	1	0.002	0.002
10/12/09 02:33:24	60.021	3787.516	350	-246.433136	16	321	10	0	-103	7711.86	1	1	1	0.002	0.002
10/12/09 02:33:26	60.017	3787.955	350	-236.553543	16	321.5	10	0	-103	7712.19	1	1	1	-0.004	0.004
10/12/09 02:33:28	60.017	3788.03	350	-236.553543	16	322	10	0	-103	7712.52	1	1	1	0.000	0.000

10/12/09 02:33:30	60.019	3788.607	350	-236.553543	16	322.5	10	0	-103	7712.85	1	1	1	0.002	0.002
10/12/09 02:33:32	60.023	3789.216	350	-236.553543	16	323	10	0	-103	7713.18	1	1	1	0.004	0.004
10/12/09 02:33:34	60.024	3787.537	350	-236.553543	16	323.5	10	0	-103	7713.51	1	1	1	0.001	0.001
10/12/09 02:33:36	60.025	3785.842	350	-230.297562	16	324	10	0	-103	7713.84	1	1	1	0.001	0.001
10/12/09 02:33:38	60.021	3786.077	350	-230.297562	16	324.5	10	0	-103	7714.17	1	1	1	-0.004	0.004
10/12/09 02:33:40	60.019	3787.93	350	-230.297562	16	325	10	0	-103	7714.5	1	1	1	-0.002	0.002
10/12/09 02:33:42	60.024	3788.76	350	-230.297562	16	325.5	10	0	-103	7714.83	1	1	1	0.005	0.005
10/12/09 02:33:44	60.024	3786.875	350	-230.297562	16	326	10	0	-103	7715.16	1	1	1	0.000	0.000
10/12/09 02:33:46	60.021	3786.55	350	-231.175537	16	326.5	10	0	-103	7715.49	1	1	1	-0.003	0.003
10/12/09 02:33:48	60.02	3787.358	350	-231.175537	16	327	10	0	-103	7715.82	1	1	1	-0.001	0.001
10/12/09 02:33:50	60.025	3785.018	350	-231.175537	16	327.5	10	0	-103	7716.15	1	1	1	0.005	0.005
10/12/09 02:33:52	60.024	3785.614	350	-231.175537	16	328	10	0	-103	7716.48	1	1	1	-0.001	0.001
10/12/09 02:33:54	60.02	3785.949	350	-231.175537	16	328.5	10	0	-103	7716.81	1	1	1	-0.004	0.004
10/12/09 02:33:56	60.02	3785.804	350	-225.61763	16	329	10	0	-103	7717.14	1	1	1	0.000	0.000
10/12/09 02:33:58	60.022	3786.864	350	-225.61763	16	329.5	10	0	-103	7717.47	1	1	1	0.002	0.002
10/12/09 02:34:00	60.022	3786.877	350	-225.61763	16	330	10	0	-103	7717.8	1	1	1	0.000	0.000
10/12/09 02:34:02	60.022	3785.254	350	-225.61763	16	330.5	10	0	-103	7718.13	1	1	1	0.000	0.000
10/12/09 02:34:04	60.021	3785.726	350	-225.61763	16	331	10	0	-103	7718.46	1	1	1	-0.001	0.001
10/12/09 02:34:06	60.021	3786.347	350	-230.734421	16	331.5	10	0	-103	7718.79	1	1	1	0.000	0.000
10/12/09 02:34:08	60.023	3785.821	350	-230.734421	16	332	10	0	-103	7719.12	1	1	1	0.002	0.002
10/12/09 02:34:10	60.023	3785.798	350	-230.734421	16	332.5	10	0	-103	7719.45	1	1	1	0.000	0.000
10/12/09 02:34:12	60.022	3786.284	350	-230.734421	16	333	10	0	-103	7719.78	1	1	1	-0.001	0.001
10/12/09 02:34:14	60.019	3786.939	350	-230.734421	16	333.5	10	0	-103	7720.11	1	1	1	-0.003	0.003
10/12/09 02:34:16	60.016	3787.627	350	-234.847107	16	334	10	0	-103	7720.44	1	1	1	-0.003	0.003
10/12/09 02:34:18	60.018	3789.444	350	-234.847107	16	334.5	10	0	-103	7720.77	1	1	1	0.002	0.002
10/12/09 02:34:20	60.018	3789.673	350	-234.847107	16	335	10	0	-103	7721.1	1	1	1	0.000	0.000
10/12/09 02:34:22	60.018	3789.404	350	-234.847107	16	335.5	10	0	-103	7721.43	1	1	1	0.000	0.000
10/12/09 02:34:24	60.019	3788.479	350	-234.847107	16	336	10	0	-103	7721.76	1	1	1	0.001	0.001
10/12/09 02:34:26	60.019	3789.183	350	-228.960922	16	336.5	10	0	-103	7722.09	1	1	1	0.000	0.000
10/12/09 02:34:28	60.016	3789.369	350	-228.960922	16	337	10	0	-103	7722.42	1	1	1	-0.003	0.003
10/12/09 02:34:30	60.015	3789.005	350	-228.960922	16	337.5	10	0	-103	7722.75	1	1	1	-0.001	0.001
10/12/09 02:34:32	60.016	3788.665	350	-228.960922	16	338	10	0	-103	7723.08	1	1	1	0.001	0.001
10/12/09 02:34:34	60.014	3788.933	350	-228.960922	16	338.5	10	0	-103	7723.41	1	1	1	-0.002	0.002
10/12/09 02:34:36	60.013	3790.667	350	-231.177917	16	339	10	0	-103	7723.74	1	1	1	-0.001	0.001
10/12/09 02:34:38	60.012	3790.805	350	-231.177917	16	339.5	10	0	-103	7724.07	1	1	1	-0.001	0.001
10/12/09 02:34:40	60.012	3790.411	350	-231.177917	16	340	10	0	-103	7724.4	1	1	1	0.000	0.000
10/12/09 02:34:42	60.01	3789.769	350	-231.177917	16	340.5	10	0	-103	7724.73	1	1	1	-0.002	0.002
10/12/09 02:34:44	60.007	3791.54	350	-231.177917	16	341	10	0	-103	7725.06	1	1	1	-0.003	0.003
10/12/09 02:34:46	60.007	3792.945	350	-236.489288	16	341.5	10	0	-103	7725.39	1	1	1	0.000	0.000
10/12/09 02:34:48	60.009	3791.027	350	-236.489288	16	342	10	0	-103	7725.72	1	1	1	0.002	0.002
10/12/09 02:34:50	60.009	3791.443	350	-236.489288	16	342.5	10	0	-103	7726.05	1	1	1	0.000	0.000
10/12/09 02:34:52	60.01	3791.426	350	-236.489288	16	343	10	0	-103	7726.38	1	1	1	0.001	0.001
10/12/09 02:34:54	60.003	3790.603	350	-236.489288	16	343.5	10	0	-103	7726.71	1	1	1	-0.007	0.007
10/12/09 02:34:56	59.999	3790.457	350	-245.038925	16	344	10	0	-103	7727.04	1	0	1	-0.004	0.004
10/12/09 02:34:58	59.995	3790.216	350	-245.038925	16	344.5	10	0	-103	7727.37	1	0	1	-0.004	0.004
10/12/09 02:35:00	59.992	3789.585	350	-245.038925	16	345	10	0	-103	7727.7	1	0	1	-0.003	0.003
10/12/09 02:35:02	59.991	3788.457	350	-245.038925	16	345.5	10	0	-103	7728.03	1	0	1	-0.001	0.001
10/12/09 02:35:04	59.992	3788.105	350	-245.038925	16	346	10	0	-103	7728.36	1	0	1	0.001	0.001
10/12/09 02:35:06	59.992	3788.057	350	-223.605682	16	346.5	10	0	-103	7728.69	1	0	1	0.000	0.000

10/12/09 02:35:08	59.988	3788.189	350	-223.605682	16	347	10	0	-103	7729.02	1	0	1	-0.004	0.004
10/12/09 02:35:10	59.986	3788.497	350	-223.605682	16	347.5	10	0	-103	7729.35	1	0	1	-0.002	0.002
10/12/09 02:35:12	59.985	3788.54	350	-223.605682	16	348	10	0	-103	7729.68	1	0	1	-0.001	0.001
10/12/09 02:35:14	59.984	3788.571	350	-223.605682	16	348.5	10	0	-103	7730.01	1	0	1	-0.001	0.001
10/12/09 02:35:16	59.985	3788.101	350	-231.119354	16	349	10	0	-103	7730.34	1	0	1	0.001	0.001
10/12/09 02:35:18	59.984	3787.133	350	-231.119354	16	349.5	10	0	-103	7730.67	1	0	1	-0.001	0.001
10/12/09 02:35:20	59.982	3786.453	350	-231.119354	16	350	10	0	-103	7731	1	0	1	-0.002	0.002
10/12/09 02:35:22	59.981	3787.732	350	-231.119354	16	350.5	10	0	-103	7731.33	1	0	1	-0.001	0.001
10/12/09 02:35:24	59.982	3788.813	350	-231.119354	16	351	10	0	-103	7731.66	1	0	1	0.001	0.001
10/12/09 02:35:26	59.979	3789.285	350	-237.20665	16	351.5	10	0	-103	7731.99	1	0	1	-0.003	0.003
10/12/09 02:35:28	59.977	3788.256	350	-237.20665	16	352	10	0	-103	7732.32	1	0	1	-0.002	0.002
10/12/09 02:35:30	59.976	3788.41	350	-237.20665	16	352.5	10	0	-103	7732.65	1	0	1	-0.001	0.001
10/12/09 02:35:32	59.976	3790.467	350	-237.20665	16	353	10	0	-103	7732.98	1	0	1	0.000	0.000
10/12/09 02:35:34	59.979	3790.665	350	-237.20665	16	353.5	10	0	-103	7733.31	1	0	1	0.003	0.003
10/12/09 02:35:36	59.982	3790.42	350	-240.516373	16	354	10	0	-103	7733.64	1	0	1	0.003	0.003
10/12/09 02:35:38	59.978	3789.674	350	-240.516373	16	354.5	10	0	-103	7733.97	1	0	1	-0.004	0.004
10/12/09 02:35:40	59.976	3789.267	350	-240.516373	16	355	10	0	-103	7734.3	1	0	1	-0.002	0.002
10/12/09 02:35:42	59.974	3789.148	350	-240.516373	16	355.5	10	0	-103	7734.63	1	0	1	-0.002	0.002
10/12/09 02:35:44	59.976	3790.43	350	-240.516373	16	356	10	0	-103	7734.96	1	0	1	0.002	0.002
10/12/09 02:35:46	59.977	3789.914	350	-237.566055	16	356.5	10	0	-103	7735.29	1	0	1	0.001	0.001
10/12/09 02:35:48	59.977	3786.243	350	-237.566055	16	357	10	0	-103	7735.62	1	0	1	0.000	0.000
10/12/09 02:35:50	59.975	3787.442	350	-237.566055	16	357.5	10	0	-103	7735.95	1	0	1	-0.002	0.002
10/12/09 02:35:52	59.973	3788.963	350	-237.566055	16	358	10	0	-103	7736.28	1	0	1	-0.002	0.002
10/12/09 02:35:54	59.969	3790.602	350	-237.566055	16	358.5	10	0	-103	7736.61	1	0	1	-0.004	0.004
10/12/09 02:35:56	59.97	3791.877	350	-231.581421	16	359	10	0	-103	7736.94	1	0	1	0.001	0.001
10/12/09 02:35:58	59.971	3792.911	350	-231.581421	16	359.5	10	0	-103	7737.27	1	0	1	0.001	0.001
10/12/09 02:36:00	59.973	3792.311	350	-231.581421	16	360	10	0	-103	7737.6	1	0	1	0.002	0.002
10/12/09 02:36:02	59.978	3789.125	350	-231.581421	16	360.5	10	0	-103	7737.93	1	0	1	0.005	0.005
10/12/09 02:36:04	59.981	3788.08	350	-231.581421	16	361	10	0	-103	7738.26	1	0	1	0.003	0.003
10/12/09 02:36:06	59.978	3787.844	350	-235.850845	16	361.5	10	0	-103	7738.59	1	0	1	-0.003	0.003
10/12/09 02:36:08	59.975	3787.135	350	-235.850845	16	362	10	0	-103	7738.92	1	0	1	-0.003	0.003
10/12/09 02:36:10	59.972	3787.164	350	-235.850845	16	362.5	10	0	-103	7739.25	1	0	1	-0.003	0.003
10/12/09 02:36:12	59.976	3786.996	350	-235.850845	16	363	10	0	-103	7739.58	1	0	1	0.004	0.004
10/12/09 02:36:14	59.975	3787.405	350	-235.850845	16	363.5	10	0	-103	7739.91	1	0	1	-0.001	0.001
10/12/09 02:36:16	59.973	3786.487	350	-233.559982	16	364	10	0	-103	7740.24	1	0	1	-0.002	0.002
10/12/09 02:36:18	59.969	3787.079	350	-233.559982	16	364.5	10	0	-103	7740.57	1	0	1	-0.004	0.004
10/12/09 02:36:20	59.966	3789.214	350	-233.559982	16	365	10	0	-103	7740.9	1	0	1	-0.003	0.003
10/12/09 02:36:22	59.965	3790.512	350	-233.559982	16	365.5	10	0	-103	7741.23	1	0	1	-0.001	0.001
10/12/09 02:36:24	59.966	3791.221	350	-233.559982	16	366	10	0	-103	7741.56	1	0	1	0.001	0.001
10/12/09 02:36:26	59.969	3792.218	350	-219.009995	16	366.5	10	0	-103	7741.89	1	0	1	0.003	0.003
10/12/09 02:36:28	59.97	3790.959	350	-219.009995	16	367	10	0	-103	7742.22	1	0	1	0.001	0.001
10/12/09 02:36:30	59.968	3788.824	350	-219.009995	16	367.5	10	0	-103	7742.55	1	0	1	-0.002	0.002
10/12/09 02:36:32	59.965	3789.026	350	-219.009995	16	368	10	0	-103	7742.88	1	0	1	-0.003	0.003
10/12/09 02:36:34	59.964	3789.167	350	-219.009995	16	368.5	10	0	-103	7743.21	1	0	1	-0.001	0.001
10/12/09 02:36:36	59.97	3787.394	350	-205.338913	16	369	10	0	-103	7743.54	1	0	1	0.006	0.006
10/12/09 02:36:38	59.972	3785.69	350	-205.338913	16	369.5	10	0	-103	7743.87	1	0	1	0.002	0.002
10/12/09 02:36:40	59.967	3784.831	350	-205.338913	16	370	10	0	-103	7744.2	1	0	1	-0.005	0.005
10/12/09 02:36:42	59.967	3785.01	350	-205.338913	16	370.5	10	0	-103	7744.53	1	0	1	0.000	0.000
10/12/09 02:36:44	59.969	3784.32	350	-205.338913	16	371	10	0	-103	7744.86	1	0	1	0.002	0.002

10/12/09 02:36:46	59.968	3782.809	350	-236.285355	16	371.5	10	0	-103	7745.19	1	0	1	-0.001	0.001
10/12/09 02:36:48	59.969	3782.11	350	-236.285355	16	372	10	0	-103	7745.52	1	0	1	0.001	0.001
10/12/09 02:36:50	59.967	3779.352	350	-236.285355	16	372.5	10	0	-103	7745.85	1	0	1	-0.002	0.002
10/12/09 02:36:52	59.967	3779.056	350	-236.285355	16	373	10	0	-103	7746.18	1	0	1	0.000	0.000
10/12/09 02:36:54	59.966	3778.633	350	-236.285355	16	373.5	10	0	-103	7746.51	1	0	1	-0.001	0.001
10/12/09 02:36:56	59.965	3779.212	350	-223.015732	16	374	10	0	-103	7746.84	1	0	1	-0.001	0.001
10/12/09 02:36:58	59.971	3779.335	350	-223.015732	16	374.5	10	0	-103	7747.17	1	0	1	0.006	0.006
10/12/09 02:37:00	59.967	3776.429	350	-223.015732	16	375	10	0	-103	7747.5	1	0	1	-0.004	0.004
10/12/09 02:37:02	59.965	3775.647	350	-223.015732	16	375.5	10	0	-103	7747.83	1	0	1	-0.002	0.002
10/12/09 02:37:04	59.962	3776.597	350	-223.015732	16	376	10	0	-103	7748.16	1	0	1	-0.003	0.003
10/12/09 02:37:06	59.964	3776.559	350	-223.015732	16	376.5	10	0	-103	7748.49	1	0	1	0.002	0.002
10/12/09 02:37:08	59.97	3776.023	350	-223.015732	16	377	10	0	-103	7748.82	1	0	1	0.006	0.006
10/12/09 02:37:10	59.967	3773.17	350	-223.015732	16	377.5	10	0	-103	7749.15	1	0	1	-0.003	0.003
10/12/09 02:37:12	59.969	3771.73	350	-223.015732	16	378	10	0	-103	7749.48	1	0	1	0.002	0.002
10/12/09 02:37:14	59.968	3768.793	350	-223.015732	16	378.5	10	0	-103	7749.81	1	0	1	-0.001	0.001
10/12/09 02:37:16	59.963	3768.503	350	-223.015732	16	379	10	0	-103	7750.14	1	0	1	-0.005	0.005
10/12/09 02:37:18	59.965	3768.917	350	-223.015732	16	379.5	10	0	-103	7750.47	1	0	1	0.002	0.002
10/12/09 02:37:20	59.97	3767.366	350	-223.015732	16	380	10	0	-103	7750.8	1	0	1	0.005	0.005
10/12/09 02:37:22	59.973	3764.786	350	-223.015732	16	380.5	10	0	-103	7751.13	1	0	1	0.003	0.003
10/12/09 02:37:24	59.968	3760.295	350	-223.015732	16	381	10	0	-103	7751.46	1	0	1	-0.005	0.005
10/12/09 02:37:26	59.965	3759.592	350	-223.015732	16	381.5	10	0	-103	7751.79	1	0	1	-0.003	0.003
10/12/09 02:37:28	59.968	3761.894	350	-223.015732	16	382	10	0	-103	7752.12	1	0	1	0.003	0.003
10/12/09 02:37:30	59.969	3761.777	350	-223.015732	16	382.5	10	0	-103	7752.45	1	0	1	0.001	0.001
10/12/09 02:37:32	59.967	3760.583	350	-223.015732	16	383	10	0	-103	7752.78	1	0	1	-0.002	0.002
10/12/09 02:37:34	59.964	3760.157	350	-223.015732	16	383.5	10	0	-103	7753.11	1	0	1	-0.003	0.003
10/12/09 02:37:36	59.966	3759.781	350	-223.015732	16	384	10	0	-103	7753.44	1	0	1	0.002	0.002
10/12/09 02:37:38	59.979	3759.495	350	-223.015732	16	384.5	10	0	-103	7753.77	1	0	1	0.013	0.013
10/12/09 02:37:40	59.99	3757.773	350	-223.015732	16	385	10	0	-103	7754.1	1	0	1	0.011	0.011
10/12/09 02:37:42	59.983	3753.277	350	-223.015732	16	385.5	10	0	-103	7754.43	1	0	1	-0.007	0.007
10/12/09 02:37:44	59.974	3753.087	350	-223.015732	16	386	10	0	-103	7754.76	1	0	1	-0.009	0.009
10/12/09 02:37:46	59.967	3751.637	350	-223.015732	16	386.5	10	0	-103	7755.09	1	0	1	-0.007	0.007
10/12/09 02:37:48	59.965	3753.751	350	-223.015732	16	387	10	0	-103	7755.42	1	0	1	-0.002	0.002
10/12/09 02:37:50	59.962	3758.225	350	-223.015732	16	387.5	10	0	-103	7755.75	1	0	1	-0.003	0.003
10/12/09 02:37:52	59.962	3759.25	350	-223.015732	16	388	10	0	-103	7756.08	1	0	1	0.000	0.000
10/12/09 02:37:54	59.961	3758.041	350	-223.015732	16	388.5	10	0	-103	7756.41	1	0	1	-0.001	0.001
10/12/09 02:37:56	59.961	3760.965	350	-223.015732	16	389	10	0	-103	7756.74	1	0	1	0.000	0.000
10/12/09 02:37:58	59.96	3762.022	350	-223.015732	16	389.5	10	0	-103	7757.07	1	0	1	-0.001	0.001
10/12/09 02:38:00	59.963	3763.822	350	-223.015732	16	390	10	0	-103	7757.4	1	0	1	0.003	0.003
10/12/09 02:38:02	59.959	3763.1	350	-223.015732	16	390.5	10	0	-103	7757.73	1	0	1	-0.004	0.004
10/12/09 02:38:04	59.956	3763.858	350	-223.015732	16	391	10	0	-103	7758.06	1	0	1	-0.003	0.003
10/12/09 02:38:06	59.951	3764.158	350	-223.015732	16	391.5	10	0	-103	7758.39	1	0	1	-0.005	0.005
10/12/09 02:38:08	59.953	3766.127	350	-223.015732	16	392	10	0	-103	7758.72	1	0	1	0.002	0.002
10/12/09 02:38:10	59.954	3768.339	350	-223.015732	16	392.5	10	0	-103	7759.05	1	0	1	0.001	0.001
10/12/09 02:38:12	59.957	3767.972	350	-223.015732	16	393	10	0	-103	7759.38	1	0	1	0.003	0.003
10/12/09 02:38:14	59.956	3767.438	350	-223.015732	16	393.5	10	0	-103	7759.71	1	0	1	-0.001	0.001
10/12/09 02:38:16	59.961	3765.606	350	-223.015732	16	394	10	0	-103	7760.04	1	0	1	0.005	0.005
10/12/09 02:38:18	59.963	3762.688	350	-223.015732	16	394.5	10	0	-103	7760.37	1	0	1	0.002	0.002
10/12/09 02:38:20	59.961	3761.57	350	-223.015732	16	395	10	0	-103	7760.7	1	0	1	-0.002	0.002
10/12/09 02:38:22	59.959	3761.92	350	-223.015732	16	395.5	10	0	-103	7761.03	1	0	1	-0.002	0.002

10/12/09 02:38:24	59.963	3759.627	350	-223.015732	16	396	10	0	-103	7761.36	1	0	1	0.004	0.004
10/12/09 02:38:26	59.963	3758.522	350	-223.015732	16	396.5	10	0	-103	7761.69	1	0	1	0.000	0.000
10/12/09 02:38:28	59.965	3752.429	350	-223.015732	16	397	10	0	-103	7762.02	1	0	1	0.002	0.002
10/12/09 02:38:30	59.968	3750.102	350	-223.015732	16	397.5	10	0	-103	7762.35	1	0	1	0.003	0.003
10/12/09 02:38:32	59.968	3753.83	350	-223.015732	16	398	10	0	-103	7762.68	1	0	1	0.000	0.000
10/12/09 02:38:34	59.968	3753.51	350	-223.015732	16	398.5	10	0	-103	7763.01	1	0	1	0.000	0.000
10/12/09 02:38:36	59.97	3753.523	350	-223.015732	16	399	10	0	-103	7763.34	1	0	1	0.002	0.002
10/12/09 02:38:38	59.973	3752.741	350	-223.015732	16	399.5	10	0	-103	7763.67	1	0	1	0.003	0.003
10/12/09 02:38:40	59.971	3753.178	350	-223.015732	16	400	10	0	-103	7764	1	0	1	-0.002	0.002
10/12/09 02:38:42	59.965	3752.729	350	-223.015732	16	400.5	10	0	-103	7764.33	1	0	1	-0.006	0.006
10/12/09 02:38:44	59.967	3753.291	350	-223.015732	16	401	10	0	-103	7764.66	1	0	1	0.002	0.002
10/12/09 02:38:46	59.967	3752.872	350	-223.015732	16	401.5	10	0	-103	7764.99	1	0	1	0.000	0.000
10/12/09 02:38:48	59.972	3752.359	350	-223.015732	16	402	10	0	-103	7765.32	1	0	1	0.005	0.005
10/12/09 02:38:50	59.976	3749.398	350	-223.015732	16	402.5	10	0	-103	7765.65	1	0	1	0.004	0.004
10/12/09 02:38:52	59.975	3747.476	350	-223.015732	16	403	10	0	-103	7765.98	1	0	1	-0.001	0.001
10/12/09 02:38:54	59.969	3740.37	350	-223.015732	16	403.5	10	0	-103	7766.31	1	0	1	-0.006	0.006
10/12/09 02:38:56	59.973	3741.285	350	-223.015732	16	404	10	0	-103	7766.64	1	0	1	0.004	0.004
10/12/09 02:38:58	59.974	3746.651	350	-223.015732	16	404.5	10	0	-103	7766.97	1	0	1	0.001	0.001
10/12/09 02:39:00	59.978	3745.738	350	-223.015732	16	405	10	0	-103	7767.3	1	0	1	0.004	0.004
10/12/09 02:39:02	59.981	3743.351	350	-223.015732	16	405.5	10	0	-103	7767.63	1	0	1	0.003	0.003
10/12/09 02:39:04	59.981	3741.618	350	-223.015732	16	406	10	0	-103	7767.96	1	0	1	0.000	0.000
10/12/09 02:39:06	59.981	3740.306	350	-223.015732	16	406.5	10	0	-103	7768.29	1	0	1	0.000	0.000
10/12/09 02:39:08	59.982	3738.484	350	-223.015732	16	407	10	0	-103	7768.62	1	0	1	0.001	0.001
10/12/09 02:39:10	59.982	3738.901	350	-223.015732	16	407.5	10	0	-103	7768.95	1	0	1	0.000	0.000
10/12/09 02:39:12	59.984	3737.404	350	-223.015732	16	408	10	0	-103	7769.28	1	0	1	0.002	0.002
10/12/09 02:39:14	59.982	3737.273	350	-223.015732	16	408.5	10	0	-103	7769.61	1	0	1	-0.002	0.002
10/12/09 02:39:16	59.981	3736.308	350	-223.015732	16	409	10	0	-103	7769.94	1	0	1	-0.001	0.001
10/12/09 02:39:18	59.979	3736.272	350	-223.015732	16	409.5	10	0	-103	7770.27	1	0	1	-0.002	0.002
10/12/09 02:39:20	59.98	3735.448	350	-223.015732	16	410	10	0	-103	7770.6	1	0	1	0.001	0.001
10/12/09 02:39:22	59.978	3735.65	350	-223.015732	16	410.5	10	0	-103	7770.93	1	0	1	-0.002	0.002
10/12/09 02:39:24	59.978	3737.541	350	-223.015732	16	411	10	0	-103	7771.26	1	0	1	0.000	0.000
10/12/09 02:39:26	59.98	3738.012	350	-223.015732	16	411.5	10	0	-103	7771.59	1	0	1	0.002	0.002
10/12/09 02:39:28	59.981	3736.748	350	-223.015732	16	412	10	0	-103	7771.92	1	0	1	0.001	0.001
10/12/09 02:39:30	59.98	3736.693	350	-223.015732	16	412.5	10	0	-103	7772.25	1	0	1	-0.001	0.001
10/12/09 02:39:32	59.978	3736.067	350	-223.015732	16	413	10	0	-103	7772.58	1	0	1	-0.002	0.002
10/12/09 02:39:34	59.976	3736.094	350	-223.015732	16	413.5	10	0	-103	7772.91	1	0	1	-0.002	0.002
10/12/09 02:39:36	59.972	3736.575	350	-223.015732	16	414	10	0	-103	7773.24	1	0	1	-0.004	0.004
10/12/09 02:39:38	59.971	3738.571	350	-223.015732	16	414.5	10	0	-103	7773.57	1	0	1	-0.001	0.001
10/12/09 02:39:40	59.969	3738.875	350	-223.015732	16	415	10	0	-103	7773.9	1	0	1	-0.002	0.002
10/12/09 02:39:42	59.974	3738.935	350	-223.015732	16	415.5	10	0	-103	7774.23	1	0	1	0.005	0.005
10/12/09 02:39:44	59.975	3738.647	350	-223.015732	16	416	10	0	-103	7774.56	1	0	1	0.001	0.001
10/12/09 02:39:46	59.976	3737.684	350	-223.015732	16	416.5	10	0	-103	7774.89	1	0	1	0.001	0.001
10/12/09 02:39:48	59.972	3737.382	350	-223.015732	16	417	10	0	-103	7775.22	1	0	1	-0.004	0.004
10/12/09 02:39:50	59.969	3737.892	350	-223.015732	16	417.5	10	0	-103	7775.55	1	0	1	-0.003	0.003
10/12/09 02:39:52	59.971	3740.017	350	-223.015732	16	418	10	0	-103	7775.88	1	0	1	0.002	0.002
10/12/09 02:39:54	59.974	3740.329	350	-223.015732	16	418.5	10	0	-103	7776.21	1	0	1	0.003	0.003
10/12/09 02:39:56	59.972	3742.053	350	-223.015732	16	419	10	0	-103	7776.54	1	0	1	-0.002	0.002
10/12/09 02:39:58	59.972	3742.424	350	-223.015732	16	419.5	10	0	-103	7776.87	1	0	1	0.000	0.000
10/12/09 02:40:00	59.972	3742.524	350	-223.015732	16	420	10	0	-103	7777.2	1	0	1	0.000	0.000

10/12/09 02:40:02	59.977	3742.245	350	-223.015732	16	420.5	10	0	-103	7777.53	1	0	1	0.005	0.005
10/12/09 02:40:04	59.982	3741.723	350	-223.015732	16	421	10	0	-103	7777.86	1	0	1	0.005	0.005
10/12/09 02:40:06	59.978	3740.085	350	-223.015732	16	421.5	10	0	-103	7778.19	1	0	1	-0.004	0.004
10/12/09 02:40:08	59.976	3740.629	350	-223.015732	16	422	10	0	-103	7778.52	1	0	1	-0.002	0.002
10/12/09 02:40:10	59.973	3739.964	350	-223.015732	16	422.5	10	0	-103	7778.85	1	0	1	-0.003	0.003
10/12/09 02:40:12	59.974	3740.775	350	-223.015732	16	423	10	0	-103	7779.18	1	0	1	0.001	0.001
10/12/09 02:40:14	59.977	3742.833	350	-223.015732	16	423.5	10	0	-103	7779.51	1	0	1	0.003	0.003
10/12/09 02:40:16	59.977	3741.268	350	-223.015732	16	424	10	0	-103	7779.84	1	0	1	0.000	0.000
10/12/09 02:40:18	59.978	3739.776	350	-223.015732	16	424.5	10	0	-103	7780.17	1	0	1	0.001	0.001
10/12/09 02:40:20	59.979	3738.966	350	-223.015732	16	425	10	0	-103	7780.5	1	0	1	0.001	0.001
10/12/09 02:40:22	59.981	3738.706	350	-223.015732	16	425.5	10	0	-103	7780.83	1	0	1	0.002	0.002
10/12/09 02:40:24	59.977	3738.879	350	-223.015732	16	426	10	0	-103	7781.16	1	0	1	-0.004	0.004
10/12/09 02:40:26	59.974	3739.86	350	-223.015732	16	426.5	10	0	-103	7781.49	1	0	1	-0.003	0.003
10/12/09 02:40:28	59.971	3738.102	350	-223.015732	16	427	10	0	-103	7781.82	1	0	1	-0.003	0.003
10/12/09 02:40:30	59.971	3738.558	350	-223.015732	16	427.5	10	0	-103	7782.15	1	0	1	0.000	0.000
10/12/09 02:40:32	59.971	3743.507	350	-223.015732	16	428	10	0	-103	7782.48	1	0	1	0.000	0.000
10/12/09 02:40:34	59.972	3743.419	350	-223.015732	16	428.5	10	0	-103	7782.81	1	0	1	0.001	0.001
10/12/09 02:40:36	59.968	3745.251	350	-223.015732	16	429	10	0	-103	7783.14	1	0	1	-0.004	0.004
10/12/09 02:40:38	59.966	3745.744	350	-223.015732	16	429.5	10	0	-103	7783.47	1	0	1	-0.002	0.002
10/12/09 02:40:40	59.966	3747.34	350	-223.015732	16	430	10	0	-103	7783.8	1	0	1	0.000	0.000
10/12/09 02:40:42	59.971	3750.7	350	-223.015732	16	430.5	10	0	-103	7784.13	1	0	1	0.005	0.005
10/12/09 02:40:44	59.973	3749.75	350	-223.015732	16	431	10	0	-103	7784.46	1	0	1	0.002	0.002
10/12/09 02:40:46	59.972	3746.217	350	-223.015732	16	431.5	10	0	-103	7784.79	1	0	1	-0.001	0.001
10/12/09 02:40:48	59.969	3744.683	350	-223.015732	16	432	10	0	-103	7785.12	1	0	1	-0.003	0.003
10/12/09 02:40:50	59.972	3743.745	350	-223.015732	16	432.5	10	0	-103	7785.45	1	0	1	0.003	0.003
10/12/09 02:40:52	59.974	3743.149	350	-223.015732	16	433	10	0	-103	7785.78	1	0	1	0.002	0.002
10/12/09 02:40:54	59.973	3740.299	350	-223.015732	16	433.5	10	0	-103	7786.11	1	0	1	-0.001	0.001
10/12/09 02:40:56	59.97	3739.453	350	-223.015732	16	434	10	0	-103	7786.44	1	0	1	-0.003	0.003
10/12/09 02:40:58	59.971	3733.376	350	-223.015732	16	434.5	10	0	-103	7786.77	1	0	1	0.001	0.001
10/12/09 02:41:00	59.974	3731.83	350	-223.015732	16	435	10	0	-103	7787.1	1	0	1	0.003	0.003
10/12/09 02:41:02	59.982	3737.583	350	-223.015732	16	435.5	10	0	-103	7787.43	1	0	1	0.008	0.008
10/12/09 02:41:04	59.985	3736.229	350	-223.015732	16	436	10	0	-103	7787.76	1	0	1	0.003	0.003
10/12/09 02:41:06	59.985	3734.897	350	-223.015732	16	436.5	10	0	-103	7788.09	1	0	1	0.000	0.000
10/12/09 02:41:08	59.985	3733.434	350	-223.015732	16	437	10	0	-103	7788.42	1	0	1	0.000	0.000
10/12/09 02:41:10	59.987	3733.115	350	-223.015732	16	437.5	10	0	-103	7788.75	1	0	1	0.002	0.002
10/12/09 02:41:12	59.989	3730.51	350	-223.015732	16	438	10	0	-103	7789.08	1	0	1	0.002	0.002
10/12/09 02:41:14	59.989	3729.18	350	-223.015732	16	438.5	10	0	-103	7789.41	1	0	1	0.000	0.000
10/12/09 02:41:16	59.986	3725.459	350	-223.015732	16	439	10	0	-103	7789.74	1	0	1	-0.003	0.003
10/12/09 02:41:18	59.987	3724.785	350	-223.015732	16	439.5	10	0	-103	7790.07	1	0	1	0.001	0.001
10/12/09 02:41:20	59.99	3720.108	350	-223.015732	16	440	10	0	-103	7790.4	1	0	1	0.003	0.003
10/12/09 02:41:22	59.994	3720.938	350	-223.015732	16	440.5	10	0	-103	7790.73	1	0	1	0.004	0.004
10/12/09 02:41:24	59.996	3725.661	350	-223.015732	16	441	10	0	-103	7791.06	1	0	1	0.002	0.002
10/12/09 02:41:26	60.001	3725.677	350	-223.015732	16	441.5	10	0	-103	7791.39	1	1	1	0.005	0.005
10/12/09 02:41:28	60.003	3727.754	350	-223.015732	16	442	10	0	-103	7791.72	1	1	1	0.002	0.002
10/12/09 02:41:30	60.004	3727.825	350	-223.015732	16	442.5	10	0	-103	7792.05	1	1	1	0.001	0.001
10/12/09 02:41:32	60.006	3727.683	350	-223.015732	16	443	10	0	-103	7792.38	1	1	1	0.002	0.002
10/12/09 02:41:34	60.012	3727.231	350	-223.015732	16	443.5	10	0	-103	7792.71	1	1	1	0.006	0.006
10/12/09 02:41:36	60.014	3725.012	350	-223.015732	16	444	10	0	-103	7793.04	1	1	1	0.002	0.002
10/12/09 02:41:38	60.019	3726.446	350	-223.015732	16	444.5	10	0	-103	7793.37	1	1	1	0.005	0.005

10/12/09 02:41:40	60.021	3726.016	350	-223.015732	16	445	10	0	-103	7793.7	1	1	1	0.002	0.002
10/12/09 02:41:42	60.025	3719.123	350	-223.015732	16	445.5	10	0	-103	7794.03	1	1	1	0.004	0.004
10/12/09 02:41:44	60.026	3716.375	350	-223.015732	16	446	10	0	-103	7794.36	1	1	1	0.001	0.001
10/12/09 02:41:46	60.027	3717.333	350	-223.015732	16	446.5	10	0	-103	7794.69	1	1	1	0.001	0.001
10/12/09 02:41:48	60.029	3717.56	350	-223.015732	16	447	10	0	-103	7795.02	1	1	1	0.002	0.002
10/12/09 02:41:50	60.029	3717.142	350	-223.015732	16	447.5	10	0	-103	7795.35	1	1	1	0.000	0.000
10/12/09 02:41:52	60.037	3715.166	350	-223.015732	16	448	10	0	-103	7795.68	1	1	1	0.008	0.008
10/12/09 02:41:54	60.036	3713.632	350	-223.015732	16	448.5	10	0	-103	7796.01	1	1	1	-0.001	0.001
10/12/09 02:41:56	60.037	3710.283	350	-223.015732	16	449	10	0	-103	7796.34	1	1	1	0.001	0.001
10/12/09 02:41:58	60.037	3710.158	350	-223.015732	16	449.5	10	0	-103	7796.67	1	1	1	0.000	0.000
10/12/09 02:42:00	60.036	3699.356	350	-223.015732	16	450	10	0	-103	7797	1	1	1	-0.001	0.001
10/12/09 02:42:02	60.041	3698.591	350	-223.015732	16	450.5	10	0	-103	7797.33	1	1	1	0.005	0.005
10/12/09 02:42:04	60.043	3704.591	350	-223.015732	16	451	10	0	-103	7797.66	1	1	1	0.002	0.002
10/12/09 02:42:06	60.044	3703.275	350	-223.015732	16	451.5	10	0	-103	7797.99	1	1	1	0.001	0.001
10/12/09 02:42:08	60.043	3702.482	350	-223.015732	16	452	10	0	-103	7798.32	1	1	1	-0.001	0.001
10/12/09 02:42:10	60.046	3701.316	350	-223.015732	16	452.5	10	0	-103	7798.65	1	1	1	0.003	0.003
10/12/09 02:42:12	60.048	3700.826	350	-223.015732	16	453	10	0	-103	7798.98	1	1	1	0.002	0.002
10/12/09 02:42:14	60.046	3699.529	350	-223.015732	16	453.5	10	0	-103	7799.31	1	1	1	-0.002	0.002
10/12/09 02:42:16	60.046	3699.726	350	-223.015732	16	454	10	0	-103	7799.64	1	1	1	0.000	0.000
10/12/09 02:42:18	60.043	3690.1	350	-223.015732	16	454.5	10	0	-103	7799.97	1	1	1	-0.003	0.003
10/12/09 02:42:20	60.043	3690.477	350	-223.015732	16	455	10	0	-103	7800.3	1	1	1	0.000	0.000
10/12/09 02:42:22	60.044	3696.865	350	-223.015732	16	455.5	10	0	-103	7800.63	1	1	1	0.001	0.001
10/12/09 02:42:24	60.043	3696.877	350	-223.015732	16	456	10	0	-103	7800.96	1	1	1	-0.001	0.001
10/12/09 02:42:26	60.043	3696.182	350	-223.015732	16	456.5	10	0	-103	7801.29	1	1	1	0.000	0.000
10/12/09 02:42:28	60.045	3696.541	350	-223.015732	16	457	10	0	-103	7801.62	1	1	1	0.002	0.002
10/12/09 02:42:30	60.04	3696.968	350	-223.015732	16	457.5	10	0	-103	7801.95	1	1	1	-0.005	0.005
10/12/09 02:42:32	60.041	3698.686	350	-223.015732	16	458	10	0	-103	7802.28	1	1	1	0.001	0.001
10/12/09 02:42:34	60.039	3699.631	350	-223.015732	16	458.5	10	0	-103	7802.61	1	1	1	-0.002	0.002
10/12/09 02:42:36	60.039	3698.787	350	-223.015732	16	459	10	0	-103	7802.94	1	1	1	0.000	0.000
10/12/09 02:42:38	60.036	3699.712	350	-223.015732	16	459.5	10	0	-103	7803.27	1	1	1	-0.003	0.003
10/12/09 02:42:40	60.038	3700.106	350	-223.015732	16	460	10	0	-103	7803.6	1	1	1	0.002	0.002
10/12/09 02:42:42	60.033	3699.968	350	-223.015732	16	460.5	10	0	-103	7803.93	1	1	1	-0.005	0.005
10/12/09 02:42:44	60.034	3701.122	350	-223.015732	16	461	10	0	-103	7804.26	1	1	1	0.001	0.001
10/12/09 02:42:46	60.037	3701.865	350	-223.015732	16	461.5	10	0	-103	7804.59	1	1	1	0.003	0.003
10/12/09 02:42:48	60.037	3701.614	350	-223.015732	16	462	10	0	-103	7804.92	1	1	1	0.000	0.000
10/12/09 02:42:50	60.035	3701.998	350	-223.015732	16	462.5	10	0	-103	7805.25	1	1	1	-0.002	0.002
10/12/09 02:42:52	60.03	3702.913	350	-223.015732	16	463	10	0	-103	7805.58	1	1	1	-0.005	0.005
10/12/09 02:42:54	60.033	3703.909	350	-223.015732	16	463.5	10	0	-103	7805.91	1	1	1	0.003	0.003
10/12/09 02:42:56	60.036	3705.522	350	-223.015732	16	464	10	0	-103	7806.24	1	1	1	0.003	0.003
10/12/09 02:42:58	60.033	3704.967	350	-223.015732	16	464.5	10	0	-103	7806.57	1	1	1	-0.003	0.003
10/12/09 02:43:00	60.034	3704.087	350	-223.015732	16	465	10	0	-103	7806.9	1	1	1	0.001	0.001
10/12/09 02:43:02	60.032	3702.771	350	-223.015732	16	465.5	10	0	-103	7807.23	1	1	1	-0.002	0.002
10/12/09 02:43:04	60.032	3703.706	350	-223.015732	16	466	10	0	-103	7807.56	1	1	1	0.000	0.000
10/12/09 02:43:06	60.034	3704.905	350	-223.015732	16	466.5	10	0	-103	7807.89	1	1	1	0.002	0.002
10/12/09 02:43:08	60.033	3705.435	350	-223.015732	16	467	10	0	-103	7808.22	1	1	1	-0.001	0.001
10/12/09 02:43:10	60.037	3704.36	350	-223.015732	16	467.5	10	0	-103	7808.55	1	1	1	0.004	0.004
10/12/09 02:43:12	60.035	3702.588	350	-223.015732	16	468	10	0	-103	7808.88	1	1	1	-0.002	0.002
10/12/09 02:43:14	60.035	3702.204	350	-223.015732	16	468.5	10	0	-103	7809.21	1	1	1	0.000	0.000
10/12/09 02:43:16	60.036	3701.942	350	-223.015732	16	469	10	0	-103	7809.54	1	1	1	0.001	0.001

10/12/09 02:43:18	60.039	3702.25	350	-223.015732	16	469.5	10	0	-103	7809.87	1	1	1	0.003	0.003
10/12/09 02:43:20	60.037	3703.318	350	-223.015732	16	470	10	0	-103	7810.2	1	1	1	-0.002	0.002
10/12/09 02:43:22	60.039	3702.457	350	-223.015732	16	470.5	10	0	-103	7810.53	1	1	1	0.002	0.002
10/12/09 02:43:24	60.036	3702.525	350	-223.015732	16	471	10	0	-103	7810.86	1	1	1	-0.003	0.003
10/12/09 02:43:26	60.034	3703.269	350	-223.015732	16	471.5	10	0	-103	7811.19	1	1	1	-0.002	0.002
10/12/09 02:43:28	60.038	3703.844	350	-223.015732	16	472	10	0	-103	7811.52	1	1	1	0.004	0.004
10/12/09 02:43:30	60.037	3702.865	350	-223.015732	16	472.5	10	0	-103	7811.85	1	1	1	-0.001	0.001
10/12/09 02:43:32	60.037	3702.518	350	-223.015732	16	473	10	0	-103	7812.18	1	1	1	0.000	0.000
10/12/09 02:43:34	60.037	3702.28	350	-223.015732	16	473.5	10	0	-103	7812.51	1	1	1	0.000	0.000
10/12/09 02:43:36	60.038	3692.427	350	-223.015732	16	474	10	0	-103	7812.84	1	1	1	0.001	0.001
10/12/09 02:43:38	60.04	3692.178	350	-223.015732	16	474.5	10	0	-103	7813.17	1	1	1	0.002	0.002
10/12/09 02:43:40	60.043	3700.276	350	-223.015732	16	475	10	0	-103	7813.5	1	1	1	0.003	0.003
10/12/09 02:43:42	60.045	3698.755	350	-223.015732	16	475.5	10	0	-103	7813.83	1	1	1	0.002	0.002
10/12/09 02:43:44	60.045	3697.729	350	-223.015732	16	476	10	0	-103	7814.16	1	1	1	0.000	0.000
10/12/09 02:43:46	60.042	3696.916	350	-223.015732	16	476.5	10	0	-103	7814.49	1	1	1	-0.003	0.003
10/12/09 02:43:48	60.043	3697.368	350	-223.015732	16	477	10	0	-103	7814.82	1	1	1	0.001	0.001
10/12/09 02:43:50	60.04	3697.346	350	-223.015732	16	477.5	10	0	-103	7815.15	1	1	1	-0.003	0.003
10/12/09 02:43:52	60.044	3698.429	350	-223.015732	16	478	10	0	-103	7815.48	1	1	1	0.004	0.004
10/12/09 02:43:54	60.046	3694.763	350	-223.015732	16	478.5	10	0	-103	7815.81	1	1	1	0.002	0.002
10/12/09 02:43:56	60.042	3693.584	350	-223.015732	16	479	10	0	-103	7816.14	1	1	1	-0.004	0.004
10/12/09 02:43:58	60.034	3693.241	350	-223.015732	16	479.5	10	0	-103	7816.47	1	1	1	-0.008	0.008
10/12/09 02:44:00	60.039	3696.798	350	-223.015732	16	480	10	0	-103	7816.8	1	1	1	0.005	0.005
10/12/09 02:44:02	60.039	3699.364	350	-223.015732	16	480.5	10	0	-103	7817.13	1	1	1	0.000	0.000
10/12/09 02:44:04	60.036	3701.791	350	-223.015732	16	481	10	0	-103	7817.46	1	1	1	-0.003	0.003
10/12/09 02:44:06	60.037	3700.708	350	-223.015732	16	481.5	10	0	-103	7817.79	1	1	1	0.001	0.001
10/12/09 02:44:08	60.034	3700.753	350	-223.015732	16	482	10	0	-103	7818.12	1	1	1	-0.003	0.003
10/12/09 02:44:10	60.033	3702.148	350	-223.015732	16	482.5	10	0	-103	7818.45	1	1	1	-0.001	0.001
10/12/09 02:44:12	60.032	3705.213	350	-223.015732	16	483	10	0	-103	7818.78	1	1	1	-0.001	0.001
10/12/09 02:44:14	60.031	3707.521	350	-223.015732	16	483.5	10	0	-103	7819.11	1	1	1	-0.001	0.001
10/12/09 02:44:16	60.033	3707.287	350	-223.015732	16	484	10	0	-103	7819.44	1	1	1	0.002	0.002
10/12/09 02:44:18	60.027	3706.988	350	-223.015732	16	484.5	10	0	-103	7819.77	1	1	1	-0.006	0.006
10/12/09 02:44:20	60.031	3707.34	350	-223.015732	16	485	10	0	-103	7820.1	1	1	1	0.004	0.004
10/12/09 02:44:22	60.032	3707.917	350	-223.015732	16	485.5	10	0	-103	7820.43	1	1	1	0.001	0.001
10/12/09 02:44:24	60.031	3707.384	350	-223.015732	16	486	10	0	-103	7820.76	1	1	1	-0.001	0.001
10/12/09 02:44:26	60.031	3706.857	350	-223.015732	16	486.5	10	0	-103	7821.09	1	1	1	0.000	0.000
10/12/09 02:44:28	60.033	3707.615	350	-223.015732	16	487	10	0	-103	7821.42	1	1	1	0.002	0.002
10/12/09 02:44:30	60.039	3706.823	350	-223.015732	16	487.5	10	0	-103	7821.75	1	1	1	0.006	0.006
10/12/09 02:44:32	60.039	3703.746	350	-223.015732	16	488	10	0	-103	7822.08	1	1	1	0.000	0.000
10/12/09 02:44:34	60.038	3701.582	350	-223.015732	16	488.5	10	0	-103	7822.41	1	1	1	-0.001	0.001
10/12/09 02:44:36	60.037	3700.847	350	-223.015732	16	489	10	0	-103	7822.74	1	1	1	-0.001	0.001
10/12/09 02:44:38	60.035	3701.208	350	-223.015732	16	489.5	10	0	-103	7823.07	1	1	1	-0.002	0.002
10/12/09 02:44:40	60.037	3702.212	350	-223.015732	16	490	10	0	-103	7823.4	1	1	1	0.002	0.002
10/12/09 02:44:42	60.04	3701.686	350	-223.015732	16	490.5	10	0	-103	7823.73	1	1	1	0.003	0.003
10/12/09 02:44:44	60.042	3700.397	350	-223.015732	16	491	10	0	-103	7824.06	1	1	1	0.002	0.002
10/12/09 02:44:46	60.035	3699.69	350	-223.015732	16	491.5	10	0	-103	7824.39	1	1	1	-0.007	0.007
10/12/09 02:44:48	60.036	3700.366	350	-223.015732	16	492	10	0	-103	7824.72	1	1	1	0.001	0.001
10/12/09 02:44:50	60.04	3700.827	350	-223.015732	16	492.5	10	0	-103	7825.05	1	1	1	0.004	0.004
10/12/09 02:44:52	60.045	3700.662	350	-223.015732	16	493	10	0	-103	7825.38	1	1	1	0.005	0.005
10/12/09 02:44:54	60.045	3696.935	350	-223.015732	16	493.5	10	0	-103	7825.71	1	1	1	0.000	0.000

10/12/09 02:44:56	60.048	3695.688	350	-223.015732	16	494	10	0	-103	7826.04	1	1	1	0.003	0.003
10/12/09 02:44:58	60.042	3695.819	350	-223.015732	16	494.5	10	0	-103	7826.37	1	1	1	-0.006	0.006
10/12/09 02:45:00	60.044	3693.824	350	-223.015732	16	495	10	0	-103	7826.7	1	1	1	0.002	0.002
10/12/09 02:45:02	60.044	3694.799	350	-223.015732	16	495.5	10	0	-103	7827.03	1	1	1	0.000	0.000
10/12/09 02:45:04	60.044	3696.897	350	-223.015732	16	496	10	0	-103	7827.36	1	1	1	0.000	0.000
10/12/09 02:45:06	60.041	3696.023	350	-223.015732	16	496.5	10	0	-103	7827.69	1	1	1	-0.003	0.003
10/12/09 02:45:08	60.04	3697.502	350	-223.015732	16	497	10	0	-103	7828.02	1	1	1	-0.001	0.001
10/12/09 02:45:10	60.04	3698.424	350	-223.015732	16	497.5	10	0	-103	7828.35	1	1	1	0.000	0.000
10/12/09 02:45:12	60.045	3699.427	350	-223.015732	16	498	10	0	-103	7828.68	1	1	1	0.005	0.005
10/12/09 02:45:14	60.044	3700.177	350	-223.015732	16	498.5	10	0	-103	7829.01	1	1	1	-0.001	0.001
10/12/09 02:45:16	60.042	3699.806	350	-223.015732	16	499	10	0	-103	7829.34	1	1	1	-0.002	0.002
10/12/09 02:45:18	60.039	3697.577	350	-223.015732	16	499.5	10	0	-103	7829.67	1	1	1	-0.003	0.003
10/12/09 02:45:20	60.042	3697.681	350	-223.015732	16	500	10	0	-103	7830	1	1	1	0.003	0.003
10/12/09 02:45:22	60.042	3698.507	350	-223.015732	16	500.5	10	0	-103	7830.33	1	1	1	0.000	0.000
10/12/09 02:45:24	60.041	3698.359	350	-223.015732	16	501	10	0	-103	7830.66	1	1	1	-0.001	0.001
10/12/09 02:45:26	60.038	3698.466	350	-223.015732	16	501.5	10	0	-103	7830.99	1	1	1	-0.003	0.003
10/12/09 02:45:28	60.036	3699.077	350	-223.015732	16	502	10	0	-103	7831.32	1	1	1	-0.002	0.002
10/12/09 02:45:30	60.037	3700.262	350	-223.015732	16	502.5	10	0	-103	7831.65	1	1	1	0.001	0.001
10/12/09 02:45:32	60.039	3701.592	350	-223.015732	16	503	10	0	-103	7831.98	1	1	1	0.002	0.002
10/12/09 02:45:34	60.038	3700.902	350	-223.015732	16	503.5	10	0	-103	7832.31	1	1	1	-0.001	0.001
10/12/09 02:45:36	60.04	3700.143	350	-223.015732	16	504	10	0	-103	7832.64	1	1	1	0.002	0.002
10/12/09 02:45:38	60.039	3700.27	350	-223.015732	16	504.5	10	0	-103	7832.97	1	1	1	-0.001	0.001
10/12/09 02:45:40	60.037	3701.139	350	-223.015732	16	505	10	0	-103	7833.3	1	1	1	-0.002	0.002
10/12/09 02:45:42	60.038	3701.586	350	-223.015732	16	505.5	10	0	-103	7833.63	1	1	1	0.001	0.001
10/12/09 02:45:44	60.039	3700.264	350	-223.015732	16	506	10	0	-103	7833.96	1	1	1	0.001	0.001
10/12/09 02:45:46	60.04	3699.458	350	-223.015732	16	506.5	10	0	-103	7834.29	1	1	1	0.001	0.001
10/12/09 02:45:48	60.037	3699.721	350	-223.015732	16	507	10	0	-103	7834.62	1	1	1	-0.003	0.003
10/12/09 02:45:50	60.037	3700.458	350	-223.015732	16	507.5	10	0	-103	7834.95	1	1	1	0.000	0.000
10/12/09 02:45:52	60.037	3699.505	350	-223.015732	16	508	10	0	-103	7835.28	1	1	1	0.000	0.000
10/12/09 02:45:54	60.039	3698.794	350	-223.015732	16	508.5	10	0	-103	7835.61	1	1	1	0.002	0.002
10/12/09 02:45:56	60.038	3699.216	350	-223.015732	16	509	10	0	-103	7835.94	1	1	1	-0.001	0.001
10/12/09 02:45:58	60.036	3699.4	350	-223.015732	16	509.5	10	0	-103	7836.27	1	1	1	-0.002	0.002
10/12/09 02:46:00	60.035	3700.661	350	-223.015732	16	510	10	0	-103	7836.6	1	1	1	-0.001	0.001
10/12/09 02:46:02	60.033	3702.173	350	-223.015732	16	510.5	10	0	-103	7836.93	1	1	1	-0.002	0.002
10/12/09 02:46:04	60.031	3702.968	350	-223.015732	16	511	10	0	-103	7837.26	1	1	1	-0.002	0.002
10/12/09 02:46:06	60.03	3705.195	350	-223.015732	16	511.5	10	0	-103	7837.59	1	1	1	-0.001	0.001
10/12/09 02:46:08	60.032	3704.952	350	-223.015732	16	512	10	0	-103	7837.92	1	1	1	0.002	0.002
10/12/09 02:46:10	60.032	3705.775	350	-223.015732	16	512.5	10	0	-103	7838.25	1	1	1	0.000	0.000
10/12/09 02:46:12	60.037	3705.621	350	-223.015732	16	513	10	0	-103	7838.58	1	1	1	0.005	0.005
10/12/09 02:46:14	60.042	3703.744	350	-223.015732	16	513.5	10	0	-103	7838.91	1	1	1	0.005	0.005
10/12/09 02:46:16	60.041	3701.981	350	-223.015732	16	514	10	0	-103	7839.24	1	1	1	-0.001	0.001
10/12/09 02:46:18	60.036	3700.756	350	-223.015732	16	514.5	10	0	-103	7839.57	1	1	1	-0.005	0.005
10/12/09 02:46:20	60.031	3700.747	350	-223.015732	16	515	10	0	-103	7839.9	1	1	1	-0.005	0.005
10/12/09 02:46:22	60.032	3702.213	350	-223.015732	16	515.5	10	0	-103	7840.23	1	1	1	0.001	0.001
10/12/09 02:46:24	60.031	3705.059	350	-223.015732	16	516	10	0	-103	7840.56	1	1	1	-0.001	0.001
10/12/09 02:46:26	60.034	3705.514	350	-223.015732	16	516.5	10	0	-103	7840.89	1	1	1	0.003	0.003
10/12/09 02:46:28	60.034	3704.449	350	-223.015732	16	517	10	0	-103	7841.22	1	1	1	0.000	0.000
10/12/09 02:46:30	60.032	3703.831	350	-223.015732	16	517.5	10	0	-103	7841.55	1	1	1	-0.002	0.002
10/12/09 02:46:32	60.038	3703.62	350	-223.015732	16	518	10	0	-103	7841.88	1	1	1	0.006	0.006

10/12/09 02:46:34	60.043	3702.795	350	-223.015732	16	518.5	10	0	-103	7842.21	1	1	1	0.005	0.005
10/12/09 02:46:36	60.044	3701.432	350	-223.015732	16	519	10	0	-103	7842.54	1	1	1	0.001	0.001
10/12/09 02:46:38	60.042	3697.38	350	-223.015732	16	519.5	10	0	-103	7842.87	1	1	1	-0.002	0.002
10/12/09 02:46:40	60.045	3696.25	350	-223.015732	16	520	10	0	-103	7843.2	1	1	1	0.003	0.003
10/12/09 02:46:42	60.04	3696.302	350	-223.015732	16	520.5	10	0	-103	7843.53	1	1	1	-0.005	0.005
10/12/09 02:46:44	60.04	3693.518	350	-223.015732	16	521	10	0	-103	7843.86	1	1	1	0.000	0.000
10/12/09 02:46:46	60.043	3693.577	350	-223.015732	16	521.5	10	0	-103	7844.19	1	1	1	0.003	0.003
10/12/09 02:46:48	60.043	3695.197	350	-223.015732	16	522	10	0	-103	7844.52	1	1	1	0.000	0.000
10/12/09 02:46:50	60.041	3695.186	350	-223.015732	16	522.5	10	0	-103	7844.85	1	1	1	-0.002	0.002
10/12/09 02:46:52	60.04	3693.786	350	-223.015732	16	523	10	0	-103	7845.18	1	1	1	-0.001	0.001
10/12/09 02:46:54	60.038	3694.753	350	-223.015732	16	523.5	10	0	-103	7845.51	1	1	1	-0.002	0.002
10/12/09 02:46:56	60.043	3694.926	350	-223.015732	16	524	10	0	-103	7845.84	1	1	1	0.005	0.005
10/12/09 02:46:58	60.044	3694.938	350	-223.015732	16	524.5	10	0	-103	7846.17	1	1	1	0.001	0.001
10/12/09 02:47:00	60.042	3694.159	350	-223.015732	16	525	10	0	-103	7846.5	1	1	1	-0.002	0.002
10/12/09 02:47:02	60.036	3691.33	350	-223.015732	16	525.5	10	0	-103	7846.83	1	1	1	-0.006	0.006
10/12/09 02:47:04	60.043	3692.686	350	-223.015732	16	526	10	0	-103	7847.16	1	1	1	0.007	0.007
10/12/09 02:47:06	60.041	3693.238	350	-223.015732	16	526.5	10	0	-103	7847.49	1	1	1	-0.002	0.002
10/12/09 02:47:08	60.042	3693.39	350	-223.015732	16	527	10	0	-103	7847.82	1	1	1	0.001	0.001
10/12/09 02:47:10	60.043	3692.357	350	-223.015732	16	527.5	10	0	-103	7848.15	1	1	1	0.001	0.001
10/12/09 02:47:12	60.043	3690.951	350	-223.015732	16	528	10	0	-103	7848.48	1	1	1	0.000	0.000
10/12/09 02:47:14	60.036	3690.836	350	-223.015732	16	528.5	10	0	-103	7848.81	1	1	1	-0.007	0.007
10/12/09 02:47:16	60.039	3692.042	350	-223.015732	16	529	10	0	-103	7849.14	1	1	1	0.003	0.003
10/12/09 02:47:18	60.039	3693.114	350	-223.015732	16	529.5	10	0	-103	7849.47	1	1	1	0.000	0.000
10/12/09 02:47:20	60.037	3694.117	350	-223.015732	16	530	10	0	-103	7849.8	1	1	1	-0.002	0.002
10/12/09 02:47:22	60.034	3695.258	350	-223.015732	16	530.5	10	0	-103	7850.13	1	1	1	-0.003	0.003
10/12/09 02:47:24	60.035	3695.581	350	-223.015732	16	531	10	0	-103	7850.46	1	1	1	0.001	0.001
10/12/09 02:47:26	60.035	3695.949	350	-223.015732	16	531.5	10	0	-103	7850.79	1	1	1	0.000	0.000
10/12/09 02:47:28	60.035	3695.491	350	-223.015732	16	532	10	0	-103	7851.12	1	1	1	0.000	0.000
10/12/09 02:47:30	60.036	3696.305	350	-223.015732	16	532.5	10	0	-103	7851.45	1	1	1	0.001	0.001
10/12/09 02:47:32	60.03	3696.486	350	-223.015732	16	533	10	0	-103	7851.78	1	1	1	-0.006	0.006
10/12/09 02:47:34	60.03	3697.336	350	-223.015732	16	533.5	10	0	-103	7852.11	1	1	1	0.000	0.000
10/12/09 02:47:36	60.03	3699.171	350	-223.015732	16	534	10	0	-103	7852.44	1	1	1	0.000	0.000
10/12/09 02:47:38	60.031	3699.357	350	-223.015732	16	534.5	10	0	-103	7852.77	1	1	1	0.001	0.001
10/12/09 02:47:40	60.031	3699.251	350	-223.015732	16	535	10	0	-103	7853.1	1	1	1	0.000	0.000
10/12/09 02:47:42	60.032	3699.117	350	-223.015732	16	535.5	10	0	-103	7853.43	1	1	1	0.001	0.001
10/12/09 02:47:44	60.031	3699.105	350	-223.015732	16	536	10	0	-103	7853.76	1	1	1	-0.001	0.001
10/12/09 02:47:46	60.032	3699.126	350	-223.015732	16	536.5	10	0	-103	7854.09	1	1	1	0.001	0.001
10/12/09 02:47:48	60.032	3698.954	350	-223.015732	16	537	10	0	-103	7854.42	1	1	1	0.000	0.000
10/12/09 02:47:50	60.032	3698.136	350	-223.015732	16	537.5	10	0	-103	7854.75	1	1	1	0.000	0.000
10/12/09 02:47:52	60.033	3698.277	350	-223.015732	16	538	10	0	-103	7855.08	1	1	1	0.001	0.001
10/12/09 02:47:54	60.037	3697.412	350	-223.015732	16	538.5	10	0	-103	7855.41	1	1	1	0.004	0.004
10/12/09 02:47:56	60.04	3695.94	350	-223.015732	16	539	10	0	-103	7855.74	1	1	1	0.003	0.003
10/12/09 02:47:58	60.039	3693.736	350	-223.015732	16	539.5	10	0	-103	7856.07	1	1	1	-0.001	0.001
10/12/09 02:48:00	60.042	3693.224	350	-223.015732	16	540	10	0	-103	7856.4	1	1	1	0.003	0.003
10/12/09 02:48:02	60.036	3691.759	350	-223.015732	16	540.5	10	0	-103	7856.73	1	1	1	-0.006	0.006
10/12/09 02:48:04	60.039	3691.919	350	-223.015732	16	541	10	0	-103	7857.06	1	1	1	0.003	0.003
10/12/09 02:48:06	60.041	3692.798	350	-223.015732	16	541.5	10	0	-103	7857.39	1	1	1	0.002	0.002
10/12/09 02:48:08	60.04	3691.582	350	-223.015732	16	542	10	0	-103	7857.72	1	1	1	-0.001	0.001
10/12/09 02:48:10	60.035	3692.374	350	-223.015732	16	542.5	10	0	-103	7858.05	1	1	1	-0.005	0.005

10/12/09 02:48:12	60.036	3693.302	350	-223.015732	16	543	10	0	-103	7858.38	1	1	1	0.001	0.001
10/12/09 02:48:14	60.038	3694.71	350	-223.015732	16	543.5	10	0	-103	7858.71	1	1	1	0.002	0.002
10/12/09 02:48:16	60.037	3694.331	350	-223.015732	16	544	10	0	-103	7859.04	1	1	1	-0.001	0.001
10/12/09 02:48:18	60.041	3693.815	350	-223.015732	16	544.5	10	0	-103	7859.37	1	1	1	0.004	0.004
10/12/09 02:48:20	60.04	3693.617	350	-223.015732	16	545	10	0	-103	7859.7	1	1	1	-0.001	0.001
10/12/09 02:48:22	60.036	3694.324	350	-223.015732	16	545.5	10	0	-103	7860.03	1	1	1	-0.004	0.004
10/12/09 02:48:24	60.033	3694.27	350	-223.015732	16	546	10	0	-103	7860.36	1	1	1	-0.003	0.003
10/12/09 02:48:26	60.034	3694.66	350	-223.015732	16	546.5	10	0	-103	7860.69	1	1	1	0.001	0.001
10/12/09 02:48:28	60.038	3693.748	350	-223.015732	16	547	10	0	-103	7861.02	1	1	1	0.004	0.004
10/12/09 02:48:30	60.04	3692.532	350	-223.015732	16	547.5	10	0	-103	7861.35	1	1	1	0.002	0.002
10/12/09 02:48:32	60.041	3691.445	350	-223.015732	16	548	10	0	-103	7861.68	1	1	1	0.001	0.001
10/12/09 02:48:34	60.037	3691.012	350	-223.015732	16	548.5	10	0	-103	7862.01	1	1	1	-0.004	0.004
10/12/09 02:48:36	60.037	3691.799	350	-223.015732	16	549	10	0	-103	7862.34	1	1	1	0.000	0.000
10/12/09 02:48:38	60.036	3693.077	350	-223.015732	16	549.5	10	0	-103	7862.67	1	1	1	-0.001	0.001
10/12/09 02:48:40	60.037	3693.727	350	-223.015732	16	550	10	0	-103	7863	1	1	1	0.001	0.001
10/12/09 02:48:42	60.038	3693.117	350	-223.015732	16	550.5	10	0	-103	7863.33	1	1	1	0.001	0.001
10/12/09 02:48:44	60.039	3692.641	350	-223.015732	16	551	10	0	-103	7863.66	1	1	1	0.001	0.001
10/12/09 02:48:46	60.038	3688.159	350	-223.015732	16	551.5	10	0	-103	7863.99	1	1	1	-0.001	0.001
10/12/09 02:48:48	60.034	3689.02	350	-223.015732	16	552	10	0	-103	7864.32	1	1	1	-0.004	0.004
10/12/09 02:48:50	60.033	3688.208	350	-223.015732	16	552.5	10	0	-103	7864.65	1	1	1	-0.001	0.001
10/12/09 02:48:52	60.031	3690.092	350	-223.015732	16	553	10	0	-103	7864.98	1	1	1	-0.002	0.002
10/12/09 02:48:54	60.034	3693.172	350	-223.015732	16	553.5	10	0	-103	7865.31	1	1	1	0.003	0.003
10/12/09 02:48:56	60.029	3693.321	350	-223.015732	16	554	10	0	-103	7865.64	1	1	1	-0.005	0.005
10/12/09 02:48:58	60.029	3694.593	350	-223.015732	16	554.5	10	0	-103	7865.97	1	1	1	0.000	0.000
10/12/09 02:49:00	60.031	3695.225	350	-223.015732	16	555	10	0	-103	7866.3	1	1	1	0.002	0.002
10/12/09 02:49:02	60.03	3694.609	350	-223.015732	16	555.5	10	0	-103	7866.63	1	1	1	-0.001	0.001
10/12/09 02:49:04	60.03	3693.412	350	-223.015732	16	556	10	0	-103	7866.96	1	1	1	0.000	0.000
10/12/09 02:49:06	60.026	3693.509	350	-223.015732	16	556.5	10	0	-103	7867.29	1	1	1	-0.004	0.004
10/12/09 02:49:08	60.022	3696.026	350	-223.015732	16	557	10	0	-103	7867.62	1	1	1	-0.004	0.004
10/12/09 02:49:10	60.021	3698.012	350	-223.015732	16	557.5	10	0	-103	7867.95	1	1	1	-0.001	0.001
10/12/09 02:49:12	60.024	3699.062	350	-223.015732	16	558	10	0	-103	7868.28	1	1	1	0.003	0.003
10/12/09 02:49:14	60.023	3699.414	350	-223.015732	16	558.5	10	0	-103	7868.61	1	1	1	-0.001	0.001
10/12/09 02:49:16	60.02	3698.935	350	-223.015732	16	559	10	0	-103	7868.94	1	1	1	-0.003	0.003
10/12/09 02:49:18	60.021	3700.084	350	-223.015732	16	559.5	10	0	-103	7869.27	1	1	1	0.001	0.001
10/12/09 02:49:20	60.023	3700.544	350	-223.015732	16	560	10	0	-103	7869.6	1	1	1	0.002	0.002
10/12/09 02:49:22	60.025	3700.486	350	-223.015732	16	560.5	10	0	-103	7869.93	1	1	1	0.002	0.002
10/12/09 02:49:24	60.026	3698.596	350	-223.015732	16	561	10	0	-103	7870.26	1	1	1	0.001	0.001
10/12/09 02:49:26	60.026	3697.961	350	-223.015732	16	561.5	10	0	-103	7870.59	1	1	1	0.000	0.000
10/12/09 02:49:28	60.025	3699.914	350	-223.015732	16	562	10	0	-103	7870.92	1	1	1	-0.001	0.001
10/12/09 02:49:30	60.024	3700.802	350	-223.015732	16	562.5	10	0	-103	7871.25	1	1	1	-0.001	0.001
10/12/09 02:49:32	60.024	3701.301	350	-223.015732	16	563	10	0	-103	7871.58	1	1	1	0.000	0.000
10/12/09 02:49:34	60.025	3701.45	350	-223.015732	16	563.5	10	0	-103	7871.91	1	1	1	0.001	0.001
10/12/09 02:49:36	60.023	3701.349	350	-223.015732	16	564	10	0	-103	7872.24	1	1	1	-0.002	0.002
10/12/09 02:49:38	60.023	3701.094	350	-223.015732	16	564.5	10	0	-103	7872.57	1	1	1	0.000	0.000
10/12/09 02:49:40	60.022	3701.702	350	-223.015732	16	565	10	0	-103	7872.9	1	1	1	-0.001	0.001
10/12/09 02:49:42	60.026	3702.07	350	-223.015732	16	565.5	10	0	-103	7873.23	1	1	1	0.004	0.004
10/12/09 02:49:44	60.029	3701.965	350	-223.015732	16	566	10	0	-103	7873.56	1	1	1	0.003	0.003
10/12/09 02:49:46	60.026	3700.269	350	-223.015732	16	566.5	10	0	-103	7873.89	1	1	1	-0.003	0.003
10/12/09 02:49:48	60.024	3700.241	350	-223.015732	16	567	10	0	-103	7874.22	1	1	1	-0.002	0.002

10/12/09 02:49:50	60.021	3701.09	350	-223.015732	16	567.5	10	0	-103	7874.55	1	1	1	-0.003	0.003
10/12/09 02:49:52	60.025	3701.268	350	-223.015732	16	568	10	0	-103	7874.88	1	1	1	0.004	0.004
10/12/09 02:49:54	60.025	3701.205	350	-223.015732	16	568.5	10	0	-103	7875.21	1	1	1	0.000	0.000
10/12/09 02:49:56	60.025	3700.587	350	-223.015732	16	569	10	0	-103	7875.54	1	1	1	0.000	0.000
10/12/09 02:49:58	60.023	3700.532	350	-223.015732	16	569.5	10	0	-103	7875.87	1	1	1	-0.002	0.002
10/12/09 02:50:00	60.026	3700.177	350	-223.015732	16	570	10	0	-103	7876.2	1	1	1	0.003	0.003
10/12/09 02:50:02	60.024	3700.295	350	-223.015732	16	570.5	10	0	-103	7876.53	1	1	1	-0.002	0.002
10/12/09 02:50:04	60.022	3700.277	350	-223.015732	16	571	10	0	-103	7876.86	1	1	1	-0.002	0.002
10/12/09 02:50:06	60.023	3700.841	350	-223.015732	16	571.5	10	0	-103	7877.19	1	1	1	0.001	0.001
10/12/09 02:50:08	60.026	3700.863	350	-223.015732	16	572	10	0	-103	7877.52	1	1	1	0.003	0.003
10/12/09 02:50:10	60.025	3700.26	350	-223.015732	16	572.5	10	0	-103	7877.85	1	1	1	-0.001	0.001
10/12/09 02:50:12	60.02	3700.052	350	-223.015732	16	573	10	0	-103	7878.18	1	1	1	-0.005	0.005
10/12/09 02:50:14	60.02	3699.926	350	-223.015732	16	573.5	10	0	-103	7878.51	1	1	1	0.000	0.000
10/12/09 02:50:16	60.019	3700.965	350	-223.015732	16	574	10	0	-103	7878.84	1	1	1	-0.001	0.001
10/12/09 02:50:18	60.015	3702.581	350	-223.015732	16	574.5	10	0	-103	7879.17	1	1	1	-0.004	0.004
10/12/09 02:50:20	60.016	3703.516	350	-223.015732	16	575	10	0	-103	7879.5	1	1	1	0.001	0.001
10/12/09 02:50:22	60.017	3703.824	350	-223.015732	16	575.5	10	0	-103	7879.83	1	1	1	0.001	0.001
10/12/09 02:50:24	60.015	3703.672	350	-223.015732	16	576	10	0	-103	7880.16	1	1	1	-0.002	0.002
10/12/09 02:50:26	60.015	3703.689	350	-223.015732	16	576.5	10	0	-103	7880.49	1	1	1	0.000	0.000
10/12/09 02:50:28	60.017	3703.003	350	-223.015732	16	577	10	0	-103	7880.82	1	1	1	0.002	0.002
10/12/09 02:50:30	60.017	3702.921	350	-223.015732	16	577.5	10	0	-103	7881.15	1	1	1	0.000	0.000
10/12/09 02:50:32	60.012	3703	350	-223.015732	16	578	10	0	-103	7881.48	1	1	1	-0.005	0.005
10/12/09 02:50:34	60.01	3703.167	350	-223.015732	16	578.5	10	0	-103	7881.81	1	1	1	-0.002	0.002
10/12/09 02:50:36	60.008	3703.918	350	-223.015732	16	579	10	0	-103	7882.14	1	1	1	-0.002	0.002
10/12/09 02:50:38	60.002	3703.616	350	-223.015732	16	579.5	10	0	-103	7882.47	1	1	1	-0.006	0.006
10/12/09 02:50:40	59.999	3703.775	350	-223.015732	16	580	10	0	-103	7882.8	1	0	1	-0.003	0.003
10/12/09 02:50:42	59.999	3703.751	350	-223.015732	16	580.5	10	0	-103	7883.13	1	0	1	0.000	0.000
10/12/09 02:50:44	60.002	3701.534	350	-223.015732	16	581	10	0	-103	7883.46	1	1	1	0.003	0.003
10/12/09 02:50:46	60.003	3700.617	350	-223.015732	16	581.5	10	0	-103	7883.79	1	1	1	0.001	0.001
10/12/09 02:50:48	60.004	3700.88	350	-223.015732	16	582	10	0	-103	7884.12	1	1	1	0.001	0.001
10/12/09 02:50:50	60.001	3700.625	350	-223.015732	16	582.5	10	0	-103	7884.45	1	1	1	-0.003	0.003
10/12/09 02:50:52	59.996	3701.389	350	-223.015732	16	583	10	0	-103	7884.78	1	0	1	-0.005	0.005
10/12/09 02:50:54	59.993	3701.737	350	-223.015732	16	583.5	10	0	-103	7885.11	1	0	1	-0.003	0.003
10/12/09 02:50:56	59.992	3700.671	350	-223.015732	16	584	10	0	-103	7885.44	1	0	1	-0.001	0.001
10/12/09 02:50:58	59.989	3700.826	350	-223.015732	16	584.5	10	0	-103	7885.77	1	0	1	-0.003	0.003
10/12/09 02:51:00	59.987	3700.977	350	-223.015732	16	585	10	0	-103	7886.1	1	0	1	-0.002	0.002
10/12/09 02:51:02	59.985	3700.7	350	-223.015732	16	585.5	10	0	-103	7886.43	1	0	1	-0.002	0.002
10/12/09 02:51:04	59.985	3699.854	350	-223.015732	16	586	10	0	-103	7886.76	1	0	1	0.000	0.000
10/12/09 02:51:06	59.986	3700.237	350	-223.015732	16	586.5	10	0	-103	7887.09	1	0	1	0.001	0.001
10/12/09 02:51:08	59.984	3700.342	350	-223.015732	16	587	10	0	-103	7887.42	1	0	1	-0.002	0.002
10/12/09 02:51:10	59.981	3700.77	350	-223.015732	16	587.5	10	0	-103	7887.75	1	0	1	-0.003	0.003
10/12/09 02:51:12	59.98	3700.789	350	-223.015732	16	588	10	0	-103	7888.08	1	0	1	-0.001	0.001
10/12/09 02:51:14	59.977	3701.625	350	-223.015732	16	588.5	10	0	-103	7888.41	1	0	1	-0.003	0.003
10/12/09 02:51:16	59.975	3703.166	350	-223.015732	16	589	10	0	-103	7888.74	1	0	1	-0.002	0.002
10/12/09 02:51:18	59.976	3704.187	350	-223.015732	16	589.5	10	0	-103	7889.07	1	0	1	0.001	0.001
10/12/09 02:51:20	59.972	3704.785	350	-223.015732	16	590	10	0	-103	7889.4	1	0	1	-0.004	0.004
10/12/09 02:51:22	59.974	3705.811	350	-223.015732	16	590.5	10	0	-103	7889.73	1	0	1	0.002	0.002
10/12/09 02:51:24	59.977	3706.958	350	-223.015732	16	591	10	0	-103	7890.06	1	0	1	0.003	0.003
10/12/09 02:51:26	59.975	3706.688	350	-223.015732	16	591.5	10	0	-103	7890.39	1	0	1	-0.002	0.002

10/12/09 02:51:28	59.973	3706.543	350	-223.015732	16	592	10	0	-103	7890.72	1	0	1	-0.002	0.002
10/12/09 02:51:30	59.971	3706.257	350	-223.015732	16	592.5	10	0	-103	7891.05	1	0	1	-0.002	0.002
10/12/09 02:51:32	59.971	3707.027	350	-223.015732	16	593	10	0	-103	7891.38	1	0	1	0.000	0.000
10/12/09 02:51:34	59.976	3710.118	350	-223.015732	16	593.5	10	0	-103	7891.71	1	0	1	0.005	0.005
10/12/09 02:51:36	59.979	3710.531	350	-223.015732	16	594	10	0	-103	7892.04	1	0	1	0.003	0.003
10/12/09 02:51:38	59.98	3708.701	350	-223.015732	16	594.5	10	0	-103	7892.37	1	0	1	0.001	0.001
10/12/09 02:51:40	59.979	3708.018	350	-223.015732	16	595	10	0	-103	7892.7	1	0	1	-0.001	0.001
10/12/09 02:51:42	59.982	3706.942	350	-223.015732	16	595.5	10	0	-103	7893.03	1	0	1	0.003	0.003
10/12/09 02:51:44	59.982	3706.343	350	-223.015732	16	596	10	0	-103	7893.36	1	0	1	0.000	0.000
10/12/09 02:51:46	59.983	3706.125	350	-223.015732	16	596.5	10	0	-103	7893.69	1	0	1	0.001	0.001
10/12/09 02:51:48	59.981	3706.311	350	-223.015732	16	597	10	0	-103	7894.02	1	0	1	-0.002	0.002
10/12/09 02:51:50	59.979	3706.119	350	-223.015732	16	597.5	10	0	-103	7894.35	1	0	1	-0.002	0.002
10/12/09 02:51:52	59.978	3706.19	350	-223.015732	16	598	10	0	-103	7894.68	1	0	1	-0.001	0.001
10/12/09 02:51:54	59.976	3707.721	350	-223.015732	16	598.5	10	0	-103	7895.01	1	0	1	-0.002	0.002
10/12/09 02:51:56	59.978	3709.409	350	-223.015732	16	599	10	0	-103	7895.34	1	0	1	0.002	0.002
10/12/09 02:51:58	59.977	3708.971	350	-223.015732	16	599.5	10	0	-103	7895.67	1	0	1	-0.001	0.001
10/12/09 02:52:00	59.976	3708.531	350	-223.015732	16	600	10	0	-103	7896	1	0	1	-0.001	0.001
10/12/09 02:52:02	59.978	3708.071	350	-223.015732	16	600.5	10	0	-103	7896.33	1	0	1	0.002	0.002
10/12/09 02:52:04	59.975	3707.24	350	-223.015732	16	601	10	0	-103	7896.66	1	0	1	-0.003	0.003
10/12/09 02:52:06	59.971	3709.213	350	-223.015732	16	601.5	10	0	-103	7896.99	1	0	1	-0.004	0.004
10/12/09 02:52:08	59.97	3709.961	350	-223.015732	16	602	10	0	-103	7897.32	1	0	1	-0.001	0.001
10/12/09 02:52:10	59.97	3711.75	350	-223.015732	16	602.5	10	0	-103	7897.65	1	0	1	0.000	0.000
10/12/09 02:52:12	59.971	3711.98	350	-223.015732	16	603	10	0	-103	7897.98	1	0	1	0.001	0.001
10/12/09 02:52:14	59.99	3710.695	350	-223.015732	16	603.5	10	0	-103	7898.31	1	0	1	0.019	0.019
10/12/09 02:52:16	59.998	3707.867	350	-223.015732	16	604	10	0	-103	7898.64	1	0	1	0.008	0.008
10/12/09 02:52:18	59.999	3704.912	350	-223.015732	16	604.5	10	0	-103	7898.97	1	0	1	0.001	0.001
10/12/09 02:52:20	59.999	3705.639	350	-223.015732	16	605	10	0	-103	7899.3	1	0	1	0.000	0.000
10/12/09 02:52:22	59.998	3703.787	350	-223.015732	16	605.5	10	0	-103	7899.63	1	0	1	-0.001	0.001
10/12/09 02:52:24	59.999	3703.191	350	-223.015732	16	606	10	0	-103	7899.96	1	0	1	0.001	0.001
10/12/09 02:52:26	60.003	3702.071	350	-223.015732	16	606.5	10	0	-103	7900.29	1	1	1	0.004	0.004
10/12/09 02:52:28	60.005	3699.51	350	-223.015732	16	607	10	0	-103	7900.62	1	1	1	0.002	0.002
10/12/09 02:52:30	60.005	3698.658	350	-223.015732	16	607.5	10	0	-103	7900.95	1	1	1	0.000	0.000
10/12/09 02:52:32	60.01	3698.137	350	-223.015732	16	608	10	0	-103	7901.28	1	1	1	0.005	0.005
10/12/09 02:52:34	60.013	3697.882	350	-223.015732	16	608.5	10	0	-103	7901.61	1	1	1	0.003	0.003
10/12/09 02:52:36	60.02	3698.668	350	-223.015732	16	609	10	0	-103	7901.94	1	1	1	0.007	0.007
10/12/09 02:52:38	60.022	3698.604	350	-223.015732	16	609.5	10	0	-103	7902.27	1	1	1	0.002	0.002
10/12/09 02:52:40	60.024	3697.868	350	-223.015732	16	610	10	0	-103	7902.6	1	1	1	0.002	0.002
10/12/09 02:52:42	60.025	3694.672	350	-223.015732	16	610.5	10	0	-103	7902.93	1	1	1	0.001	0.001
10/12/09 02:52:44	60.025	3693.912	350	-223.015732	16	611	10	0	-103	7903.26	1	1	1	0.000	0.000
10/12/09 02:52:46	60.024	3693.418	350	-223.015732	16	611.5	10	0	-103	7903.59	1	1	1	-0.001	0.001
10/12/09 02:52:48	60.023	3688.301	350	-223.015732	16	612	10	0	-103	7903.92	1	1	1	-0.001	0.001
10/12/09 02:52:50	60.029	3688.021	350	-223.015732	16	612.5	10	0	-103	7904.25	1	1	1	0.006	0.006
10/12/09 02:52:52	60.029	3689.143	350	-223.015732	16	613	10	0	-103	7904.58	1	1	1	0.000	0.000
10/12/09 02:52:54	60.029	3688.237	350	-223.015732	16	613.5	10	0	-103	7904.91	1	1	1	0.000	0.000
10/12/09 02:52:56	60.028	3687.878	350	-223.015732	16	614	10	0	-103	7905.24	1	1	1	-0.001	0.001
10/12/09 02:52:58	60.028	3687.026	350	-223.015732	16	614.5	10	0	-103	7905.57	1	1	1	0.000	0.000
10/12/09 02:53:00	60.031	3686.683	350	-223.015732	16	615	10	0	-103	7905.9	1	1	1	0.003	0.003
10/12/09 02:53:02	60.032	3685.276	350	-223.015732	16	615.5	10	0	-103	7906.23	1	1	1	0.001	0.001
10/12/09 02:53:04	60.033	3685.576	350	-223.015732	16	616	10	0	-103	7906.56	1	1	1	0.001	0.001

10/12/09 02:53:06	60.031	3685.985	350	-223.015732	16	616.5	10	0	-103	7906.89	1	1	1	-0.002	0.002
10/12/09 02:53:08	60.03	3686.418	350	-223.015732	16	617	10	0	-103	7907.22	1	1	1	-0.001	0.001
10/12/09 02:53:10	60.022	3687.159	350	-223.015732	16	617.5	10	0	-103	7907.55	1	1	1	-0.008	0.008
10/12/09 02:53:12	60.021	3687.873	350	-223.015732	16	618	10	0	-103	7907.88	1	1	1	-0.001	0.001
10/12/09 02:53:14	60.019	3688.997	350	-223.015732	16	618.5	10	0	-103	7908.21	1	1	1	-0.002	0.002
10/12/09 02:53:16	60.017	3690.426	350	-223.015732	16	619	10	0	-103	7908.54	1	1	1	-0.002	0.002
10/12/09 02:53:18	60.017	3690.776	350	-223.015732	16	619.5	10	0	-103	7908.87	1	1	1	0.000	0.000
10/12/09 02:53:20	60.017	3692.715	350	-223.015732	16	620	10	0	-103	7909.2	1	1	1	0.000	0.000
10/12/09 02:53:22	60.016	3692.578	350	-223.015732	16	620.5	10	0	-103	7909.53	1	1	1	-0.001	0.001
10/12/09 02:53:24	60.015	3692.462	350	-223.015732	16	621	10	0	-103	7909.86	1	1	1	-0.001	0.001
10/12/09 02:53:26	60.015	3693.173	350	-223.015732	16	621.5	10	0	-103	7910.19	1	1	1	0.000	0.000
10/12/09 02:53:28	60.012	3693.249	350	-223.015732	16	622	10	0	-103	7910.52	1	1	1	-0.003	0.003
10/12/09 02:53:30	60.009	3693.743	350	-223.015732	16	622.5	10	0	-103	7910.85	1	1	1	-0.003	0.003
10/12/09 02:53:32	60.008	3695.124	350	-223.015732	16	623	10	0	-103	7911.18	1	1	1	-0.001	0.001
10/12/09 02:53:34	60.008	3694.681	350	-223.015732	16	623.5	10	0	-103	7911.51	1	1	1	0.000	0.000
10/12/09 02:53:36	60.005	3694.741	350	-223.015732	16	624	10	0	-103	7911.84	1	1	1	-0.003	0.003
10/12/09 02:53:38	60.005	3694.199	350	-223.015732	16	624.5	10	0	-103	7912.17	1	1	1	0.000	0.000
10/12/09 02:53:40	60.003	3693.75	350	-223.015732	16	625	10	0	-103	7912.5	1	1	1	-0.002	0.002
10/12/09 02:53:42	59.999	3693.624	350	-223.015732	16	625.5	10	0	-103	7912.83	1	0	1	-0.004	0.004
10/12/09 02:53:44	59.997	3692.806	350	-223.015732	16	626	10	0	-103	7913.16	1	0	1	-0.002	0.002
10/12/09 02:53:46	59.999	3691.15	350	-223.015732	16	626.5	10	0	-103	7913.49	1	0	1	0.002	0.002
10/12/09 02:53:48	60	3691.407	350	-223.015732	16	627	10	0	-103	7913.82	1	0	1	0.001	0.001
10/12/09 02:53:50	59.998	3691.077	350	-223.015732	16	627.5	10	0	-103	7914.15	1	0	1	-0.002	0.002
10/12/09 02:53:52	59.995	3690.588	350	-223.015732	16	628	10	0	-103	7914.48	1	0	1	-0.003	0.003
10/12/09 02:53:54	59.994	3689.797	350	-223.015732	16	628.5	10	0	-103	7914.81	1	0	1	-0.001	0.001
10/12/09 02:53:56	59.992	3688.483	350	-223.015732	16	629	10	0	-103	7915.14	1	0	1	-0.002	0.002
10/12/09 02:53:58	59.993	3689.445	350	-223.015732	16	629.5	10	0	-103	7915.47	1	0	1	0.001	0.001
10/12/09 02:54:00	59.988	3689.553	350	-223.015732	16	630	10	0	-103	7915.8	1	0	1	-0.005	0.005
10/12/09 02:54:02	59.985	3689.525	350	-223.015732	16	630.5	10	0	-103	7916.13	1	0	1	-0.003	0.003
10/12/09 02:54:04	59.986	3689.736	350	-223.015732	16	631	10	0	-103	7916.46	1	0	1	0.001	0.001
10/12/09 02:54:06	59.988	3688.853	350	-223.015732	16	631.5	10	0	-103	7916.79	1	0	1	0.002	0.002
10/12/09 02:54:08	59.988	3688.24	350	-223.015732	16	632	10	0	-103	7917.12	1	0	1	0.000	0.000
10/12/09 02:54:10	59.985	3687.494	350	-223.015732	16	632.5	10	0	-103	7917.45	1	0	1	-0.003	0.003
10/12/09 02:54:12	59.983	3687.475	350	-223.015732	16	633	10	0	-103	7917.78	1	0	1	-0.002	0.002
10/12/09 02:54:14	59.983	3686.707	350	-223.015732	16	633.5	10	0	-103	7918.11	1	0	1	0.000	0.000
10/12/09 02:54:16	59.985	3685.66	350	-223.015732	16	634	10	0	-103	7918.44	1	0	1	0.002	0.002
10/12/09 02:54:18	59.986	3684.51	350	-223.015732	16	634.5	10	0	-103	7918.77	1	0	1	0.001	0.001
10/12/09 02:54:20	59.987	3684.333	350	-223.015732	16	635	10	0	-103	7919.1	1	0	1	0.001	0.001
10/12/09 02:54:22	59.99	3683.911	350	-223.015732	16	635.5	10	0	-103	7919.43	1	0	1	0.003	0.003
10/12/09 02:54:24	59.986	3683.735	350	-223.015732	16	636	10	0	-103	7919.76	1	0	1	-0.004	0.004
10/12/09 02:54:26	59.985	3684.208	350	-223.015732	16	636.5	10	0	-103	7920.09	1	0	1	-0.001	0.001
10/12/09 02:54:28	59.984	3683.811	350	-223.015732	16	637	10	0	-103	7920.42	1	0	1	-0.001	0.001
10/12/09 02:54:30	59.983	3683.473	350	-223.015732	16	637.5	10	0	-103	7920.75	1	0	1	-0.001	0.001
10/12/09 02:54:32	59.982	3684.258	350	-223.015732	16	638	10	0	-103	7921.08	1	0	1	-0.001	0.001
10/12/09 02:54:34	59.982	3684.884	350	-223.015732	16	638.5	10	0	-103	7921.41	1	0	1	0.000	0.000
10/12/09 02:54:36	59.98	3685.092	350	-223.015732	16	639	10	0	-103	7921.74	1	0	1	-0.002	0.002
10/12/09 02:54:38	59.978	3685.654	350	-223.015732	16	639.5	10	0	-103	7922.07	1	0	1	-0.002	0.002
10/12/09 02:54:40	59.977	3685.087	350	-223.015732	16	640	10	0	-103	7922.4	1	0	1	-0.001	0.001
10/12/09 02:54:42	59.975	3685.491	350	-223.015732	16	640.5	10	0	-103	7922.73	1	0	1	-0.002	0.002

10/12/09 02:54:44	59.973	3685.196	350	-223.015732	16	641	10	0	-103	7923.06	1	0	1	-0.002	0.002
10/12/09 02:54:46	59.975	3687.412	350	-223.015732	16	641.5	10	0	-103	7923.39	1	0	1	0.002	0.002
10/12/09 02:54:48	59.976	3688.417	350	-223.015732	16	642	10	0	-103	7923.72	1	0	1	0.001	0.001
10/12/09 02:54:50	59.976	3688.599	350	-223.015732	16	642.5	10	0	-103	7924.05	1	0	1	0.000	0.000
10/12/09 02:54:52	59.979	3687.848	350	-223.015732	16	643	10	0	-103	7924.38	1	0	1	0.003	0.003
10/12/09 02:54:54	59.982	3686.678	350	-223.015732	16	643.5	10	0	-103	7924.71	1	0	1	0.003	0.003
10/12/09 02:54:56	59.979	3685.782	350	-223.015732	16	644	10	0	-103	7925.04	1	0	1	-0.003	0.003
10/12/09 02:54:58	59.979	3684.89	350	-223.015732	16	644.5	10	0	-103	7925.37	1	0	1	0.000	0.000
10/12/09 02:55:00	59.977	3685.143	350	-223.015732	16	645	10	0	-103	7925.7	1	0	1	-0.002	0.002
10/12/09 02:55:02	59.977	3684.549	350	-223.015732	16	645.5	10	0	-103	7926.03	1	0	1	0.000	0.000
10/12/09 02:55:04	59.978	3684.093	350	-223.015732	16	646	10	0	-103	7926.36	1	0	1	0.001	0.001
10/12/09 02:55:06	59.978	3684.555	350	-223.015732	16	646.5	10	0	-103	7926.69	1	0	1	0.000	0.000
10/12/09 02:55:08	59.978	3682.814	350	-223.015732	16	647	10	0	-103	7927.02	1	0	1	0.000	0.000
10/12/09 02:55:10	59.979	3682.318	350	-223.015732	16	647.5	10	0	-103	7927.35	1	0	1	0.001	0.001
10/12/09 02:55:12	59.983	3682.366	350	-223.015732	16	648	10	0	-103	7927.68	1	0	1	0.004	0.004
10/12/09 02:55:14	59.981	3682.647	350	-223.015732	16	648.5	10	0	-103	7928.01	1	0	1	-0.002	0.002
10/12/09 02:55:16	59.98	3682.855	350	-223.015732	16	649	10	0	-103	7928.34	1	0	1	-0.001	0.001
10/12/09 02:55:18	59.978	3683.557	350	-223.015732	16	649.5	10	0	-103	7928.67	1	0	1	-0.002	0.002
10/12/09 02:55:20	59.979	3684.052	350	-223.015732	16	650	10	0	-103	7929	1	0	1	0.001	0.001
10/12/09 02:55:22	59.978	3684.318	350	-223.015732	16	650.5	10	0	-103	7929.33	1	0	1	-0.001	0.001
10/12/09 02:55:24	59.979	3686.049	350	-223.015732	16	651	10	0	-103	7929.66	1	0	1	0.001	0.001
10/12/09 02:55:26	59.983	3686.629	350	-223.015732	16	651.5	10	0	-103	7929.99	1	0	1	0.004	0.004
10/12/09 02:55:28	59.987	3685.286	350	-223.015732	16	652	10	0	-103	7930.32	1	0	1	0.004	0.004
10/12/09 02:55:30	59.99	3683.415	350	-223.015732	16	652.5	10	0	-103	7930.65	1	0	1	0.003	0.003
10/12/09 02:55:32	59.992	3682.416	350	-223.015732	16	653	10	0	-103	7930.98	1	0	1	0.002	0.002
10/12/09 02:55:34	59.993	3681.403	350	-223.015732	16	653.5	10	0	-103	7931.31	1	0	1	0.001	0.001
10/12/09 02:55:36	59.99	3679.012	350	-223.015732	16	654	10	0	-103	7931.64	1	0	1	-0.003	0.003
10/12/09 02:55:38	59.988	3679.436	350	-223.015732	16	654.5	10	0	-103	7931.97	1	0	1	-0.002	0.002
10/12/09 02:55:40	59.988	3671.761	350	-223.015732	16	655	10	0	-103	7932.3	1	0	1	0.000	0.000
10/12/09 02:55:42	59.99	3670.717	350	-223.015732	16	655.5	10	0	-103	7932.63	1	0	1	0.002	0.002
10/12/09 02:55:44	59.993	3670.159	350	-223.015732	16	656	10	0	-103	7932.96	1	0	1	0.003	0.003
10/12/09 02:55:46	59.994	3679	350	-223.015732	16	656.5	10	0	-103	7933.29	1	0	1	0.001	0.001
10/12/09 02:55:48	59.993	3680.176	350	-223.015732	16	657	10	0	-103	7933.62	1	0	1	-0.001	0.001
10/12/09 02:55:50	59.994	3681.799	350	-223.015732	16	657.5	10	0	-103	7933.95	1	0	1	0.001	0.001
10/12/09 02:55:52	59.994	3682.7	350	-223.015732	16	658	10	0	-103	7934.28	1	0	1	0.000	0.000
10/12/09 02:55:54	59.993	3684.116	350	-223.015732	16	658.5	10	0	-103	7934.61	1	0	1	-0.001	0.001
10/12/09 02:55:56	59.989	3685.03	350	-223.015732	16	659	10	0	-103	7934.94	1	0	1	-0.004	0.004
10/12/09 02:55:58	59.984	3684.878	350	-223.015732	16	659.5	10	0	-103	7935.27	1	0	1	-0.005	0.005
10/12/09 02:56:00	59.986	3684.165	350	-223.015732	16	660	10	0	-103	7935.6	1	0	1	0.002	0.002
10/12/09 02:56:02	59.985	3684.478	350	-223.015732	16	660.5	10	0	-103	7935.93	1	0	1	-0.001	0.001
10/12/09 02:56:04	59.988	3685.584	350	-223.015732	16	661	10	0	-103	7936.26	1	0	1	0.003	0.003
10/12/09 02:56:06	59.987	3685.148	350	-223.015732	16	661.5	10	0	-103	7936.59	1	0	1	-0.001	0.001
10/12/09 02:56:08	59.986	3684.587	350	-223.015732	16	662	10	0	-103	7936.92	1	0	1	-0.001	0.001
10/12/09 02:56:10	59.987	3684.976	350	-223.015732	16	662.5	10	0	-103	7937.25	1	0	1	0.001	0.001
10/12/09 02:56:12	59.985	3683.674	350	-223.015732	16	663	10	0	-103	7937.58	1	0	1	-0.002	0.002
10/12/09 02:56:14	59.982	3684.872	350	-223.015732	16	663.5	10	0	-103	7937.91	1	0	1	-0.003	0.003
10/12/09 02:56:16	59.981	3684.245	350	-223.015732	16	664	10	0	-103	7938.24	1	0	1	-0.001	0.001
10/12/09 02:56:18	59.982	3684.711	350	-223.015732	16	664.5	10	0	-103	7938.57	1	0	1	0.001	0.001
10/12/09 02:56:20	59.987	3685.589	350	-223.015732	16	665	10	0	-103	7938.9	1	0	1	0.005	0.005

10/12/09 02:56:22	59.992	3683.736	350	-223.015732	16	665.5	10	0	-103	7939.23	1	0	1	0.005	0.005
10/12/09 02:56:24	59.997	3682.579	350	-223.015732	16	666	10	0	-103	7939.56	1	0	1	0.005	0.005
10/12/09 02:56:26	60	3682.234	350	-223.015732	16	666.5	10	0	-103	7939.89	1	0	1	0.003	0.003
10/12/09 02:56:28	60.003	3682.138	350	-223.015732	16	667	10	0	-103	7940.22	1	1	1	0.003	0.003
10/12/09 02:56:30	60.003	3682.224	350	-223.015732	16	667.5	10	0	-103	7940.55	1	1	1	0.000	0.000
10/12/09 02:56:32	60.003	3681.689	350	-223.015732	16	668	10	0	-103	7940.88	1	1	1	0.000	0.000
10/12/09 02:56:34	60.002	3681.458	350	-223.015732	16	668.5	10	0	-103	7941.21	1	1	1	-0.001	0.001
10/12/09 02:56:36	60.003	3681.65	350	-223.015732	16	669	10	0	-103	7941.54	1	1	1	0.001	0.001
10/12/09 02:56:38	60.002	3681.013	350	-223.015732	16	669.5	10	0	-103	7941.87	1	1	1	-0.001	0.001
10/12/09 02:56:40	60.003	3680.167	350	-223.015732	16	670	10	0	-103	7942.2	1	1	1	0.001	0.001
10/12/09 02:56:42	60.004	3679.943	350	-223.015732	16	670.5	10	0	-103	7942.53	1	1	1	0.001	0.001
10/12/09 02:56:44	60.005	3679.429	350	-223.015732	16	671	10	0	-103	7942.86	1	1	1	0.001	0.001
10/12/09 02:56:46	60.006	3679.669	350	-223.015732	16	671.5	10	0	-103	7943.19	1	1	1	0.001	0.001
10/12/09 02:56:48	60.009	3678.981	350	-223.015732	16	672	10	0	-103	7943.52	1	1	1	0.003	0.003
10/12/09 02:56:50	60.012	3678.267	350	-223.015732	16	672.5	10	0	-103	7943.85	1	1	1	0.003	0.003
10/12/09 02:56:52	60.017	3676.796	350	-223.015732	16	673	10	0	-103	7944.18	1	1	1	0.005	0.005
10/12/09 02:56:54	60.021	3676.81	350	-223.015732	16	673.5	10	0	-103	7944.51	1	1	1	0.004	0.004
10/12/09 02:56:56	60.022	3674.798	350	-223.015732	16	674	10	0	-103	7944.84	1	1	1	0.001	0.001
10/12/09 02:56:58	60.021	3673.906	350	-223.015732	16	674.5	10	0	-103	7945.17	1	1	1	-0.001	0.001
10/12/09 02:57:00	60.02	3671.145	350	-223.015732	16	675	10	0	-103	7945.5	1	1	1	-0.001	0.001
10/12/09 02:57:02	60.018	3670.51	350	-223.015732	16	675.5	10	0	-103	7945.83	1	1	1	-0.002	0.002
10/12/09 02:57:04	60.021	3673.648	350	-223.015732	16	676	10	0	-103	7946.16	1	1	1	0.003	0.003
10/12/09 02:57:06	60.02	3673.684	350	-223.015732	16	676.5	10	0	-103	7946.49	1	1	1	-0.001	0.001
10/12/09 02:57:08	60.02	3675.865	350	-223.015732	16	677	10	0	-103	7946.82	1	1	1	0.000	0.000
10/12/09 02:57:10	60.018	3676.676	350	-223.015732	16	677.5	10	0	-103	7947.15	1	1	1	-0.002	0.002
10/12/09 02:57:12	60.018	3676.404	350	-223.015732	16	678	10	0	-103	7947.48	1	1	1	0.000	0.000
10/12/09 02:57:14	60.019	3676.437	350	-223.015732	16	678.5	10	0	-103	7947.81	1	1	1	0.001	0.001
10/12/09 02:57:16	60.019	3677.185	350	-223.015732	16	679	10	0	-103	7948.14	1	1	1	0.000	0.000
10/12/09 02:57:18	60.018	3677.659	350	-223.015732	16	679.5	10	0	-103	7948.47	1	1	1	-0.001	0.001
10/12/09 02:57:20	60.017	3678.828	350	-223.015732	16	680	10	0	-103	7948.8	1	1	1	-0.001	0.001
10/12/09 02:57:22	60.016	3679.289	350	-223.015732	16	680.5	10	0	-103	7949.13	1	1	1	-0.001	0.001
10/12/09 02:57:24	60.016	3678.915	350	-223.015732	16	681	10	0	-103	7949.46	1	1	1	0.000	0.000
10/12/09 02:57:26	60.016	3679.276	350	-223.015732	16	681.5	10	0	-103	7949.79	1	1	1	0.000	0.000
10/12/09 02:57:28	60.015	3678.599	350	-223.015732	16	682	10	0	-103	7950.12	1	1	1	-0.001	0.001
10/12/09 02:57:30	60.014	3678.367	350	-223.015732	16	682.5	10	0	-103	7950.45	1	1	1	-0.001	0.001
10/12/09 02:57:32	60.014	3678.25	350	-223.015732	16	683	10	0	-103	7950.78	1	1	1	0.000	0.000
10/12/09 02:57:34	60.013	3678.589	350	-223.015732	16	683.5	10	0	-103	7951.11	1	1	1	-0.001	0.001
10/12/09 02:57:36	60.013	3677.251	350	-223.015732	16	684	10	0	-103	7951.44	1	1	1	0.000	0.000
10/12/09 02:57:38	60.015	3675.698	350	-223.015732	16	684.5	10	0	-103	7951.77	1	1	1	0.002	0.002
10/12/09 02:57:40	60.017	3674.669	350	-223.015732	16	685	10	0	-103	7952.1	1	1	1	0.002	0.002
10/12/09 02:57:42	60.016	3674.87	350	-223.015732	16	685.5	10	0	-103	7952.43	1	1	1	-0.001	0.001
10/12/09 02:57:44	60.019	3674.402	350	-223.015732	16	686	10	0	-103	7952.76	1	1	1	0.003	0.003
10/12/09 02:57:46	60.021	3674.546	350	-223.015732	16	686.5	10	0	-103	7953.09	1	1	1	0.002	0.002
10/12/09 02:57:48	60.021	3672.969	350	-223.015732	16	687	10	0	-103	7953.42	1	1	1	0.000	0.000
10/12/09 02:57:50	60.02	3671.914	350	-223.015732	16	687.5	10	0	-103	7953.75	1	1	1	-0.001	0.001
10/12/09 02:57:52	60.022	3671.982	350	-223.015732	16	688	10	0	-103	7954.08	1	1	1	0.002	0.002
10/12/09 02:57:54	60.024	3670.946	350	-223.015732	16	688.5	10	0	-103	7954.41	1	1	1	0.002	0.002
10/12/09 02:57:56	60.026	3670.821	350	-223.015732	16	689	10	0	-103	7954.74	1	1	1	0.002	0.002
10/12/09 02:57:58	60.025	3671.06	350	-223.015732	16	689.5	10	0	-103	7955.07	1	1	1	-0.001	0.001

10/12/09 02:58:00	60.026	3671.539	350	-223.015732	16	690	10	0	-103	7955.4	1	1	1	0.001	0.001
10/12/09 02:58:02	60.022	3673.794	350	-223.015732	16	690.5	10	0	-103	7955.73	1	1	1	-0.004	0.004
10/12/09 02:58:04	60.021	3674.01	350	-223.015732	16	691	10	0	-103	7956.06	1	1	1	-0.001	0.001
10/12/09 02:58:06	60.022	3675.102	350	-223.015732	16	691.5	10	0	-103	7956.39	1	1	1	0.001	0.001
10/12/09 02:58:08	60.024	3675.284	350	-223.015732	16	692	10	0	-103	7956.72	1	1	1	0.002	0.002
10/12/09 02:58:10	60.027	3676.051	350	-223.015732	16	692.5	10	0	-103	7957.05	1	1	1	0.003	0.003
10/12/09 02:58:12	60.029	3675.704	350	-223.015732	16	693	10	0	-103	7957.38	1	1	1	0.002	0.002
10/12/09 02:58:14	60.028	3672.583	350	-223.015732	16	693.5	10	0	-103	7957.71	1	1	1	-0.001	0.001
10/12/09 02:58:16	60.028	3671.343	350	-223.015732	16	694	10	0	-103	7958.04	1	1	1	0.000	0.000
10/12/09 02:58:18	60.032	3670.232	350	-223.015732	16	694.5	10	0	-103	7958.37	1	1	1	0.004	0.004
10/12/09 02:58:20	60.035	3668.654	350	-223.015732	16	695	10	0	-103	7958.7	1	1	1	0.003	0.003
10/12/09 02:58:22	60.03	3668.767	350	-223.015732	16	695.5	10	0	-103	7959.03	1	1	1	-0.005	0.005
10/12/09 02:58:24	60.028	3666.312	350	-223.015732	16	696	10	0	-103	7959.36	1	1	1	-0.002	0.002
10/12/09 02:58:26	60.021	3667.322	350	-223.015732	16	696.5	10	0	-103	7959.69	1	1	1	-0.007	0.007
10/12/09 02:58:28	60.021	3657.164	350	-223.015732	16	697	10	0	-103	7960.02	1	1	1	0.000	0.000
10/12/09 02:58:30	60.024	3657.714	350	-223.015732	16	697.5	10	0	-103	7960.35	1	1	1	0.003	0.003
10/12/09 02:58:32	60.025	3668.637	350	-223.015732	16	698	10	0	-103	7960.68	1	1	1	0.001	0.001
10/12/09 02:58:34	60.024	3669.309	350	-223.015732	16	698.5	10	0	-103	7961.01	1	1	1	-0.001	0.001
10/12/09 02:58:36	60.022	3670.112	350	-223.015732	16	699	10	0	-103	7961.34	1	1	1	-0.002	0.002
10/12/09 02:58:38	60.023	3670.735	350	-223.015732	16	699.5	10	0	-103	7961.67	1	1	1	0.001	0.001
10/12/09 02:58:40	60.021	3671.332	350	-223.015732	16	700	10	0	-103	7962	1	1	1	-0.002	0.002
10/12/09 02:58:42	60.02	3672.095	350	-223.015732	16	700.5	10	0	-103	7962.33	1	1	1	-0.001	0.001
10/12/09 02:58:44	60.02	3672.683	350	-223.015732	16	701	10	0	-103	7962.66	1	1	1	0.000	0.000
10/12/09 02:58:46	60.02	3673.833	350	-223.015732	16	701.5	10	0	-103	7962.99	1	1	1	0.000	0.000
10/12/09 02:58:48	60.02	3674.645	350	-223.015732	16	702	10	0	-103	7963.32	1	1	1	0.000	0.000
10/12/09 02:58:50	60.017	3675.641	350	-223.015732	16	702.5	10	0	-103	7963.65	1	1	1	-0.003	0.003
10/12/09 02:58:52	60.014	3675.971	350	-223.015732	16	703	10	0	-103	7963.98	1	1	1	-0.003	0.003
10/12/09 02:58:54	60.012	3677.009	350	-223.015732	16	703.5	10	0	-103	7964.31	1	1	1	-0.002	0.002
10/12/09 02:58:56	60.01	3678.314	350	-223.015732	16	704	10	0	-103	7964.64	1	1	1	-0.002	0.002
10/12/09 02:58:58	60.011	3679.393	350	-223.015732	16	704.5	10	0	-103	7964.97	1	1	1	0.001	0.001
10/12/09 02:59:00	60.01	3680.02	350	-223.015732	16	705	10	0	-103	7965.3	1	1	1	-0.001	0.001
10/12/09 02:59:02	60.01	3679.792	350	-223.015732	16	705.5	10	0	-103	7965.63	1	1	1	0.000	0.000
10/12/09 02:59:04	60.01	3679.597	350	-223.015732	16	706	10	0	-103	7965.96	1	1	1	0.000	0.000
10/12/09 02:59:06	60.012	3680.315	350	-223.015732	16	706.5	10	0	-103	7966.29	1	1	1	0.002	0.002
10/12/09 02:59:08	60.012	3680.11	350	-223.015732	16	707	10	0	-103	7966.62	1	1	1	0.000	0.000
10/12/09 02:59:10	60.013	3679.062	350	-223.015732	16	707.5	10	0	-103	7966.95	1	1	1	0.001	0.001
10/12/09 02:59:12	60.014	3679.127	350	-223.015732	16	708	10	0	-103	7967.28	1	1	1	0.001	0.001
10/12/09 02:59:14	60.013	3679.587	350	-223.015732	16	708.5	10	0	-103	7967.61	1	1	1	-0.001	0.001
10/12/09 02:59:16	60.012	3679.637	350	-223.015732	16	709	10	0	-103	7967.94	1	1	1	-0.001	0.001
10/12/09 02:59:18	60.011	3679.02	350	-223.015732	16	709.5	10	0	-103	7968.27	1	1	1	-0.001	0.001
10/12/09 02:59:20	60.01	3678.418	350	-223.015732	16	710	10	0	-103	7968.6	1	1	1	-0.001	0.001
10/12/09 02:59:22	60.008	3679.383	350	-223.015732	16	710.5	10	0	-103	7968.93	1	1	1	-0.002	0.002
10/12/09 02:59:24	60.01	3679.681	350	-223.015732	16	711	10	0	-103	7969.26	1	1	1	0.002	0.002
10/12/09 02:59:26	60.011	3679.932	350	-223.015732	16	711.5	10	0	-103	7969.59	1	1	1	0.001	0.001
10/12/09 02:59:28	60.013	3679.138	350	-223.015732	16	712	10	0	-103	7969.92	1	1	1	0.002	0.002
10/12/09 02:59:30	60.016	3678.469	350	-223.015732	16	712.5	10	0	-103	7970.25	1	1	1	0.003	0.003
10/12/09 02:59:32	60.018	3678.499	350	-223.015732	16	713	10	0	-103	7970.58	1	1	1	0.002	0.002
10/12/09 02:59:34	60.019	3678.456	350	-223.015732	16	713.5	10	0	-103	7970.91	1	1	1	0.001	0.001
10/12/09 02:59:36	60.019	3677.615	350	-223.015732	16	714	10	0	-103	7971.24	1	1	1	0.000	0.000

10/12/09 02:59:38	60.019	3677.446	350	-223.015732	16	714.5	10	0	-103	7971.57	1	1	1	0.000	0.000
10/12/09 02:59:40	60.02	3677.431	350	-223.015732	16	715	10	0	-103	7971.9	1	1	1	0.001	0.001
10/12/09 02:59:42	60.02	3677.451	350	-223.015732	16	715.5	10	0	-103	7972.23	1	1	1	0.000	0.000
10/12/09 02:59:44	60.018	3677.315	350	-223.015732	16	716	10	0	-103	7972.56	1	1	1	-0.002	0.002
10/12/09 02:59:46	60.018	3678.151	350	-223.015732	16	716.5	10	0	-103	7972.89	1	1	1	0.000	0.000
10/12/09 02:59:48	60.016	3678.362	350	-223.015732	16	717	10	0	-103	7973.22	1	1	1	-0.002	0.002
10/12/09 02:59:50	60.016	3678.874	350	-223.015732	16	717.5	10	0	-103	7973.55	1	1	1	0.000	0.000
10/12/09 02:59:52	60.019	3680.771	350	-223.015732	16	718	10	0	-103	7973.88	1	1	1	0.003	0.003
10/12/09 02:59:54	60.023	3681.058	350	-223.015732	16	718.5	10	0	-103	7974.21	1	1	1	0.004	0.004
10/12/09 02:59:56	60.022	3680.353	350	-223.015732	16	719	10	0	-103	7974.54	1	1	1	-0.001	0.001
10/12/09 02:59:58	60.018	3679.167	350	-223.015732	16	719.5	10	0	-103	7974.87	1	1	1	-0.004	0.004
10/12/09 03:00:00	60.015	3679.553	350	-223.015732	16	720	10	0	-103	7975.2	1	1	1	-0.003	0.003
10/12/09 03:00:02	60.016	3680.672	350	-223.015732	16	720.5	10	0	-103	7975.53	1	1	1	0.001	0.001
10/12/09 03:00:04	60.017	3682.73	350	-223.015732	16	721	10	0	-103	7975.86	1	1	1	0.001	0.001
10/12/09 03:00:06	60.015	3682.714	350	-223.015732	16	721.5	10	0	-103	7976.19	1	1	1	-0.002	0.002
10/12/09 03:00:08	60.01	3681.915	350	-223.015732	16	722	10	0	-103	7976.52	1	1	1	-0.005	0.005
10/12/09 03:00:10	60.004	3682.01	350	-223.015732	16	722.5	10	0	-103	7976.85	1	1	1	-0.006	0.006
10/12/09 03:00:12	59.999	3682.483	350	-223.015732	16	723	10	0	-103	7977.18	1	0	1	-0.005	0.005
10/12/09 03:00:14	59.995	3683.813	350	-223.015732	16	723.5	10	0	-103	7977.51	1	0	1	-0.004	0.004
10/12/09 03:00:16	59.99	3685.306	350	-223.015732	16	724	10	0	-103	7977.84	1	0	1	-0.005	0.005
10/12/09 03:00:18	59.982	3684.846	350	-223.015732	16	724.5	10	0	-103	7978.17	1	0	1	-0.008	0.008
10/12/09 03:00:20	59.974	3684.643	350	-223.015732	16	725	10	0	-103	7978.5	1	0	1	-0.008	0.008
10/12/09 03:00:22	59.97	3687.527	350	-223.015732	16	725.5	10	0	-103	7978.83	1	0	1	-0.004	0.004
10/12/09 03:00:24	59.97	3689.404	350	-223.015732	16	726	10	0	-103	7979.16	1	0	1	0.000	0.000
10/12/09 03:00:26	59.968	3692.287	350	-223.015732	16	726.5	10	0	-103	7979.49	1	0	1	-0.002	0.002
10/12/09 03:00:28	59.968	3692.966	350	-223.015732	16	727	10	0	-103	7979.82	1	0	1	0.000	0.000
10/12/09 03:00:30	59.968	3693.793	350	-223.015732	16	727.5	10	0	-103	7980.15	1	0	1	0.000	0.000
10/12/09 03:00:32	59.972	3694.397	350	-223.015732	16	728	10	0	-103	7980.48	1	0	1	0.004	0.004
10/12/09 03:00:34	59.967	3694.974	350	-223.015732	16	728.5	10	0	-103	7980.81	1	0	1	-0.005	0.005
10/12/09 03:00:36	59.966	3697.407	350	-223.015732	16	729	10	0	-103	7981.14	1	0	1	-0.001	0.001
10/12/09 03:00:38	59.964	3698.502	350	-223.015732	16	729.5	10	0	-103	7981.47	1	0	1	-0.002	0.002
10/12/09 03:00:40	59.965	3698.617	350	-223.015732	16	730	10	0	-103	7981.8	1	0	1	0.001	0.001
10/12/09 03:00:42	59.966	3698.992	350	-223.015732	16	730.5	10	0	-103	7982.13	1	0	1	0.001	0.001
10/12/09 03:00:44	59.963	3699.85	350	-223.015732	16	731	10	0	-103	7982.46	1	0	1	-0.003	0.003
10/12/09 03:00:46	59.963	3702.645	350	-223.015732	16	731.5	10	0	-103	7982.79	1	0	1	0.000	0.000
10/12/09 03:00:48	59.965	3701.989	350	-223.015732	16	732	10	0	-103	7983.12	1	0	1	0.002	0.002
10/12/09 03:00:50	59.968	3702.218	350	-223.015732	16	732.5	10	0	-103	7983.45	1	0	1	0.003	0.003
10/12/09 03:00:52	59.97	3704.023	350	-223.015732	16	733	10	0	-103	7983.78	1	0	1	0.002	0.002
10/12/09 03:00:54	59.97	3703.365	350	-223.015732	16	733.5	10	0	-103	7984.11	1	0	1	0.000	0.000
10/12/09 03:00:56	59.97	3702.988	350	-223.015732	16	734	10	0	-103	7984.44	1	0	1	0.000	0.000
10/12/09 03:00:58	59.973	3703.814	350	-223.015732	16	734.5	10	0	-103	7984.77	1	0	1	0.003	0.003
10/12/09 03:01:00	59.972	3704.899	350	-223.015732	16	735	10	0	-103	7985.1	1	0	1	-0.001	0.001
10/12/09 03:01:02	59.976	3705.625	350	-223.015732	16	735.5	10	0	-103	7985.43	1	0	1	0.004	0.004
10/12/09 03:01:04	59.975	3704.293	350	-223.015732	16	736	10	0	-103	7985.76	1	0	1	-0.001	0.001
10/12/09 03:01:06	59.975	3702.094	350	-223.015732	16	736.5	10	0	-103	7986.09	1	0	1	0.000	0.000
10/12/09 03:01:08	59.977	3701.944	350	-223.015732	16	737	10	0	-103	7986.42	1	0	1	0.002	0.002
10/12/09 03:01:10	59.976	3703.142	350	-223.015732	16	737.5	10	0	-103	7986.75	1	0	1	-0.001	0.001
10/12/09 03:01:12	59.976	3704.669	350	-223.015732	16	738	10	0	-103	7987.08	1	0	1	0.000	0.000
10/12/09 03:01:14	59.974	3705.376	350	-223.015732	16	738.5	10	0	-103	7987.41	1	0	1	-0.002	0.002

10/12/09 03:01:16	59.975	3705.662	350	-223.015732	16	739	10	0	-103	7987.74	1	0	1	0.001	0.001
10/12/09 03:01:18	59.974	3705.855	350	-223.015732	16	739.5	10	0	-103	7988.07	1	0	1	-0.001	0.001
10/12/09 03:01:20	59.974	3706.776	350	-223.015732	16	740	10	0	-103	7988.4	1	0	1	0.000	0.000
10/12/09 03:01:22	59.976	3707.514	350	-223.015732	16	740.5	10	0	-103	7988.73	1	0	1	0.002	0.002
10/12/09 03:01:24	59.977	3706.928	350	-223.015732	16	741	10	0	-103	7989.06	1	0	1	0.001	0.001
10/12/09 03:01:26	59.979	3706.446	350	-223.015732	16	741.5	10	0	-103	7989.39	1	0	1	0.002	0.002
10/12/09 03:01:28	59.981	3706.335	350	-223.015732	16	742	10	0	-103	7989.72	1	0	1	0.002	0.002
10/12/09 03:01:30	59.983	3706.771	350	-223.015732	16	742.5	10	0	-103	7990.05	1	0	1	0.002	0.002
10/12/09 03:01:32	59.985	3705.943	350	-223.015732	16	743	10	0	-103	7990.38	1	0	1	0.002	0.002
10/12/09 03:01:34	59.983	3704.127	350	-223.015732	16	743.5	10	0	-103	7990.71	1	0	1	-0.002	0.002
10/12/09 03:01:36	59.98	3704.777	350	-223.015732	16	744	10	0	-103	7991.04	1	0	1	-0.003	0.003
10/12/09 03:01:38	59.979	3705.974	350	-223.015732	16	744.5	10	0	-103	7991.37	1	0	1	-0.001	0.001
10/12/09 03:01:40	59.983	3705.968	350	-223.015732	16	745	10	0	-103	7991.7	1	0	1	0.004	0.004
10/12/09 03:01:42	59.987	3705.356	350	-223.015732	16	745.5	10	0	-103	7992.03	1	0	1	0.004	0.004
10/12/09 03:01:44	59.986	3704.683	350	-223.015732	16	746	10	0	-103	7992.36	1	0	1	-0.001	0.001
10/12/09 03:01:46	59.984	3703.913	350	-223.015732	16	746.5	10	0	-103	7992.69	1	0	1	-0.002	0.002
10/12/09 03:01:48	59.98	3704.361	350	-223.015732	16	747	10	0	-103	7993.02	1	0	1	-0.004	0.004
10/12/09 03:01:50	59.982	3704.988	350	-223.015732	16	747.5	10	0	-103	7993.35	1	0	1	0.002	0.002
10/12/09 03:01:52	59.984	3705.05	350	-223.015732	16	748	10	0	-103	7993.68	1	0	1	0.002	0.002
10/12/09 03:01:54	59.985	3704.893	350	-223.015732	16	748.5	10	0	-103	7994.01	1	0	1	0.001	0.001
10/12/09 03:01:56	59.987	3703.741	350	-223.015732	16	749	10	0	-103	7994.34	1	0	1	0.002	0.002
10/12/09 03:01:58	59.989	3701.831	350	-223.015732	16	749.5	10	0	-103	7994.67	1	0	1	0.002	0.002
10/12/09 03:02:00	59.992	3701.795	350	-223.015732	16	750	10	0	-103	7995	1	0	1	0.003	0.003
10/12/09 03:02:02	59.996	3700.07	350	-223.015732	16	750.5	10	0	-103	7995.33	1	0	1	0.004	0.004
10/12/09 03:02:04	59.999	3701.308	350	-223.015732	16	751	10	0	-103	7995.66	1	0	1	0.003	0.003
10/12/09 03:02:06	59.997	3700.429	350	-223.015732	16	751.5	10	0	-103	7995.99	1	0	1	-0.002	0.002
10/12/09 03:02:08	59.997	3700.913	350	-223.015732	16	752	10	0	-103	7996.32	1	0	1	0.000	0.000
10/12/09 03:02:10	59.997	3700.541	350	-223.015732	16	752.5	10	0	-103	7996.65	1	0	1	0.000	0.000
10/12/09 03:02:12	59.997	3699.927	350	-223.015732	16	753	10	0	-103	7996.98	1	0	1	0.000	0.000
10/12/09 03:02:14	59.996	3700.858	350	-223.015732	16	753.5	10	0	-103	7997.31	1	0	1	-0.001	0.001
10/12/09 03:02:16	59.997	3700.549	350	-223.015732	16	754	10	0	-103	7997.64	1	0	1	0.001	0.001
10/12/09 03:02:18	59.996	3700.614	350	-223.015732	16	754.5	10	0	-103	7997.97	1	0	1	-0.001	0.001
10/12/09 03:02:20	59.998	3700.224	350	-223.015732	16	755	10	0	-103	7998.3	1	0	1	0.002	0.002
10/12/09 03:02:22	60.003	3699.5	350	-223.015732	16	755.5	10	0	-103	7998.63	1	1	1	0.005	0.005
10/12/09 03:02:24	60.009	3698.032	350	-223.015732	16	756	10	0	-103	7998.96	1	1	1	0.006	0.006
10/12/09 03:02:26	60.01	3697.96	350	-223.015732	16	756.5	10	0	-103	7999.29	1	1	1	0.001	0.001
10/12/09 03:02:28	60.008	3699.409	350	-223.015732	16	757	10	0	-103	7999.62	1	1	1	-0.002	0.002
10/12/09 03:02:30	60.005	3699.241	350	-223.015732	16	757.5	10	0	-103	7999.95	1	1	1	-0.003	0.003
10/12/09 03:02:32	60.004	3700.738	350	-223.015732	16	758	10	0	-103	8000.28	1	1	1	-0.001	0.001
10/12/09 03:02:34	60.006	3701.11	350	-223.015732	16	758.5	10	0	-103	8000.61	1	1	1	0.002	0.002
10/12/09 03:02:36	60.003	3701.238	350	-223.015732	16	759	10	0	-103	8000.94	1	1	1	-0.003	0.003
10/12/09 03:02:38	60.001	3699.998	350	-223.015732	16	759.5	10	0	-103	8001.27	1	1	1	-0.002	0.002
10/12/09 03:02:40	60.002	3700.22	350	-223.015732	16	760	10	0	-103	8001.6	1	1	1	0.001	0.001
10/12/09 03:02:42	60.004	3701.823	350	-223.015732	16	760.5	10	0	-103	8001.93	1	1	1	0.002	0.002
10/12/09 03:02:44	60.007	3702.554	350	-223.015732	16	761	10	0	-103	8002.26	1	1	1	0.003	0.003
10/12/09 03:02:46	60.007	3702.276	350	-223.015732	16	761.5	10	0	-103	8002.59	1	1	1	0.000	0.000
10/12/09 03:02:48	60.008	3701.026	350	-223.015732	16	762	10	0	-103	8002.92	1	1	1	0.001	0.001
10/12/09 03:02:50	60.008	3701.923	350	-223.015732	16	762.5	10	0	-103	8003.25	1	1	1	0.000	0.000
10/12/09 03:02:52	60.006	3702.943	350	-223.015732	16	763	10	0	-103	8003.58	1	1	1	-0.002	0.002

10/12/09 03:02:54	60.006	3704.093	350	-223.015732	16	763.5	10	0	-103	8003.91	1	1	1	0.000	0.000
10/12/09 03:02:56	60.006	3703.96	350	-223.015732	16	764	10	0	-103	8004.24	1	1	1	0.000	0.000
10/12/09 03:02:58	60.005	3703.819	350	-223.015732	16	764.5	10	0	-103	8004.57	1	1	1	-0.001	0.001
10/12/09 03:03:00	60	3704.455	350	-223.015732	16	765	10	0	-103	8004.9	1	0	1	-0.005	0.005
10/12/09 03:03:02	59.999	3704.346	350	-223.015732	16	765.5	10	0	-103	8005.23	1	0	1	-0.001	0.001
10/12/09 03:03:04	60	3705.329	350	-223.015732	16	766	10	0	-103	8005.56	1	0	1	0.001	0.001
10/12/09 03:03:06	60	3704.93	350	-223.015732	16	766.5	10	0	-103	8005.89	1	0	1	0.000	0.000
10/12/09 03:03:08	60.004	3704.405	350	-223.015732	16	767	10	0	-103	8006.22	1	1	1	0.004	0.004
10/12/09 03:03:10	60.008	3703.675	350	-223.015732	16	767.5	10	0	-103	8006.55	1	1	1	0.004	0.004
10/12/09 03:03:12	60.013	3702.748	350	-223.015732	16	768	10	0	-103	8006.88	1	1	1	0.005	0.005
10/12/09 03:03:14	60.015	3702.669	350	-223.015732	16	768.5	10	0	-103	8007.21	1	1	1	0.002	0.002
10/12/09 03:03:16	60.015	3703.017	350	-223.015732	16	769	10	0	-103	8007.54	1	1	1	0.000	0.000
10/12/09 03:03:18	60.012	3703.416	350	-223.015732	16	769.5	10	0	-103	8007.87	1	1	1	-0.003	0.003
10/12/09 03:03:20	60.009	3703.297	350	-223.015732	16	770	10	0	-103	8008.2	1	1	1	-0.003	0.003
10/12/09 03:03:22	60.005	3705.189	350	-223.015732	16	770.5	10	0	-103	8008.53	1	1	1	-0.004	0.004
10/12/09 03:03:24	60.008	3705.279	350	-223.015732	16	771	10	0	-103	8008.86	1	1	1	0.003	0.003
10/12/09 03:03:26	60.011	3704.646	350	-223.015732	16	771.5	10	0	-103	8009.19	1	1	1	0.003	0.003
10/12/09 03:03:28	60.011	3704.051	350	-223.015732	16	772	10	0	-103	8009.52	1	1	1	0.000	0.000
10/12/09 03:03:30	60.013	3703.438	350	-223.015732	16	772.5	10	0	-103	8009.85	1	1	1	0.002	0.002
10/12/09 03:03:32	60.016	3704.255	350	-223.015732	16	773	10	0	-103	8010.18	1	1	1	0.003	0.003
10/12/09 03:03:34	60.018	3703.708	350	-223.015732	16	773.5	10	0	-103	8010.51	1	1	1	0.002	0.002
10/12/09 03:03:36	60.018	3703.83	350	-223.015732	16	774	10	0	-103	8010.84	1	1	1	0.000	0.000
10/12/09 03:03:38	60.019	3704.524	350	-223.015732	16	774.5	10	0	-103	8011.17	1	1	1	0.001	0.001
10/12/09 03:03:40	60.018	3704.139	350	-223.015732	16	775	10	0	-103	8011.5	1	1	1	-0.001	0.001
10/12/09 03:03:42	60.013	3704.27	350	-223.015732	16	775.5	10	0	-103	8011.83	1	1	1	-0.005	0.005
10/12/09 03:03:44	60.011	3705.429	350	-223.015732	16	776	10	0	-103	8012.16	1	1	1	-0.002	0.002
10/12/09 03:03:46	60.009	3705.942	350	-223.015732	16	776.5	10	0	-103	8012.49	1	1	1	-0.002	0.002
10/12/09 03:03:48	60.009	3705.54	350	-223.015732	16	777	10	0	-103	8012.82	1	1	1	0.000	0.000
10/12/09 03:03:50	60.008	3705.634	350	-223.015732	16	777.5	10	0	-103	8013.15	1	1	1	-0.001	0.001
10/12/09 03:03:52	60.009	3705.749	350	-223.015732	16	778	10	0	-103	8013.48	1	1	1	0.001	0.001
10/12/09 03:03:54	60.011	3707.267	350	-223.015732	16	778.5	10	0	-103	8013.81	1	1	1	0.002	0.002
10/12/09 03:03:56	60.015	3706.945	350	-223.015732	16	779	10	0	-103	8014.14	1	1	1	0.004	0.004
10/12/09 03:03:58	60.02	3706.63	350	-223.015732	16	779.5	10	0	-103	8014.47	1	1	1	0.005	0.005
10/12/09 03:04:00	60.021	3705.655	350	-223.015732	16	780	10	0	-103	8014.8	1	1	1	0.001	0.001
10/12/09 03:04:02	60.018	3703.895	350	-223.015732	16	780.5	10	0	-103	8015.13	1	1	1	-0.003	0.003
10/12/09 03:04:04	60.017	3704.224	350	-223.015732	16	781	10	0	-103	8015.46	1	1	1	-0.001	0.001
10/12/09 03:04:06	60.019	3703.887	350	-223.015732	16	781.5	10	0	-103	8015.79	1	1	1	0.002	0.002
10/12/09 03:04:08	60.019	3704.648	350	-223.015732	16	782	10	0	-103	8016.12	1	1	1	0.000	0.000
10/12/09 03:04:10	60.021	3704.795	350	-223.015732	16	782.5	10	0	-103	8016.45	1	1	1	0.002	0.002
10/12/09 03:04:12	60.022	3704.167	350	-223.015732	16	783	10	0	-103	8016.78	1	1	1	0.001	0.001
10/12/09 03:04:14	60.025	3702.764	350	-223.015732	16	783.5	10	0	-103	8017.11	1	1	1	0.003	0.003
10/12/09 03:04:16	60.027	3702.008	350	-223.015732	16	784	10	0	-103	8017.44	1	1	1	0.002	0.002
10/12/09 03:04:18	60.03	3700.36	350	-223.015732	16	784.5	10	0	-103	8017.77	1	1	1	0.003	0.003
10/12/09 03:04:20	60.027	3701.063	350	-223.015732	16	785	10	0	-103	8018.1	1	1	1	-0.003	0.003
10/12/09 03:04:22	60.023	3700.34	350	-223.015732	16	785.5	10	0	-103	8018.43	1	1	1	-0.004	0.004
10/12/09 03:04:24	60.021	3699.369	350	-223.015732	16	786	10	0	-103	8018.76	1	1	1	-0.002	0.002
10/12/09 03:04:26	60.023	3701.568	350	-223.015732	16	786.5	10	0	-103	8019.09	1	1	1	0.002	0.002
10/12/09 03:04:28	60.023	3702.959	350	-223.015732	16	787	10	0	-103	8019.42	1	1	1	0.000	0.000
10/12/09 03:04:30	60.02	3704.25	350	-223.015732	16	787.5	10	0	-103	8019.75	1	1	1	-0.003	0.003

10/12/09 03:04:32	60.024	3703.621	350	-223.015732	16	788	10	0	-103	8020.08	1	1	1	0.004	0.004
10/12/09 03:04:34	60.024	3703.374	350	-223.015732	16	788.5	10	0	-103	8020.41	1	1	1	0.000	0.000
10/12/09 03:04:36	60.022	3703.036	350	-223.015732	16	789	10	0	-103	8020.74	1	1	1	-0.002	0.002
10/12/09 03:04:38	60.022	3703.931	350	-223.015732	16	789.5	10	0	-103	8021.07	1	1	1	0.000	0.000
10/12/09 03:04:40	60.024	3704.947	350	-223.015732	16	790	10	0	-103	8021.4	1	1	1	0.002	0.002
10/12/09 03:04:42	60.025	3704.208	350	-223.015732	16	790.5	10	0	-103	8021.73	1	1	1	0.001	0.001
10/12/09 03:04:44	60.023	3703.541	350	-223.015732	16	791	10	0	-103	8022.06	1	1	1	-0.002	0.002
10/12/09 03:04:46	60.024	3703.16	350	-223.015732	16	791.5	10	0	-103	8022.39	1	1	1	0.001	0.001
10/12/09 03:04:48	60.02	3703.397	350	-223.015732	16	792	10	0	-103	8022.72	1	1	1	-0.004	0.004
10/12/09 03:04:50	60.018	3704.376	350	-223.015732	16	792.5	10	0	-103	8023.05	1	1	1	-0.002	0.002
10/12/09 03:04:52	60.013	3705.441	350	-223.015732	16	793	10	0	-103	8023.38	1	1	1	-0.005	0.005
10/12/09 03:04:54	60.008	3706.995	350	-223.015732	16	793.5	10	0	-103	8023.71	1	1	1	-0.005	0.005
10/12/09 03:04:56	60.012	3710.072	350	-223.015732	16	794	10	0	-103	8024.04	1	1	1	0.004	0.004
10/12/09 03:04:58	60.017	3707.971	350	-223.015732	16	794.5	10	0	-103	8024.37	1	1	1	0.005	0.005
10/12/09 03:05:00	60.019	3707.767	350	-223.015732	16	795	10	0	-103	8024.7	1	1	1	0.002	0.002
10/12/09 03:05:02	60.019	3707.609	350	-223.015732	16	795.5	10	0	-103	8025.03	1	1	1	0.000	0.000
10/12/09 03:05:04	60.015	3708.831	350	-223.015732	16	796	10	0	-103	8025.36	1	1	1	-0.004	0.004
10/12/09 03:05:06	60.016	3709.465	350	-223.015732	16	796.5	10	0	-103	8025.69	1	1	1	0.001	0.001
10/12/09 03:05:08	60.015	3709.813	350	-223.015732	16	797	10	0	-103	8026.02	1	1	1	-0.001	0.001
10/12/09 03:05:10	60.016	3709.817	350	-223.015732	16	797.5	10	0	-103	8026.35	1	1	1	0.001	0.001
10/12/09 03:05:12	60.014	3709.99	350	-223.015732	16	798	10	0	-103	8026.68	1	1	1	-0.002	0.002
10/12/09 03:05:14	60.016	3709.094	350	-223.015732	16	798.5	10	0	-103	8027.01	1	1	1	0.002	0.002
10/12/09 03:05:16	60.018	3709.642	350	-223.015732	16	799	10	0	-103	8027.34	1	1	1	0.002	0.002
10/12/09 03:05:18	60.019	3709.812	350	-223.015732	16	799.5	10	0	-103	8027.67	1	1	1	0.001	0.001
10/12/09 03:05:20	60.016	3709.933	350	-223.015732	16	800	10	0	-103	8028	1	1	1	-0.003	0.003
10/12/09 03:05:22	60.014	3710.677	350	-223.015732	16	800.5	10	0	-103	8028.33	1	1	1	-0.002	0.002
10/12/09 03:05:24	60.014	3710.591	350	-223.015732	16	801	10	0	-103	8028.66	1	1	1	0.000	0.000
10/12/09 03:05:26	60.018	3709.354	350	-223.015732	16	801.5	10	0	-103	8028.99	1	1	1	0.004	0.004
10/12/09 03:05:28	60.022	3707.696	350	-223.015732	16	802	10	0	-103	8029.32	1	1	1	0.004	0.004
10/12/09 03:05:30	60.023	3707.38	350	-223.015732	16	802.5	10	0	-103	8029.65	1	1	1	0.001	0.001
10/12/09 03:05:32	60.024	3707.12	350	-223.015732	16	803	10	0	-103	8029.98	1	1	1	0.001	0.001
10/12/09 03:05:34	60.026	3706.99	350	-223.015732	16	803.5	10	0	-103	8030.31	1	1	1	0.002	0.002
10/12/09 03:05:36	60.026	3705.848	350	-223.015732	16	804	10	0	-103	8030.64	1	1	1	0.000	0.000
10/12/09 03:05:38	60.024	3704.185	350	-223.015732	16	804.5	10	0	-103	8030.97	1	1	1	-0.002	0.002
10/12/09 03:05:40	60.022	3704.406	350	-223.015732	16	805	10	0	-103	8031.3	1	1	1	-0.002	0.002
10/12/09 03:05:42	60.02	3704.963	350	-223.015732	16	805.5	10	0	-103	8031.63	1	1	1	-0.002	0.002
10/12/09 03:05:44	60.019	3706.567	350	-223.015732	16	806	10	0	-103	8031.96	1	1	1	-0.001	0.001
10/12/09 03:05:46	60.022	3705.516	350	-223.015732	16	806.5	10	0	-103	8032.29	1	1	1	0.003	0.003
10/12/09 03:05:48	60.025	3704.869	350	-223.015732	16	807	10	0	-103	8032.62	1	1	1	0.003	0.003
10/12/09 03:05:50	60.028	3704.428	350	-223.015732	16	807.5	10	0	-103	8032.95	1	1	1	0.003	0.003
10/12/09 03:05:52	60.03	3704.773	350	-223.015732	16	808	10	0	-103	8033.28	1	1	1	0.002	0.002
10/12/09 03:05:54	60.031	3703.532	350	-223.015732	16	808.5	10	0	-103	8033.61	1	1	1	0.001	0.001
10/12/09 03:05:56	60.029	3702.686	350	-223.015732	16	809	10	0	-103	8033.94	1	1	1	-0.002	0.002
10/12/09 03:05:58	60.026	3702.093	350	-223.015732	16	809.5	10	0	-103	8034.27	1	1	1	-0.003	0.003
10/12/09 03:06:00	60.026	3703.169	350	-223.015732	16	810	10	0	-103	8034.6	1	1	1	0.000	0.000
10/12/09 03:06:02	60.029	3703.676	350	-223.015732	16	810.5	10	0	-103	8034.93	1	1	1	0.003	0.003
10/12/09 03:06:04	60.03	3701.52	350	-223.015732	16	811	10	0	-103	8035.26	1	1	1	0.001	0.001
10/12/09 03:06:06	60.033	3700.106	350	-223.015732	16	811.5	10	0	-103	8035.59	1	1	1	0.003	0.003
10/12/09 03:06:08	60.03	3698.222	350	-223.015732	16	812	10	0	-103	8035.92	1	1	1	-0.003	0.003

10/12/09 03:06:10	60.022	3698.009	350	-223.015732	16	812.5	10	0	-103	8036.25	1	1	1	-0.008	0.008
10/12/09 03:06:12	60.016	3700.28	350	-223.015732	16	813	10	0	-103	8036.58	1	1	1	-0.006	0.006
10/12/09 03:06:14	60.019	3703.192	350	-223.015732	16	813.5	10	0	-103	8036.91	1	1	1	0.003	0.003
10/12/09 03:06:16	60.03	3703.815	350	-223.015732	16	814	10	0	-103	8037.24	1	1	1	0.011	0.011
10/12/09 03:06:18	60.028	3701.863	350	-223.015732	16	814.5	10	0	-103	8037.57	1	1	1	-0.002	0.002
10/12/09 03:06:20	60.021	3699.956	350	-223.015732	16	815	10	0	-103	8037.9	1	1	1	-0.007	0.007
10/12/09 03:06:22	60.015	3700.816	350	-223.015732	16	815.5	10	0	-103	8038.23	1	1	1	-0.006	0.006
10/12/09 03:06:24	60.015	3703.802	350	-223.015732	16	816	10	0	-103	8038.56	1	1	1	0.000	0.000
10/12/09 03:06:26	60.012	3706.943	350	-223.015732	16	816.5	10	0	-103	8038.89	1	1	1	-0.003	0.003
10/12/09 03:06:28	60.011	3708.527	350	-223.015732	16	817	10	0	-103	8039.22	1	1	1	-0.001	0.001
10/12/09 03:06:30	60.014	3707.49	350	-223.015732	16	817.5	10	0	-103	8039.55	1	1	1	0.003	0.003
10/12/09 03:06:32	60.013	3707.647	350	-223.015732	16	818	10	0	-103	8039.88	1	1	1	-0.001	0.001
10/12/09 03:06:34	60.014	3706.991	350	-223.015732	16	818.5	10	0	-103	8040.21	1	1	1	0.001	0.001
10/12/09 03:06:36	60.016	3707.495	350	-223.015732	16	819	10	0	-103	8040.54	1	1	1	0.002	0.002
10/12/09 03:06:38	60.016	3705.584	350	-223.015732	16	819.5	10	0	-103	8040.87	1	1	1	0.000	0.000
10/12/09 03:06:40	60.015	3705.398	350	-223.015732	16	820	10	0	-103	8041.2	1	1	1	-0.001	0.001
10/12/09 03:06:42	60.013	3707.12	350	-223.015732	16	820.5	10	0	-103	8041.53	1	1	1	-0.002	0.002
10/12/09 03:06:44	60.007	3709.144	350	-223.015732	16	821	10	0	-103	8041.86	1	1	1	-0.006	0.006
10/12/09 03:06:46	59.997	3708.99	350	-223.015732	16	821.5	10	0	-103	8042.19	1	0	1	-0.010	0.010
10/12/09 03:06:48	59.994	3708.291	350	-223.015732	16	822	10	0	-103	8042.52	1	0	1	-0.003	0.003
10/12/09 03:06:50	59.993	3706.193	350	-223.015732	16	822.5	10	0	-103	8042.85	1	0	1	-0.001	0.001
10/12/09 03:06:52	59.99	3707.304	350	-223.015732	16	823	10	0	-103	8043.18	1	0	1	-0.003	0.003
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10/12/09 03:06:56	59.994	3706.76	350	-223.015732	16	824	10	0	-103	8043.84	1	0	1	0.001	0.001
10/12/09 03:06:58	59.993	3706.921	350	-223.015732	16	824.5	10	0	-103	8044.17	1	0	1	-0.001	0.001
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10/12/09 03:07:02	59.993	3706.888	350	-223.015732	16	825.5	10	0	-103	8044.83	1	0	1	-0.001	0.001
10/12/09 03:07:04	59.996	3704.934	350	-223.015732	16	826	10	0	-103	8045.16	1	0	1	0.003	0.003
10/12/09 03:07:06	59.988	3705.678	350	-223.015732	16	826.5	10	0	-103	8045.49	1	0	1	-0.008	0.008
10/12/09 03:07:08	59.985	3706.481	350	-223.015732	16	827	10	0	-103	8045.82	1	0	1	-0.003	0.003
10/12/09 03:07:10	59.983	3707.071	350	-223.015732	16	827.5	10	0	-103	8046.15	1	0	1	-0.002	0.002
10/12/09 03:07:12	59.982	3706.696	350	-223.015732	16	828	10	0	-103	8046.48	1	0	1	-0.001	0.001
10/12/09 03:07:14	59.98	3707.479	350	-223.015732	16	828.5	10	0	-103	8046.81	1	0	1	-0.002	0.002
10/12/09 03:07:16	59.977	3708.246	350	-223.015732	16	829	10	0	-103	8047.14	1	0	1	-0.003	0.003
10/12/09 03:07:18	59.981	3709.436	350	-223.015732	16	829.5	10	0	-103	8047.47	1	0	1	0.004	0.004
10/12/09 03:07:20	59.982	3710.419	350	-223.015732	16	830	10	0	-103	8047.8	1	0	1	0.001	0.001
10/12/09 03:07:22	59.978	3710.134	350	-223.015732	16	830.5	10	0	-103	8048.13	1	0	1	-0.004	0.004
10/12/09 03:07:24	59.98	3708.708	350	-223.015732	16	831	10	0	-103	8048.46	1	0	1	0.002	0.002
10/12/09 03:07:26	59.98	3710.024	350	-223.015732	16	831.5	10	0	-103	8048.79	1	0	1	0.000	0.000
10/12/09 03:07:28	59.977	3709.192	350	-223.015732	16	832	10	0	-103	8049.12	1	0	1	-0.003	0.003
10/12/09 03:07:30	59.98	3708.335	350	-223.015732	16	832.5	10	0	-103	8049.45	1	0	1	0.003	0.003
10/12/09 03:07:32	59.983	3709.399	350	-223.015732	16	833	10	0	-103	8049.78	1	0	1	0.003	0.003
10/12/09 03:07:34	59.984	3707.911	350	-223.015732	16	833.5	10	0	-103	8050.11	1	0	1	0.001	0.001
10/12/09 03:07:36	59.981	3709.004	350	-223.015732	16	834	10	0	-103	8050.44	1	0	1	-0.003	0.003
10/12/09 03:07:38	59.981	3707.638	350	-223.015732	16	834.5	10	0	-103	8050.77	1	0	1	0.000	0.000
10/12/09 03:07:40	59.98	3709.689	350	-223.015732	16	835	10	0	-103	8051.1	1	0	1	-0.001	0.001
10/12/09 03:07:42	59.981	3708.945	350	-223.015732	16	835.5	10	0	-103	8051.43	1	0	1	0.001	0.001
10/12/09 03:07:44	59.981	3706.541	350	-223.015732	16	836	10	0	-103	8051.76	1	0	1	0.000	0.000
10/12/09 03:07:46	59.981	3711.256	350	-223.015732	16	836.5	10	0	-103	8052.09	1	0	1	0.000	0.000

10/12/09 03:07:48	59.98	3711.362	350	-223.015732	16	837	10	0	-103	8052.42	1	0	1	-0.001	0.001
10/12/09 03:07:50	59.978	3712.303	350	-223.015732	16	837.5	10	0	-103	8052.75	1	0	1	-0.002	0.002
10/12/09 03:07:52	59.978	3712.012	350	-223.015732	16	838	10	0	-103	8053.08	1	0	1	0.000	0.000
10/12/09 03:07:54	59.979	3711.703	350	-223.015732	16	838.5	10	0	-103	8053.41	1	0	1	0.001	0.001
10/12/09 03:07:56	59.978	3712.093	350	-223.015732	16	839	10	0	-103	8053.74	1	0	1	-0.001	0.001
10/12/09 03:07:58	59.976	3713.992	350	-223.015732	16				-103	8054.07	1	0	1	-0.002	0.002
10/12/09 03:08:00	59.976	3714.612	350	-223.015732	16				-103	8054.4	1	0	1	0.000	0.000
10/12/09 03:08:02	59.975	3715.083	350	-223.015732	16				-103	8054.73	1	0	1	-0.001	0.001
10/12/09 03:08:04	59.976	3715.323	350	-223.015732	16				-103	8055.06	1	0	1	0.001	0.001
10/12/09 03:08:06	59.975	3714.794	350	-223.015732	16				-103	8055.39	1	0	1	-0.001	0.001
10/12/09 03:08:08	59.979	3714.717	350	-223.015732	16				-103	8055.72	1	0	1	0.004	0.004
10/12/09 03:08:10	59.978	3715.161	350	-223.015732	16				-103	8056.05	1	0	1	-0.001	0.001
10/12/09 03:08:12	59.975	3715.001	350	-223.015732	16				-103	8056.38	1	0	1	-0.003	0.003
10/12/09 03:08:14	59.976	3713.996	350	-223.015732	16				-103	8056.71	1	0	1	0.001	0.001
10/12/09 03:08:16	59.981	3714.063	350	-223.015732	16				-103	8057.04	1	0	1	0.005	0.005
10/12/09 03:08:18	59.977	3714.335	350	-223.015732	16				-103	8057.37	1	0	1	-0.004	0.004
10/12/09 03:08:20	59.975	3715.631	350	-223.015732	16				-103	8057.7	1	0	1	-0.002	0.002
10/12/09 03:08:22	59.976	3715.688	350	-223.015732	16				-103	8058.03	1	0	1	0.001	0.001
10/12/09 03:08:24	59.979	3715.567	350	-223.015732	16				-103	8058.36	1	0	1	0.003	0.003
10/12/09 03:08:26	59.98	3715.725	350	-223.015732	16				-103	8058.69	1	0	1	0.001	0.001
10/12/09 03:08:28	59.979	3714.848	350	-223.015732	16				-103	8059.02	1	0	1	-0.001	0.001
10/12/09 03:08:30	59.978	3713.142	350	-223.015732	16				-103	8059.35	1	0	1	-0.001	0.001
10/12/09 03:08:32	59.979	3713.358	350	-223.015732	16				-103	8059.68	1	0	1	0.001	0.001
10/12/09 03:08:34	59.982	3712.275	350	-223.015732	16				-103	8060.01	1	0	1	0.003	0.003
10/12/09 03:08:36	59.983	3712.619	350	-223.015732	16				-103	8060.34	1	0	1	0.001	0.001
10/12/09 03:08:38	59.987	3712.153	350	-223.015732	16				-103	8060.67	1	0	1	0.004	0.004
10/12/09 03:08:40	59.988	3710.05	350	-223.015732	16				-103	8061	1	0	1	0.001	0.001
10/12/09 03:08:42	59.984	3709.082	350	-223.015732	16				-103	8061.33	1	0	1	-0.004	0.004
10/12/09 03:08:44	59.98	3710.472	350	-223.015732	16				-103	8061.66	1	0	1	-0.004	0.004
10/12/09 03:08:46	59.979	3710.624	350	-223.015732	16				-103	8061.99	1	0	1	-0.001	0.001
10/12/09 03:08:48	59.98	3710.946	350	-223.015732	16				-103	8062.32	1	0	1	0.001	0.001
10/12/09 03:08:50	59.979	3710.2	350	-223.015732	16				-103	8062.65	1	0	1	-0.001	0.001
10/12/09 03:08:52	59.978	3710.475	350	-223.015732	16				-103	8062.98	1	0	1	-0.001	0.001
10/12/09 03:08:54	59.975	3709.462	350	-223.015732	16				-103	8063.31	1	0	1	-0.003	0.003
10/12/09 03:08:56	59.979	3710.803	350	-223.015732	16				-103	8063.64	1	0	1	0.004	0.004
10/12/09 03:08:58	59.982	3709.286	350	-223.015732	16				-103	8063.97	1	0	1	0.003	0.003
10/12/09 03:09:00	59.983	3710.573	350	-223.015732	16				-103	8064.3	1	0	1	0.001	0.001
10/12/09 03:09:02	59.983	3709.525	350	-223.015732	16				-103	8064.63	1	0	1	0.000	0.000
10/12/09 03:09:04	59.985	3708.371	350	-223.015732	16				-103	8064.96	1	0	1	0.002	0.002
10/12/09 03:09:06	59.99	3708.527	350	-223.015732	16				-103	8065.29	1	0	1	0.005	0.005
10/12/09 03:09:08	59.987	3706.512	350	-223.015732	16				-103	8065.62	1	0	1	-0.003	0.003
10/12/09 03:09:10	59.984	3707.49	350	-223.015732	16				-103	8065.95	1	0	1	-0.003	0.003
10/12/09 03:09:12	59.976	3708.962	350	-223.015732	16				-103	8066.28	1	0	1	-0.008	0.008
10/12/09 03:09:14	59.979	3709.894	350	-223.015732	16				-103	8066.61	1	0	1	0.003	0.003
10/12/09 03:09:16	59.985	3712.303	350	-223.015732	16				-103	8066.94	1	0	1	0.006	0.006
10/12/09 03:09:18	59.983	3711.35	350	-223.015732	16				-103	8067.27	1	0	1	-0.002	0.002
10/12/09 03:09:20	59.979	3711.627	350	-223.015732	16				-103	8067.6	1	0	1	-0.004	0.004
10/12/09 03:09:22	59.981	3712.076	350	-223.015732	16				-103	8067.93	1	0	1	0.002	0.002
10/12/09 03:09:24	59.978	3712.393	350	-223.015732	16				-103	8068.26	1	0	1	-0.003	0.003

10/12/09 03:09:26	59.975	3712.999	350	-223.015732	16	-103	8068.59	1	0	1	-0.003	0.003
10/12/09 03:09:28	59.978	3713.51	350	-223.015732	16	-103	8068.92	1	0	1	0.003	0.003
10/12/09 03:09:30	59.989	3716.626	350	-223.015732	16	-103	8069.25	1	0	1	0.011	0.011
10/12/09 03:09:32	59.999	3715.443	350	-223.015732	16	-103	8069.58	1	0	1	0.010	0.010
10/12/09 03:09:34	59.994	3712.092	350	-223.015732	16	-103	8069.91	1	0	1	-0.005	0.005
10/12/09 03:09:36	59.989	3713.906	350	-223.015732	16	-103	8070.24	1	0	1	-0.005	0.005
10/12/09 03:09:38	59.986	3714.894	350	-223.015732	16	-103	8070.57	1	0	1	-0.003	0.003
10/12/09 03:09:40	59.984	3714.953	350	-223.015732	16	-103	8070.9	1	0	1	-0.002	0.002
10/12/09 03:09:42	59.983	3716.122	350	-223.015732	16	-103	8071.23	1	0	1	-0.001	0.001
10/12/09 03:09:44	59.982	3716.308	350	-223.015732	16	-103	8071.56	1	0	1	-0.001	0.001
10/12/09 03:09:46	59.98	3715.438	350	-223.015732	16	-103	8071.89	1	0	1	-0.002	0.002
10/12/09 03:09:48	59.99	3714.764	350	-223.015732	16	-103	8072.22	1	0	1	0.010	0.010
10/12/09 03:09:50	59.995	3714.714	350	-223.015732	16	-103	8072.55	1	0	1	0.005	0.005
10/12/09 03:09:52	59.995	3715.068	350	-223.015732	16	-103	8072.88	1	0	1	0.000	0.000
10/12/09 03:09:54	59.99	3715.927	350	-223.015732	16	-103	8073.21	1	0	1	-0.005	0.005
10/12/09 03:09:56	59.989	3715.791	350	-223.015732	16	-103	8073.54	1	0	1	-0.001	0.001
10/12/09 03:09:58	59.991	3716.285	350	-223.015732	16	-103	8073.87	1	0	1	0.002	0.002
10/12/09 03:10:00	59.996	3715.324	350	-223.015732	16	-103	8074.2	1	0	1	0.005	0.005
10/12/09 03:10:02	60	3714.46	350	-223.015732	16	-103	8074.53	1	0	1	0.004	0.004
10/12/09 03:10:04	60.002	3711.708	350	-223.015732	16	-103	8074.86	1	1	1	0.002	0.002
10/12/09 03:10:06	60.004	3712.698	350	-223.015732	16	-103	8075.19	1	1	1	0.002	0.002
10/12/09 03:10:08	60.004	3712.851	350	-223.015732	16	-103	8075.52	1	1	1	0.000	0.000
10/12/09 03:10:10	60.002	3713.362	350	-223.015732	16	-103	8075.85	1	1	1	-0.002	0.002
10/12/09 03:10:12	59.999	3716.641	350	-223.015732	16	-103	8076.18	1	0	1	-0.003	0.003
10/12/09 03:10:14	59.998	3718.292	350	-223.015732	16	-103	8076.51	1	0	1	-0.001	0.001
10/12/09 03:10:16	59.995	3719.079	350	-223.015732	16	-103	8076.84	1	0	1	-0.003	0.003
10/12/09 03:10:18	59.996	3718.233	350	-223.015732	16	-103	8077.17	1	0	1	0.001	0.001
10/12/09 03:10:20	60.001	3717.815	350	-223.015732	16	-103	8077.5	1	1	1	0.005	0.005
10/12/09 03:10:22	60.002	3717.889	350	-223.015732	16	-103	8077.83	1	1	1	0.001	0.001
10/12/09 03:10:24	60.001	3718.56	350	-223.015732	16	-103	8078.16	1	1	1	-0.001	0.001
10/12/09 03:10:26	60.003	3718.195	350	-223.015732	16	-103	8078.49	1	1	1	0.002	0.002
10/12/09 03:10:28	60.005	3719.021	350	-223.015732	16	-103	8078.82	1	1	1	0.002	0.002
10/12/09 03:10:30	60.004	3718.821	350	-223.015732	16	-103	8079.15	1	1	1	-0.001	0.001
10/12/09 03:10:32	60.004	3719.897	350	-223.015732	16	-103	8079.48	1	1	1	0.000	0.000
10/12/09 03:10:34	60.004	3719.299	350	-223.015732	16	-103	8079.81	1	1	1	0.000	0.000
10/12/09 03:10:36	60.006	3719.643	350	-223.015732	16	-103	8080.14	1	1	1	0.002	0.002
10/12/09 03:10:38	60.003	3719.527	350	-223.015732	16	-103	8080.47	1	1	1	-0.003	0.003
10/12/09 03:10:40	60.005	3719.731	350	-223.015732	16	-103	8080.8	1	1	1	0.002	0.002
10/12/09 03:10:42	60.006	3720.279	350	-223.015732	16	-103	8081.13	1	1	1	0.001	0.001
10/12/09 03:10:44	60.009	3718.58	350	-223.015732	16	-103	8081.46	1	1	1	0.003	0.003
10/12/09 03:10:46	60.009	3718.976	350	-223.015732	16	-103	8081.79	1	1	1	0.000	0.000
10/12/09 03:10:48	60.01	3718.982	350	-223.015732	16	-103	8082.12	1	1	1	0.001	0.001
10/12/09 03:10:50	60.009	3720.034	350	-223.015732	16	-103	8082.45	1	1	1	-0.001	0.001
10/12/09 03:10:52	60.013	3720.609	350	-223.015732	16	-103	8082.78	1	1	1	0.004	0.004
10/12/09 03:10:54	60.015	3720.811	350	-223.015732	16	-103	8083.11	1	1	1	0.002	0.002
10/12/09 03:10:56	60.014	3721.239	350	-223.015732	16	-103	8083.44	1	1	1	-0.001	0.001
10/12/09 03:10:58	60.009	3720.38	350	-223.015732	16	-103	8083.77	1	1	1	-0.005	0.005
10/12/09 03:11:00	60.009	3719.447	350	-223.015732	16	-103	8084.1	1	1	1	0.000	0.000
10/12/09 03:11:02	60.008	3720.807	350	-223.015732	16	-103	8084.43	1	1	1	-0.001	0.001

10/12/09 03:11:04	60.011	3721.272	350	-223.015732	16	-103	8084.76	1	1	1	0.003	0.003
10/12/09 03:11:06	60.01	3720.592	350	-223.015732	16	-103	8085.09	1	1	1	-0.001	0.001
10/12/09 03:11:08	60.009	3721.245	350	-223.015732	16	-103	8085.42	1	1	1	-0.001	0.001
10/12/09 03:11:10	60.013	3721.594	350	-223.015732	16	-103	8085.75	1	1	1	0.004	0.004
10/12/09 03:11:12	60.013	3722.176	350	-223.015732	16	-103	8086.08	1	1	1	0.000	0.000
10/12/09 03:11:14	60.014	3721.999	350	-223.015732	16	-103	8086.41	1	1	1	0.001	0.001
10/12/09 03:11:16	60.014	3721.646	350	-223.015732	16	-103	8086.74	1	1	1	0.000	0.000
10/12/09 03:11:18	60.012	3721.678	350	-223.015732	16	-103	8087.07	1	1	1	-0.002	0.002
10/12/09 03:11:20	60.01	3720.86	350	-223.015732	16	-103	8087.4	1	1	1	-0.002	0.002
10/12/09 03:11:22	60.011	3721.645	350	-223.015732	16	-103	8087.73	1	1	1	0.001	0.001
10/12/09 03:11:24	60.007	3723.816	350	-223.015732	16	-103	8088.06	1	1	1	-0.004	0.004
10/12/09 03:11:26	60.003	3725.07	350	-223.015732	16	-103	8088.39	1	1	1	-0.004	0.004
10/12/09 03:11:28	60.001	3724.656	350	-223.015732	16	-103	8088.72	1	1	1	-0.002	0.002
10/12/09 03:11:30	60	3724.869	350	-223.015732	16	-103	8089.05	1	0	1	-0.001	0.001
10/12/09 03:11:32	59.998	3724.661	350	-223.015732	16	-103	8089.38	1	0	1	-0.002	0.002
10/12/09 03:11:34	59.998	3723.696	350	-223.015732	16	-103	8089.71	1	0	1	0.000	0.000
10/12/09 03:11:36	59.999	3723.58	350	-223.015732	16	-103	8090.04	1	0	1	0.001	0.001
10/12/09 03:11:38	60.002	3723.405	350	-223.015732	16	-103	8090.37	1	1	1	0.003	0.003
10/12/09 03:11:40	60.003	3721.879	350	-223.015732	16	-103	8090.7	1	1	1	0.001	0.001
10/12/09 03:11:42	60.003	3722.401	350	-223.015732	16	-103	8091.03	1	1	1	0.000	0.000
10/12/09 03:11:44	59.999	3722.906	350	-223.015732	16	-103	8091.36	1	0	1	-0.004	0.004
10/12/09 03:11:46	59.998	3724.142	350	-223.015732	16	-103	8091.69	1	0	1	-0.001	0.001
10/12/09 03:11:48	60.001	3723.65	350	-223.015732	16	-103	8092.02	1	1	1	0.003	0.003
10/12/09 03:11:50	59.995	3723.201	350	-223.015732	16	-103	8092.35	1	0	1	-0.006	0.006
10/12/09 03:11:52	59.989	3723.639	350	-223.015732	16	-103	8092.68	1	0	1	-0.006	0.006
10/12/09 03:11:54	59.987	3723.881	350	-223.015732	16	-103	8093.01	1	0	1	-0.002	0.002
10/12/09 03:11:56	59.988	3724.654	350	-223.015732	16	-103	8093.34	1	0	1	0.001	0.001
10/12/09 03:11:58	59.988	3725.361	350	-223.015732	16	-103	8093.67	1	0	1	0.000	0.000
10/12/09 03:12:00	59.99	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.002	0.002
10/12/09 03:12:02	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.009	0.009
10/12/09 03:12:04	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:12:06	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:12:08	60.0005	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:12:10	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:12:12	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:14	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:16	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:18	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:20	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:22	59.994	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:24	59.993	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:26	59.992	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:28	59.991	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:30	59.99	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:12:32	59.991	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:34	59.992	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:36	59.993	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:38	59.994	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:40	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001

10/12/09 03:12:42	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:44	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:46	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:48	59.9965	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:50	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:12:52	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:54	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:56	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:12:58	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:13:00	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.002	0.002
10/12/09 03:13:02	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:04	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:06	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:08	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.003	0.003
10/12/09 03:13:10	60.007	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.003	0.003
10/12/09 03:13:12	60.009	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:14	60.011	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:16	60.0085	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.003	0.003
10/12/09 03:13:18	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:13:20	60.007	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:13:22	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:13:24	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:26	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:13:28	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:30	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:32	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:13:34	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:13:36	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:38	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:40	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:42	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:44	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:46	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:48	60.007	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:13:50	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:13:52	60.005	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:13:54	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:13:56	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:13:58	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:14:00	60.0025	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:14:02	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:14:04	59.9995	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:06	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:08	59.9965	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:10	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:12	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:14	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:16	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:14:18	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001

10/12/09 03:14:20	59.995	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:22	59.993	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:24	59.9925	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:26	59.992	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:28	59.9905	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:30	59.989	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:32	59.99	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:14:34	59.991	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:14:36	59.989	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:38	59.987	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:14:40	59.9875	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:42	59.988	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:44	59.988	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:46	59.988	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:48	59.987	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:50	59.986	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:14:52	59.9855	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:54	59.985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:56	59.9845	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:14:58	59.984	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:15:00	59.984	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:15:02	59.984	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:15:04	59.985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:06	59.986	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:08	59.987	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:10	59.988	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:12	59.992	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.004	0.004
10/12/09 03:15:14	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.004	0.004
10/12/09 03:15:16	59.9975	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:15:18	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.002	0.002
10/12/09 03:15:20	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:22	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:24	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:26	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:28	60.0055	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.003	0.003
10/12/09 03:15:30	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:32	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:34	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:15:36	60.0105	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:15:38	60.009	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:15:40	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:42	60.011	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:44	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:46	60.013	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:48	60.013	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:50	60.013	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:52	60.0145	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:54	60.016	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:15:56	60.0155	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000

10/12/09 03:15:58	60.015	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:15:59	60.014	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:01	60.013	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:03	60.012	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:05	60.011	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:07	60.0105	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:09	60.01	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:11	60.008	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:16:13	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:16:15	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:17	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:19	60.0045	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:21	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:16:23	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:25	60.003	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:27	60.0035	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:16:29	60.004	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:16:31	60.0025	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.001	0.001
10/12/09 03:16:33	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	-0.002	0.002
10/12/09 03:16:35	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:16:37	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.002	0.002
10/12/09 03:16:39	59.9965	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:16:41	59.996	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:43	59.9965	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:45	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:16:47	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:49	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:51	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:16:53	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:16:55	59.9985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:57	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:16:59	59.9985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:17:01	59.999	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.000	0.000
10/12/09 03:17:03	59.998	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:17:05	59.997	3724.944	350	-223.015732	16	-103	8094	1	0	1	-0.001	0.001
10/12/09 03:17:07	59.9985	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:17:09	60	3724.944	350	-223.015732	16	-103	8094	1	0	1	0.001	0.001
10/12/09 03:17:11	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:17:13	60.002	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.001	0.001
10/12/09 03:17:15	60.0015	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:17:17	60.001	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:17:19	60.0035	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.003	0.003
10/12/09 03:17:21	60.006	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.002	0.002
10/12/09 03:17:23	60.0055	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000
10/12/09 03:17:25	60.005	3724.944	350	-223.015732	16	-103	8094	1	1	1	0.000	0.000

Balancing Authority Name: MyBA

MyBA_091012_0227_FRS_Form2.9.xlsm

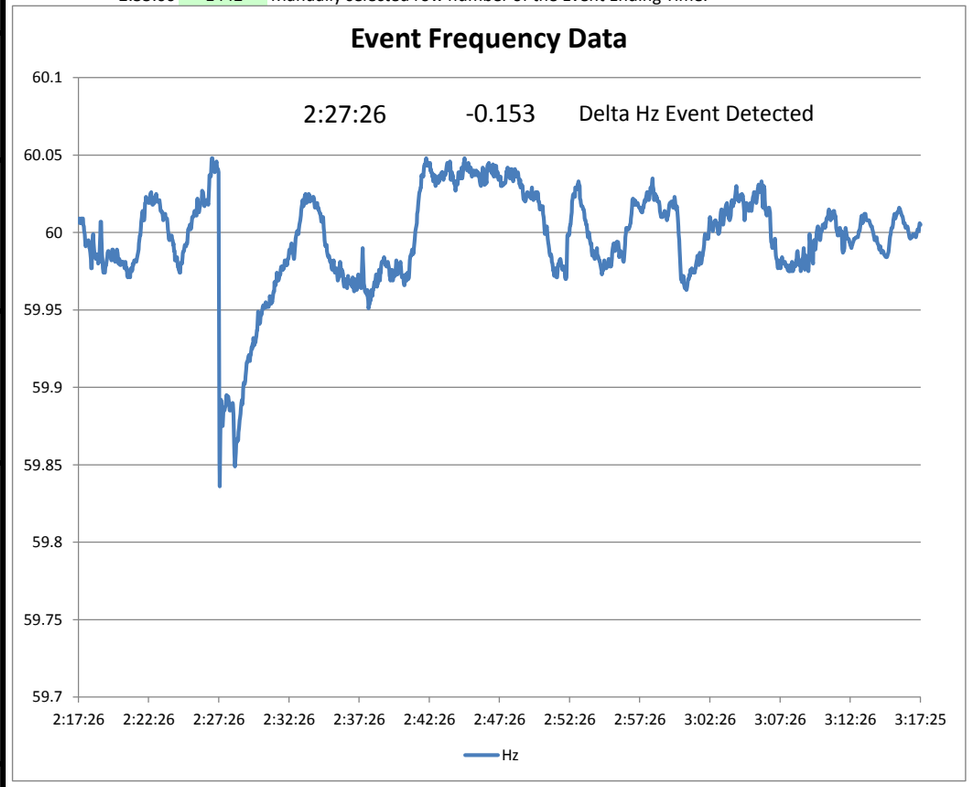
Interconnection Prevailing UFLS First Step Relay trip point 59.500 Hz

Interconnection High Relay trip point 60.500 Hz

Note: See "Instruction" tab for more detailed instructions.

	Auto	**Event Detection**
2:27:26	1245	Manually selected row number of the Event Starting Time.
2:33:00	1442	Manually selected row number of the Event Ending Time.

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



09/10/12 Date yymmdd

2:27 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_091012_0227_FRS_Form2.9.xlsm

Auto
Manual

Date:	Monday, October 12, 2009			Balancing Authority	MyBA		A Point
Time of T(0)	2:27:26			Grid Nominal Frequency	60.000 Hz		FPointA
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:00						A Value
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.042	Hz		Droop Setting	5.00%	3.00000 Hz	C Value
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.889	Hz		Deadband Setting	0.000 Hz		Delta FC
Pre to Post Perturbation Delta Frequency Actual	-0.153	Hz		Hz Span	3.00000 Hz		
Value A Pre-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.73	MW					
Value B Post-Perturbation Average Interchange MW [T(+20 to T(+52)]	3788.35	MW					
Pre to Post Perturbation Interchange Delta MW Actual	157.63	MW					
Initial Performance Ramp Magnitude Adjustment	-15.40	MW					
EPFR Pre-Perturbation Average	-43.39	MW					
EPFR Post-Perturbation Average	114.21	MW					
EPFR Delta	157.60	MW		TC (frequency response filter constant)	0.350	Time Constant for delayed delivery of PFR during Sustained Measure	

		Low Hz	Delta Hz Event
		3764.66	Actual Interchange MW Average during frequency recovery period
		3804.23	Target Interchange MW Average during frequency recovery period
EPFR = Expected Primary Frequency Response	EPFR(Final) 142.20 MW	3719.84	Interchange Average Ramp MW during frequency recovery period
MW Response in right direction for frequency delta	Yes	3640.68	Actual MW @ T(-4)
		103.04	Starting and Ending Difference in Interchange MW during frequency recovery per
		0:05:34	Event Duration (h:mm:ss)
		No	Target MW Average minus MW @ T(-4) less than zero
		163.55	Interchange Target Relative Average Change - MW (Low Frequency Event)
		123.97	Interchange Actual Relative Average Change - MW (Low Frequency Event)
		No	Interchange Actual Average minus MW @ T(-4) less than zero
		Yes	Interchange Average MW minus MW @ T(-4) greater than zero
		Yes	Interchange Target MW Average minus MW @ T(-4) greater than zero
		60.52	Interchange Target Relative Average Change - MW (High Frequency Event)
		20.94	Interchange Actual Relative Average Change - MW (High Frequency Event)
		Up	Ramp Direction during frequency recovery period
Initial Response P.U. Performance	1.109 P.U.	0.758	P.U. Sustained Response P.U. Performance

	T	Frequency Hz	Interchange MW	Value B 20 to 52 sec Average Frequency	Average MW	Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW
T-72 sec	2:26:14	60.027	3671.189			3090	-27.810	-9.734						
T-70 sec	2:26:16	60.026	3668.611			3090	-26.781	-15.700						
T-68 sec	2:26:18	60.026	3665.232			3090	-26.781	-19.578						

T-66 sec	2:26:20	60.022	3664.495			3090	-22.659	-20.657									
T-64 sec	2:26:22	60.019	3666.062			3090	-19.571	-20.277									
T-62 sec	2:26:24	60.017	3666.821			3090	-17.508	-19.308									
T-60 sec	2:26:26	60.019	3666.787			3090	-19.571	-19.400		-0.102	3666.787						
T-58 sec	2:26:28	60.02	3670.454			3090	-20.600	-19.820		-0.102	3666.265						
T-56 sec	2:26:30	60.019	3670.267			3090	-19.571	-19.733		-0.102	3666.251						
T-54 sec	2:26:32	60.021	3671.668			3090	-21.630	-20.397		-0.102	3665.485						
T-52 sec	2:26:34	60.021	3672.493			3090	-21.630	-20.828		-0.102	3664.952						
T-50 sec	2:26:36	60.021	3672.685			3090	-21.630	-21.109		-0.102	3664.570						
T-48 sec	2:26:38	60.019	3672.857			3090	-19.571	-20.571		-0.102	3665.006						
T-46 sec	2:26:40	60.018	3672.164			3090	-18.542	-19.861		-0.102	3665.615						
T-44 sec	2:26:42	60.022	3671.413			3090	-22.659	-20.840		-0.102	3664.533						
T-42 sec	2:26:44	60.031	3669.983			3090	-31.928	-24.721		-0.102	3660.551						
T-40 sec	2:26:46	60.037	3666.467			3090	-38.109	-29.407		-0.102	3655.763						
T-38 sec	2:26:48	60.037	3663.758			3090	-38.109	-32.452		-0.102	3652.616						
T-36 sec	2:26:50	60.036	3661.599			3090	-37.079	-34.072		-0.102	3650.895						
T-34 sec	2:26:52	60.037	3660.672			3090	-38.109	-35.485		-0.102	3649.380						
T-32 sec	2:26:54	60.046	3651.492			3090	-47.381	-39.649		-0.102	3645.114						
T-30 sec	2:26:56	60.048	3649.190			3090	-49.440	-43.076		-0.102	3641.585						
T-28 sec	2:26:58	60.048	3650.025			3090	-49.440	-45.303		-0.102	3639.256						
T-26 sec	2:27:00	60.043	3648.246			3090	-44.289	-44.948		-0.102	3639.509						
T-24 sec	2:27:02	60.041	3649.512			3090	-42.230	-43.997		-0.102	3640.359						
T-22 sec	2:27:04	60.041	3654.294			3090	-42.230	-43.379		-0.102	3640.875						
T-20 sec	2:27:06	60.041	3655.007			3090	-42.230	-42.977		-0.102	3641.176						
T-18 sec	2:27:08	60.039	3651.874			3090	-40.172	-41.995		-0.102	3642.056						
T-16 sec	2:27:10	60.041	3651.059	60.042	3645.73	3090	-42.230	-42.077		-0.102	3641.872						
T-14 sec	2:27:12	60.043	3649.187	60.042	3645.73	3090	-44.289	-42.852		-0.102	3640.996						
T-12 sec	2:27:14	60.045	3648.236	60.042	3645.73	3090	-46.348	-44.075		-0.102	3639.670						
T-10 sec	2:27:16	60.046	3645.387	60.042	3645.73	3090	-47.381	-45.232		-0.102	3638.411						
T-08 sec	2:27:18	60.041	3644.628	60.042	3645.73	3090	-42.230	-44.182		-0.102	3639.360						
T-06 sec	2:27:20	60.041	3645.446	60.042	3645.73	3090	-42.230	-43.499		-0.102	3639.942						
T-04 sec	2:27:22	60.041	3640.682	60.042	3645.73	3090	-42.230	-43.055		-0.102	3640.284						
T-02 sec	2:27:24	60.039	3641.191	60.042	3645.73	3090	-40.172	-42.046		-0.102	3641.191						
T+0 sec	2:27:26	59.978	3659.465			3090	22.659	-19.399		0.000	3663.838						
T+02 sec	2:27:28	59.852	3696.362			3090	152.439	40.744		0.617	3724.598	3677.914	3694.218	3668.635	3668.635		
T+04 sec	2:27:30	59.836	3734.904			3090	168.922	85.606		0.617	3770.077	3696.910	3719.504	3669.252	3668.944		
T+06 sec	2:27:32	59.869	3734.673			3090	134.931	102.870		0.617	3787.958	3706.351	3736.618	3669.869	3669.252		
T+08 sec	2:27:34	59.869	3734.673			3090	134.931	114.091		0.617	3799.796	3712.015	3749.253	3670.486	3669.561		
T+10 sec	2:27:36	59.892	3737.157			3090	111.242	113.094		0.617	3799.415	3716.206	3757.614	3671.103	3669.869		
T+12 sec	2:27:38	59.891	3761.250			3090	112.271	112.806		0.617	3799.745	3722.640	3763.632	3671.720	3670.178		
T+14 sec	2:27:40	59.88	3766.113			3090	123.599	116.583		0.617	3804.139	3728.074	3768.696	3672.337	3670.486		
T+16 sec	2:27:42	59.876	3766.194			3090	127.721	120.481		0.617	3808.654	3732.310	3773.136	3672.954	3670.795		
T+18 sec	2:27:44	59.875	3768.877			3090	128.750	123.375		0.617	3812.165	3735.967	3777.038	3673.571	3671.103		
T+20 sec	2:27:46	59.883	3769.925	59.889	3788.35	3090	120.511	122.373	3803.32	0.617	3811.779	3739.054	3780.197	3674.188	3671.412		
T+22 sec	2:27:48	59.887	3780.621	59.889	3788.35	3090	116.389	120.278	3803.32	0.617	3810.302	3742.518	3782.705	3674.805	3671.720		
T+24 sec	2:27:50	59.886	3781.592	59.889	3788.35	3090	117.418	119.277	3803.32	0.617	3809.918	3745.523	3784.799	3675.422	3672.029		

T+26 sec	2:27:52	59.885	3782.500	59.889	3788.35	3090	118.452	118.988	3803.32	0.617	3810.246	3748.165	3786.616	3676.039	3672.337
T+28 sec	2:27:54	59.887	3784.962	59.889	3788.35	3090	116.389	118.079	3803.32	0.617	3809.953	3750.618	3788.172	3676.656	3672.646
T+30 sec	2:27:56	59.888	3784.730	59.889	3788.35	3090	115.359	117.127	3803.32	0.617	3809.618	3752.750	3789.513	3677.273	3672.954
T+32 sec	2:27:58	59.89	3784.419	59.889	3788.35	3090	113.301	115.788	3803.32	0.617	3808.896	3754.613	3790.653	3677.890	3673.263
T+34 sec	2:28:00	59.895	3788.072	59.889	3788.35	3090	108.150	113.114	3803.32	0.617	3806.840	3756.471	3791.552	3678.507	3673.571
T+36 sec	2:28:02	59.894	3788.328	59.889	3788.35	3090	109.179	111.737	3803.32	0.617	3806.079	3758.148	3792.317	3679.124	3673.879
T+38 sec	2:28:04	59.893	3788.868	59.889	3788.35	3090	110.208	111.202	3803.32	0.617	3806.161	3759.684	3793.009	3679.741	3674.188
T+40 sec	2:28:06	59.894	3788.472	59.889	3788.35	3090	109.179	110.494	3803.32	0.617	3806.070	3761.055	3793.631	3680.358	3674.496
T+42 sec	2:28:08	59.894	3792.276	59.889	3788.35	3090	109.179	110.034	3803.32	0.617	3806.227	3762.474	3794.203	3680.975	3674.805
T+44 sec	2:28:10	59.891	3793.074	59.889	3788.35	3090	112.271	110.817	3803.32	0.617	3807.627	3763.805	3794.787	3681.592	3675.113
T+46 sec	2:28:12	59.89	3794.374	59.889	3788.35	3090	113.301	111.686	3803.32	0.617	3809.113	3765.078	3795.384	3682.209	3675.422
T+48 sec	2:28:14	59.885	3799.428	59.889	3788.35	3090	118.452	114.054	3803.32	0.617	3812.098	3766.452	3796.053	3682.826	3675.730
T+50 sec	2:28:16	59.885	3800.427	59.889	3788.35	3090	118.452	115.593	3803.32	0.617	3814.254	3767.759	3796.753	3683.443	3676.039
T+52 sec	2:28:18	59.888	3799.959	59.889	3788.35	3090	115.359	115.511	3803.32	0.617	3814.790	3768.952	3797.421	3684.060	3676.347
T+54 sec	2:28:20	59.887	3803.625			3090	116.389	115.819		0.617	3815.714	3770.190	3798.074	3684.677	3676.656
T+56 sec	2:28:22	59.888	3802.925			3090	115.359	115.658		0.617	3816.170	3771.319	3798.698	3685.293	3676.964
T+58 sec	2:28:24	59.888	3802.951			3090	115.359	115.553		0.617	3816.682	3772.373	3799.297	3685.910	3677.273
T+60 sec	2:28:26	59.89	3804.388			3090	113.301	114.765		0.617	3816.511	3773.406	3799.853	3686.527	3677.581
T+62 sec	2:28:28	59.889	3805.496			3090	114.330	114.613		0.617	3816.976	3774.409	3800.388	3687.144	3677.890
T+64 sec	2:28:30	59.882	3805.617			3090	121.540	117.037		0.617	3820.017	3775.354	3800.983	3687.761	3678.198
T+66 sec	2:28:32	59.873	3809.237			3090	130.809	121.857		0.617	3825.454	3776.351	3801.702	3688.378	3678.507
T+68 sec	2:28:34	59.857	3811.503			3090	147.292	130.759		0.617	3834.973	3777.355	3802.653	3688.995	3678.815
T+70 sec	2:28:36	59.849	3814.862			3090	155.531	139.429		0.617	3844.260	3778.397	3803.809	3689.612	3679.124
T+72 sec	2:28:38	59.852	3815.889			3090	152.439	143.983		0.617	3849.431	3779.410	3805.042	3690.229	3679.432
T+74 sec	2:28:40	59.858	3825.643			3090	146.258	144.779		0.617	3850.844	3780.627	3806.247	3690.846	3679.741
T+76 sec	2:28:42	59.863	3826.053			3090	141.111	143.495		0.617	3850.177	3781.792	3807.373	3691.463	3680.049
T+78 sec	2:28:44	59.866	3826.002			3090	138.019	141.579		0.617	3848.877	3782.897	3808.411	3692.080	3680.358
T+80 sec	2:28:46	59.865	3827.524			3090	139.048	140.693		0.617	3848.609	3783.986	3809.392	3692.697	3680.666
T+82 sec	2:28:48	59.867	3826.753			3090	136.989	139.397		0.617	3847.929	3785.004	3810.309	3693.314	3680.975
T+84 sec	2:28:50	59.866	3826.783			3090	138.019	138.914		0.617	3848.064	3785.975	3811.187	3693.931	3681.283
T+86 sec	2:28:52	59.871	3826.454			3090	132.872	136.799		0.617	3846.566	3786.895	3811.991	3694.548	3681.592
T+88 sec	2:28:54	59.874	3825.713			3090	129.779	134.342		0.617	3844.726	3787.758	3812.719	3695.165	3681.900
T+90 sec	2:28:56	59.879	3823.826			3090	124.628	130.943		0.617	3841.943	3788.542	3813.354	3695.782	3682.209
T+92 sec	2:28:58	59.88	3822.505			3090	123.599	128.372		0.617	3839.990	3789.265	3813.921	3696.399	3682.517
T+94 sec	2:29:00	59.883	3819.081			3090	120.511	125.621		0.617	3837.855	3789.886	3814.419	3697.016	3682.826
T+96 sec	2:29:02	59.886	3818.055			3090	117.418	122.750		0.617	3835.601	3790.461	3814.852	3697.633	3683.134
T+98 sec	2:29:04	59.89	3816.815			3090	113.301	119.443		0.617	3832.911	3790.988	3815.213	3698.250	3683.443
T+100 sec	2:29:06	59.892	3815.010			3090	111.242	116.572		0.617	3830.658	3791.459	3815.516	3698.867	3683.751
T+102 sec	2:29:08	59.889	3813.783			3090	114.330	115.788		0.617	3830.490	3791.888	3815.804	3699.484	3684.060
T+104 sec	2:29:10	59.893	3811.838			3090	110.208	113.835		0.617	3829.154	3792.265	3816.055	3700.101	3684.368
T+106 sec	2:29:12	59.899	3809.652			3090	104.032	110.404		0.617	3826.340	3792.587	3816.246	3700.718	3684.677
T+108 sec	2:29:14	59.903	3806.972			3090	99.910	106.731		0.617	3823.284	3792.848	3816.374	3701.335	3684.985
T+110 sec	2:29:16	59.902	3805.593			3090	100.940	104.704		0.617	3821.874	3793.076	3816.472	3701.952	3685.293
T+112 sec	2:29:18	59.902	3804.188			3090	100.940	103.386		0.617	3821.174	3793.271	3816.555	3702.569	3685.602
T+114 sec	2:29:20	59.904	3796.078			3090	98.881	101.809		0.617	3820.214	3793.319	3816.618	3703.186	3685.910

T+116 sec	2:29:22	59.907	3793.975	3090	95.788	99.702	0.617	3818.723	3793.330	3816.653	3703.803	3686.219
T+118 sec	2:29:24	59.911	3792.169	3090	91.671	96.891	0.617	3816.529	3793.311	3816.651	3704.420	3686.527
T+120 sec	2:29:26	59.916	3791.502	3090	86.520	93.261	0.617	3813.516	3793.281	3816.600	3705.037	3686.836
T+122 sec	2:29:28	59.916	3789.534	3090	86.520	90.902	0.617	3811.774	3793.221	3816.522	3705.654	3687.144
T+124 sec	2:29:30	59.917	3788.132	3090	85.490	89.008	0.617	3810.497	3793.140	3816.426	3706.271	3687.453
T+126 sec	2:29:32	59.918	3784.563	3090	84.461	87.416	0.617	3809.522	3793.006	3816.319	3706.888	3687.761
T+128 sec	2:29:34	59.92	3783.028	3090	82.402	85.661	0.617	3808.384	3792.853	3816.197	3707.504	3688.070
T+130 sec	2:29:36	59.921	3781.701	3090	81.369	84.159	0.617	3807.499	3792.684	3816.065	3708.121	3688.378
T+132 sec	2:29:38	59.92	3776.358	3090	82.402	83.544	0.617	3807.501	3792.440	3815.937	3708.738	3688.687
T+134 sec	2:29:40	59.917	3775.635	3090	85.490	84.225	0.617	3808.799	3792.193	3815.832	3709.355	3688.995
T+136 sec	2:29:42	59.92	3774.604	3090	82.402	83.587	0.617	3808.778	3791.938	3815.730	3709.972	3689.304
T+138 sec	2:29:44	59.921	3773.334	3090	81.369	82.811	0.617	3808.618	3791.672	3815.628	3710.589	3689.612
T+140 sec	2:29:46	59.923	3773.958	3090	79.310	81.585	0.617	3808.010	3791.423	3815.521	3711.206	3689.921
T+142 sec	2:29:48	59.926	3772.722	3090	76.221	79.708	0.617	3806.750	3791.163	3815.399	3711.823	3690.229
T+144 sec	2:29:50	59.925	3771.670	3090	77.251	78.848	0.617	3806.507	3790.896	3815.277	3712.440	3690.538
T+146 sec	2:29:52	59.928	3769.630	3090	74.159	77.207	0.617	3805.482	3790.608	3815.145	3713.057	3690.846
T+148 sec	2:29:54	59.927	3768.707	3090	75.192	76.501	0.617	3805.394	3790.316	3815.015	3713.674	3691.155
T+150 sec	2:29:56	59.932	3767.643	3090	70.041	74.240	0.617	3803.750	3790.018	3814.867	3714.291	3691.463
T+152 sec	2:29:58	59.927	3767.021	3090	75.192	74.573	0.617	3804.700	3789.719	3814.735	3714.908	3691.772
T+154 sec	2:30:00	59.928	3767.408	3090	74.159	74.428	0.617	3805.172	3789.433	3814.612	3715.525	3692.080
T+156 sec	2:30:02	59.931	3766.788	3090	71.070	73.253	0.617	3804.614	3789.147	3814.485	3716.142	3692.389
T+158 sec	2:30:04	59.929	3766.259	3090	73.129	73.210	0.617	3805.187	3788.861	3814.369	3716.759	3692.697
T+160 sec	2:30:06	59.931	3765.672	3090	71.070	72.461	0.617	3805.055	3788.574	3814.254	3717.376	3693.006
T+162 sec	2:30:08	59.933	3766.123	3090	69.011	71.254	0.617	3804.465	3788.301	3814.135	3717.993	3693.314
T+164 sec	2:30:10	59.937	3764.243	3090	64.890	69.026	0.617	3802.855	3788.011	3813.999	3718.610	3693.623
T+166 sec	2:30:12	59.937	3765.105	3090	64.890	67.578	0.617	3802.024	3787.738	3813.856	3719.227	3693.931
T+168 sec	2:30:14	59.945	3762.935	3090	56.650	63.754	0.617	3798.816	3787.446	3813.679	3719.844	3694.240
T+170 sec	2:30:16	59.949	3758.387	3090	52.529	59.825	0.617	3795.504	3787.108	3813.468	3720.461	3694.548
T+172 sec	2:30:18	59.947	3753.922	3090	54.591	57.993	0.617	3794.290	3786.727	3813.248	3721.078	3694.857
T+174 sec	2:30:20	59.942	3749.867	3090	59.739	58.604	0.617	3795.518	3786.308	3813.046	3721.695	3695.165
T+176 sec	2:30:22	59.941	3746.889	3090	60.768	59.361	0.617	3796.892	3785.865	3812.865	3722.312	3695.474
T+178 sec	2:30:24	59.942	3747.875	3090	59.739	59.493	0.617	3797.641	3785.443	3812.695	3722.929	3695.782
T+180 sec	2:30:26	59.945	3749.593	3090	56.650	58.498	0.617	3797.263	3785.049	3812.526	3723.546	3696.090
	2:30:28	59.948	3748.661	3090	53.558	56.769	0.617	3796.151	3784.654	3812.348	3724.163	3696.399
	2:30:30	59.947	3746.706	3090	54.591	56.007	0.617	3796.005	3784.245	3812.172	3724.780	3696.707
	2:30:32	59.949	3749.077	3090	52.529	54.790	0.617	3795.405	3783.871	3811.994	3725.397	3697.016
	2:30:34	59.951	3742.741	3090	50.470	53.278	0.617	3794.510	3783.438	3811.810	3726.014	3697.324
	2:30:36	59.952	3740.259	3090	49.440	51.935	0.617	3793.784	3782.989	3811.622	3726.631	3697.633
	2:30:38	59.953	3736.139	3090	48.411	50.701	0.617	3793.167	3782.506	3811.432	3727.248	3697.941
	2:30:40	59.951	3731.382	3090	50.470	50.620	0.617	3793.703	3781.984	3811.251	3727.865	3698.250
	2:30:42	59.952	3727.838	3090	49.440	50.207	0.617	3793.907	3781.437	3811.076	3728.482	3698.558
	2:30:44	59.952	3725.952	3090	49.440	49.939	0.617	3794.256	3780.882	3810.907	3729.099	3698.867
	2:30:46	59.952	3722.649	3090	49.440	49.764	0.617	3794.698	3780.306	3810.747	3729.715	3699.175
	2:30:48	59.955	3720.578	3090	46.348	48.569	0.617	3794.120	3779.720	3810.584	3730.332	3699.484
	2:30:50	59.952	3717.996	3090	49.440	48.874	0.617	3795.042	3779.121	3810.433	3730.949	3699.792
	2:30:52	59.954	3718.142	3090	47.381	48.351	0.617	3795.136	3778.534	3810.286	3731.566	3700.101

2:30:54	59.952	3715.753	3090	49.440	48.733	0.617	3796.135	3777.937	3810.151	3732.183	3700.409
2:30:56	59.953	3713.694	3090	48.411	48.620	0.617	3796.639	3777.330	3810.024	3732.800	3700.718
2:30:58	59.953	3713.484	3090	48.411	48.547	0.617	3797.183	3776.734	3809.904	3733.417	3701.026
2:31:00	59.952	3710.848	3090	49.440	48.860	0.617	3798.112	3776.124	3809.795	3734.034	3701.335
2:31:02	59.954	3710.810	3090	47.381	48.342	0.617	3798.212	3775.525	3809.688	3734.651	3701.643
2:31:04	59.954	3712.092	3090	47.381	48.006	0.617	3798.493	3774.948	3809.586	3735.268	3701.952
2:31:06	59.959	3714.623	3090	42.230	45.985	0.617	3797.088	3774.404	3809.474	3735.885	3702.260
2:31:08	59.957	3715.130	3090	44.289	45.391	0.617	3797.112	3773.875	3809.364	3736.502	3702.569
2:31:10	59.956	3716.168	3090	45.319	45.366	0.617	3797.704	3773.364	3809.260	3737.119	3702.877
2:31:12	59.954	3716.461	3090	47.381	46.071	0.617	3799.026	3772.865	3809.171	3737.736	3703.186
2:31:14	59.956	3716.980	3090	45.319	45.808	0.617	3799.380	3772.379	3809.085	3738.353	3703.494
2:31:16	59.955	3717.759	3090	46.348	45.997	0.617	3800.186	3771.908	3809.009	3738.970	3703.803
2:31:18	59.958	3722.361	3090	43.260	45.039	0.617	3799.845	3771.485	3808.930	3739.587	3704.111
2:31:20	59.961	3721.973	3090	40.172	43.335	0.617	3798.758	3771.065	3808.844	3740.204	3704.420
2:31:22	59.962	3722.658	3090	39.138	41.866	0.617	3797.906	3770.659	3808.752	3740.821	3704.728
2:31:24	59.962	3722.267	3090	39.138	40.911	0.617	3797.568	3770.255	3808.659	3741.438	3705.037
2:31:26	59.968	3722.278	3090	32.962	38.129	0.617	3795.403	3769.859	3808.549	3742.055	3705.345
2:31:28	59.966	3721.787	3090	35.020	37.041	0.617	3794.931	3769.465	3808.438	3742.672	3705.654
2:31:30	59.966	3723.091	3090	35.020	36.334	0.617	3794.841	3769.088	3808.327	3743.289	3705.962
2:31:32	59.968	3723.984	3090	32.962	35.153	0.617	3794.278	3768.724	3808.214	3743.906	3706.271
2:31:34	59.97	3723.435	3090	30.899	33.664	0.617	3793.406	3768.362	3808.096	3744.523	3706.579
2:31:36	59.974	3723.893	3090	26.781	31.255	0.617	3791.614	3768.009	3807.965	3745.140	3706.888
2:31:38	59.97	3725.403	3090	30.899	31.130	0.617	3792.106	3767.673	3807.840	3745.757	3707.196
2:31:40	59.969	3727.121	3090	31.928	31.410	0.617	3793.002	3767.357	3807.724	3746.374	3707.504
2:31:42	59.969	3728.053	3090	31.928	31.591	0.617	3793.800	3767.052	3807.616	3746.991	3707.813
2:31:44	59.97	3731.130	3090	30.899	31.349	0.617	3794.175	3766.776	3807.513	3747.608	3708.121
2:31:46	59.971	3732.530	3090	29.869	30.831	0.617	3794.274	3766.514	3807.412	3748.225	3708.430
2:31:48	59.973	3733.327	3090	27.810	29.774	0.617	3793.834	3766.263	3807.309	3748.842	3708.738
2:31:50	59.973	3736.535	3090	27.810	29.087	0.617	3793.764	3766.039	3807.207	3749.459	3709.047
2:31:52	59.976	3736.907	3090	24.718	27.558	0.617	3792.852	3765.822	3807.100	3750.076	3709.355
2:31:54	59.978	3736.822	3090	22.659	25.843	0.617	3791.754	3765.607	3806.986	3750.693	3709.664
2:31:56	59.978	3738.699	3090	22.659	24.729	0.617	3791.257	3765.409	3806.870	3751.310	3709.972
2:31:58	59.976	3739.944	3090	24.718	24.725	0.617	3791.870	3765.223	3806.761	3751.927	3710.281
2:32:00	59.978	3740.877	3090	22.659	24.002	0.617	3791.764	3765.047	3806.652	3752.543	3710.589
2:32:02	59.976	3741.794	3090	24.718	24.253	0.617	3792.632	3764.880	3806.551	3753.160	3710.898
2:32:04	59.978	3745.234	3090	22.659	23.695	0.617	3792.691	3764.739	3806.452	3753.777	3711.206
2:32:06	59.977	3746.608	3090	23.689	23.693	0.617	3793.306	3764.611	3806.359	3754.394	3711.515
2:32:08	59.98	3748.300	3090	20.600	22.611	0.617	3792.840	3764.496	3806.264	3755.011	3711.823
2:32:10	59.982	3750.716	3090	18.542	21.186	0.617	3792.033	3764.399	3806.164	3755.628	3712.132
2:32:12	59.981	3751.558	3090	19.571	20.621	0.617	3792.085	3764.310	3806.067	3756.245	3712.440
2:32:14	59.98	3752.748	3090	20.600	20.614	0.617	3792.695	3764.230	3805.974	3756.862	3712.749
2:32:16	59.979	3755.599	3090	21.630	20.969	0.617	3793.667	3764.171	3805.890	3757.479	3713.057
2:32:18	59.98	3756.407	3090	20.600	20.840	0.617	3794.155	3764.119	3805.810	3758.096	3713.366
2:32:20	59.979	3756.975	3090	21.630	21.117	0.617	3795.048	3764.070	3805.738	3758.713	3713.674
2:32:22	59.983	3760.405	3090	17.508	19.854	0.617	3794.402	3764.046	3805.662	3759.330	3713.983
2:32:24	59.983	3760.982	3090	17.508	19.033	0.617	3794.199	3764.025	3805.585	3759.947	3714.291

2:32:26	59.984	3761.407	3090	16.479	18.139	0.617	3793.922	3764.008	3805.508	3760.564	3714.600
2:32:28	59.988	3762.737	3090	12.361	16.117	0.617	3792.516	3764.000	3805.422	3761.181	3714.908
2:32:30	59.989	3763.212	3090	11.332	14.442	0.617	3791.459	3763.994	3805.331	3761.798	3715.217
2:32:32	59.987	3764.958	3090	13.391	14.074	0.617	3791.708	3764.001	3805.243	3762.415	3715.525
2:32:34	59.987	3766.085	3090	13.391	13.835	0.617	3792.085	3764.014	3805.158	3763.032	3715.834
2:32:36	59.991	3766.433	3090	9.269	12.237	0.617	3791.104	3764.030	3805.068	3763.649	3716.142
2:32:38	59.993	3767.251	3090	7.210	10.477	0.617	3789.962	3764.050	3804.971	3764.266	3716.451
2:32:40	59.992	3767.792	3090	8.239	9.694	0.617	3789.796	3764.074	3804.875	3764.883	3716.759
2:32:42	59.991	3768.634	3090	9.269	9.545	0.617	3790.264	3764.102	3804.784	3765.500	3717.068
2:32:44	59.989	3771.146	3090	11.332	10.170	0.617	3791.506	3764.146	3804.701	3766.117	3717.376
2:32:46	59.986	3772.445	3090	14.420	11.658	0.617	3793.610	3764.198	3804.632	3766.734	3717.685
2:32:48	59.983	3773.695	3090	17.508	13.705	0.617	3796.275	3764.257	3804.580	3767.351	3717.993
2:32:50	59.983	3774.668	3090	17.508	15.036	0.617	3798.223	3764.321	3804.541	3767.968	3718.302
2:32:52	59.988	3775.841	3090	12.361	14.100	0.617	3797.903	3764.391	3804.501	3768.585	3718.610
2:32:54	59.993	3775.363	3090	7.210	11.689	0.617	3796.109	3764.457	3804.450	3769.202	3718.918
2:32:56	59.996	3774.866	3090	4.122	9.040	0.617	3794.077	3764.520	3804.387	3769.819	3719.227
2:32:58	59.998	3775.492	3090	2.059	6.597	0.617	3792.251	3764.586	3804.315	3770.436	3719.535
2:33:00	59.999	3776.420	3090	1.029	4.648	0.617	3790.919	3764.656	3804.235	3771.053	3719.844
2:33:02	60.001	3778.554	3090	-1.029	2.661	0.000	3788.932	3764.738	3804.144	3771.053	3720.149
2:33:04	59.999	3779.692	3090	1.029	2.090	0.000	3788.361	3764.826	3804.051	3771.053	3720.450
2:33:06	59.999	3781.256	3090	1.029	1.719	0.000	3787.990	3764.922	3803.958	3771.053	3720.748
2:33:08	59.999	3780.595	3090	1.029	1.478	0.000	3787.749	3765.014	3803.863	3771.053	3721.042
2:33:10	60.002	3783.092	3090	-2.059	0.240	0.000	3786.511	3765.118	3803.763	3771.053	3721.333
2:33:12	60.005	3783.896	3090	-5.151	-1.647	0.000	3784.624	3765.226	3803.653	3771.053	3721.620
2:33:14	60.007	3784.421	3090	-7.210	-3.594	0.000	3782.677	3765.336	3803.533	3771.053	3721.904
2:33:16	60.008	3785.768	3090	-8.239	-5.220	0.000	3781.051	3765.452	3803.405	3771.053	3722.185
2:33:18	60.011	3785.463	3090	-11.332	-7.359	0.000	3778.912	3765.565	3803.267	3771.053	3722.463
2:33:20	60.014	3786.850	3090	-14.420	-9.830	0.000	3776.441	3765.684	3803.116	3771.053	3722.737
2:33:22	60.017	3786.304	3090	-17.508	-12.518	0.000	3773.754	3765.800	3802.952	3771.053	3723.009
2:33:24	60.019	3787.259	3090	-19.571	-14.986	0.000	3771.285	3765.919	3802.776	3771.053	3723.277
2:33:26	60.021	3787.516	3090	-21.630	-17.312	0.000	3768.960	3766.038	3802.590	3771.053	3723.542
2:33:28	60.017	3787.955	3090	-17.508	-17.380	0.000	3768.891	3766.159	3802.404	3771.053	3723.805
2:33:30	60.017	3788.030	3090	-17.508	-17.425	0.000	3768.846	3766.278	3802.221	3771.053	3724.064
2:33:32	60.019	3788.607	3090	-19.571	-18.176	0.000	3768.095	3766.399	3802.036	3771.053	3724.321
2:33:34	60.023	3789.216	3090	-23.689	-20.106	0.000	3766.166	3766.523	3801.842	3771.053	3724.575
2:33:36	60.024	3787.537	3090	-24.718	-21.720	0.000	3764.551	3766.636	3801.641	3771.053	3724.826
2:33:38	60.025	3785.842	3090	-25.752	-23.131	0.000	3763.140	3766.738	3801.435	3771.053	3725.075
2:33:40	60.021	3786.077	3090	-21.630	-22.606	0.000	3763.666	3766.841	3801.234	3771.053	3725.321
2:33:42	60.019	3787.930	3090	-19.571	-21.544	0.000	3764.728	3766.953	3801.041	3771.053	3725.564
2:33:44	60.024	3788.760	3090	-24.718	-22.655	0.000	3763.617	3767.068	3800.844	3771.053	3725.805
2:33:46	60.024	3786.875	3090	-24.718	-23.377	0.000	3762.894	3767.171	3800.646	3771.053	3726.043
2:33:48	60.021	3786.550	3090	-21.630	-22.765	0.000	3763.506	3767.272	3800.452	3771.053	3726.279
2:33:50	60.02	3787.358	3090	-20.600	-22.008	0.000	3764.264	3767.376	3800.265	3771.053	3726.512
2:33:52	60.025	3785.018	3090	-25.752	-23.318	0.000	3762.953	3767.467	3800.072	3771.053	3726.743
2:33:54	60.024	3785.614	3090	-24.718	-23.808	0.000	3762.463	3767.560	3799.879	3771.053	3726.971
2:33:56	60.02	3785.949	3090	-20.600	-22.685	0.000	3763.586	3767.654	3799.694	3771.053	3727.197

2:33:58	60.02	3785.804	3090	-20.600	-21.956	0.000	3764.316	3767.746	3799.515	3771.053	3727.421
2:34:00	60.022	3786.864	3090	-22.659	-22.202	0.000	3764.069	3767.843	3799.336	3771.053	3727.642
2:34:02	60.022	3786.877	3090	-22.659	-22.362	0.000	3763.909	3767.938	3799.158	3771.053	3727.861
2:34:04	60.022	3785.254	3090	-22.659	-22.466	0.000	3763.805	3768.025	3798.981	3771.053	3728.079
2:34:06	60.021	3785.726	3090	-21.630	-22.173	0.000	3764.098	3768.113	3798.807	3771.053	3728.293
2:34:08	60.021	3786.347	3090	-21.630	-21.983	0.000	3764.288	3768.203	3798.636	3771.053	3728.506
2:34:10	60.023	3785.821	3090	-23.689	-22.580	0.000	3763.691	3768.290	3798.464	3771.053	3728.717
2:34:12	60.023	3785.798	3090	-23.689	-22.968	0.000	3763.303	3768.376	3798.292	3771.053	3728.925
2:34:14	60.022	3786.284	3090	-22.659	-22.860	0.000	3763.411	3768.463	3798.122	3771.053	3729.132
2:34:16	60.019	3786.939	3090	-19.571	-21.709	0.000	3764.562	3768.553	3797.959	3771.053	3729.336
2:34:18	60.016	3787.627	3090	-16.479	-19.878	0.000	3766.393	3768.645	3797.806	3771.053	3729.539
2:34:20	60.018	3789.444	3090	-18.542	-19.411	0.000	3766.861	3768.745	3797.658	3771.053	3729.739
2:34:22	60.018	3789.673	3090	-18.542	-19.106	0.000	3767.165	3768.845	3797.512	3771.053	3729.938
2:34:24	60.018	3789.404	3090	-18.542	-18.909	0.000	3767.363	3768.943	3797.368	3771.053	3730.135
2:34:26	60.019	3788.479	3090	-19.571	-19.141	0.000	3767.131	3769.036	3797.225	3771.053	3730.330
2:34:28	60.019	3789.183	3090	-19.571	-19.291	0.000	3766.980	3769.131	3797.082	3771.053	3730.523
2:34:30	60.016	3789.369	3090	-16.479	-18.307	0.000	3767.964	3769.226	3796.945	3771.053	3730.714
2:34:32	60.015	3789.005	3090	-15.449	-17.307	0.000	3768.964	3769.318	3796.815	3771.053	3730.903
2:34:34	60.016	3788.665	3090	-16.479	-17.017	0.000	3769.254	3769.408	3796.686	3771.053	3731.091
2:34:36	60.014	3788.933	3090	-14.420	-16.108	0.000	3770.163	3769.499	3796.564	3771.053	3731.277
2:34:38	60.013	3790.667	3090	-13.391	-15.157	0.000	3771.114	3769.596	3796.446	3771.053	3731.461
2:34:40	60.012	3790.805	3090	-12.361	-14.178	0.000	3772.093	3769.693	3796.335	3771.053	3731.643
2:34:42	60.012	3790.411	3090	-12.361	-13.542	0.000	3772.729	3769.788	3796.227	3771.053	3731.824
2:34:44	60.01	3789.769	3090	-10.298	-12.407	0.000	3773.864	3769.879	3796.125	3771.053	3732.003
2:34:46	60.007	3791.540	3090	-7.210	-10.588	0.000	3775.683	3769.977	3796.033	3771.053	3732.181
2:34:48	60.007	3792.945	3090	-7.210	-9.406	0.000	3776.866	3770.080	3795.946	3771.053	3732.356
2:34:50	60.009	3791.027	3090	-9.269	-9.358	0.000	3776.913	3770.174	3795.861	3771.053	3732.531
2:34:52	60.009	3791.443	3090	-9.269	-9.327	0.000	3776.945	3770.269	3795.777	3771.053	3732.704
2:34:54	60.01	3791.426	3090	-10.298	-9.667	0.000	3776.605	3770.363	3795.691	3771.053	3732.875
2:34:56	60.003	3790.603	3090	-3.088	-7.364	0.000	3778.907	3770.453	3795.617	3771.053	3733.044
2:34:58	59.999	3790.457	3090	1.029	-4.426	0.000	3781.845	3770.541	3795.556	3771.053	3733.213
2:35:00	59.995	3790.216	3090	5.151	-1.074	0.000	3785.197	3770.627	3795.511	3771.053	3733.379
2:35:02	59.992	3789.585	3090	8.239	2.185	0.000	3788.457	3770.710	3795.480	3771.053	3733.545
2:35:04	59.991	3788.457	3090	9.269	4.665	0.000	3790.936	3770.787	3795.460	3771.053	3733.708
2:35:06	59.992	3788.105	3090	8.239	5.916	0.000	3792.187	3770.862	3795.446	3771.053	3733.871
2:35:08	59.992	3788.057	3090	8.239	6.729	0.000	3793.000	3770.936	3795.436	3771.053	3734.032
2:35:10	59.988	3788.189	3090	12.361	8.700	0.000	3794.972	3771.010	3795.434	3771.053	3734.191
2:35:12	59.986	3788.497	3090	14.420	10.702	0.000	3796.973	3771.085	3795.440	3771.053	3734.349
2:35:14	59.985	3788.540	3090	15.449	12.364	0.000	3798.635	3771.159	3795.454	3771.053	3734.506
2:35:16	59.984	3788.571	3090	16.479	13.804	0.000	3800.075	3771.233	3795.474	3771.053	3734.662
2:35:18	59.985	3788.101	3090	15.449	14.380	0.000	3800.651	3771.304	3795.495	3771.053	3734.816
2:35:20	59.984	3787.133	3090	16.479	15.114	0.000	3801.386	3771.371	3795.520	3771.053	3734.969
2:35:22	59.982	3786.453	3090	18.542	16.314	0.000	3802.585	3771.434	3795.550	3771.053	3735.120
2:35:24	59.981	3787.732	3090	19.571	17.454	0.000	3803.725	3771.502	3795.584	3771.053	3735.271
2:35:26	59.982	3788.813	3090	18.542	17.835	0.000	3804.106	3771.574	3795.619	3771.053	3735.420
2:35:28	59.979	3789.285	3090	21.630	19.163	0.000	3805.434	3771.647	3795.660	3771.053	3735.568

2:35:30	59.977	3788.256	3090	23.689	20.747	0.000	3807.018	3771.715	3795.706	3771.053	3735.714
2:35:32	59.976	3788.410	3090	24.718	22.137	0.000	3808.408	3771.784	3795.758	3771.053	3735.860
2:35:34	59.976	3790.467	3090	24.718	23.040	0.000	3809.312	3771.860	3795.814	3771.053	3736.004
2:35:36	59.979	3790.665	3090	21.630	22.547	0.000	3808.818	3771.936	3795.867	3771.053	3736.147
2:35:38	59.982	3790.420	3090	18.542	21.145	0.000	3807.416	3772.011	3795.913	3771.053	3736.289
2:35:40	59.978	3789.674	3090	22.659	21.675	0.000	3807.946	3772.082	3795.962	3771.053	3736.430
2:35:42	59.976	3789.267	3090	24.718	22.740	0.000	3809.011	3772.151	3796.014	3771.053	3736.569
2:35:44	59.974	3789.148	3090	26.781	24.154	0.000	3810.426	3772.219	3796.072	3771.053	3736.708
2:35:46	59.976	3790.430	3090	24.718	24.352	0.000	3810.623	3772.292	3796.130	3771.053	3736.845
2:35:48	59.977	3789.914	3090	23.689	24.120	0.000	3810.391	3772.362	3796.187	3771.053	3736.982
2:35:50	59.977	3786.243	3090	23.689	23.969	0.000	3810.240	3772.417	3796.242	3771.053	3737.117
2:35:52	59.975	3787.442	3090	25.752	24.593	0.000	3810.864	3772.476	3796.300	3771.053	3737.251
2:35:54	59.973	3788.963	3090	27.810	25.719	0.000	3811.990	3772.541	3796.361	3771.053	3737.384
2:35:56	59.969	3790.602	3090	31.928	27.892	0.000	3814.163	3772.611	3796.431	3771.053	3737.516
2:35:58	59.97	3791.877	3090	30.899	28.944	0.000	3815.216	3772.686	3796.504	3771.053	3737.647
2:36:00	59.971	3792.911	3090	29.869	29.268	0.000	3815.539	3772.764	3796.578	3771.053	3737.777
2:36:02	59.973	3792.311	3090	27.810	28.758	0.000	3815.029	3772.840	3796.649	3771.053	3737.906
2:36:04	59.978	3789.125	3090	22.659	26.623	0.000	3812.895	3772.903	3796.711	3771.053	3738.034
2:36:06	59.981	3788.080	3090	19.571	24.155	0.000	3810.426	3772.961	3796.764	3771.053	3738.161
2:36:08	59.978	3787.844	3090	22.659	23.632	0.000	3809.903	3773.018	3796.814	3771.053	3738.287
2:36:10	59.975	3787.135	3090	25.752	24.374	0.000	3810.645	3773.071	3796.867	3771.053	3738.412
2:36:12	59.972	3787.164	3090	28.840	25.937	0.000	3812.208	3773.125	3796.925	3771.053	3738.536
2:36:14	59.976	3786.996	3090	24.718	25.510	0.000	3811.782	3773.177	3796.981	3771.053	3738.659
2:36:16	59.975	3787.405	3090	25.752	25.595	0.000	3811.866	3773.230	3797.037	3771.053	3738.781
2:36:18	59.973	3786.487	3090	27.810	26.370	0.000	3812.641	3773.280	3797.095	3771.053	3738.903
2:36:20	59.969	3787.079	3090	31.928	28.316	0.000	3814.587	3773.332	3797.160	3771.053	3739.023
2:36:22	59.966	3789.214	3090	35.020	30.662	0.000	3816.933	3773.391	3797.234	3771.053	3739.143
2:36:24	59.965	3790.512	3090	36.050	32.548	0.000	3818.819	3773.454	3797.314	3771.053	3739.261
2:36:26	59.966	3791.221	3090	35.020	33.413	0.000	3819.685	3773.520	3797.396	3771.053	3739.379
2:36:28	59.969	3792.218	3090	31.928	32.893	0.000	3819.165	3773.588	3797.476	3771.053	3739.496
2:36:30	59.97	3790.959	3090	30.899	32.195	0.000	3818.467	3773.652	3797.553	3771.053	3739.612
2:36:32	59.968	3788.824	3090	32.962	32.464	0.000	3818.735	3773.707	3797.631	3771.053	3739.727
2:36:34	59.965	3789.026	3090	36.050	33.719	0.000	3819.990	3773.763	3797.712	3771.053	3739.841
2:36:36	59.964	3789.167	3090	37.079	34.895	0.000	3821.166	3773.819	3797.797	3771.053	3739.955
2:36:38	59.97	3787.394	3090	30.899	33.496	0.000	3819.767	3773.868	3797.876	3771.053	3740.068
2:36:40	59.972	3785.690	3090	28.840	31.867	0.000	3818.138	3773.910	3797.949	3771.053	3740.180
2:36:42	59.967	3784.831	3090	33.991	32.610	0.000	3818.881	3773.950	3798.024	3771.053	3740.291
2:36:44	59.967	3785.010	3090	33.991	33.093	0.000	3819.365	3773.989	3798.100	3771.053	3740.401
2:36:46	59.969	3784.320	3090	31.928	32.686	0.000	3818.957	3774.026	3798.175	3771.053	3740.510
2:36:48	59.968	3782.809	3090	32.962	32.782	0.000	3819.053	3774.057	3798.249	3771.053	3740.619
2:36:50	59.969	3782.110	3090	31.928	32.483	0.000	3818.754	3774.085	3798.321	3771.053	3740.727
2:36:52	59.967	3779.352	3090	33.991	33.011	0.000	3819.282	3774.104	3798.395	3771.053	3740.834
2:36:54	59.967	3779.056	3090	33.991	33.354	0.000	3819.625	3774.121	3798.469	3771.053	3740.940
2:36:56	59.966	3778.633	3090	35.020	33.937	0.000	3820.208	3774.137	3798.545	3771.053	3741.046
2:36:58	59.965	3779.212	3090	36.050	34.677	0.000	3820.948	3774.155	3798.623	3771.053	3741.151
2:37:00	59.971	3779.335	3090	29.869	32.994	0.000	3819.265	3774.173	3798.695	3771.053	3741.255

2:37:02	59.967	3776.429	3090	33.991	33.343	0.000	3819.614	3774.181	3798.768	3771.053	3741.359
2:37:04	59.965	3775.647	3090	36.050	34.290	0.000	3820.562	3774.186	3798.843	3771.053	3741.461
2:37:06	59.962	3776.597	3090	39.138	35.987	0.000	3822.258	3774.194	3798.923	3771.053	3741.563
2:37:08	59.964	3776.559	3090	37.079	36.369	0.000	3822.641	3774.202	3799.004	3771.053	3741.665
2:37:10	59.97	3776.023	3090	30.899	34.455	0.000	3820.726	3774.208	3799.079	3771.053	3741.765
2:37:12	59.967	3773.170	3090	33.991	34.292	0.000	3820.564	3774.205	3799.152	3771.053	3741.865
2:37:14	59.969	3771.730	3090	31.928	33.465	0.000	3819.736	3774.196	3799.221	3771.053	3741.965
2:37:16	59.968	3768.793	3090	32.962	33.289	0.000	3819.560	3774.178	3799.290	3771.053	3742.063
2:37:18	59.963	3768.503	3090	38.109	34.976	0.000	3821.247	3774.159	3799.364	3771.053	3742.161
2:37:20	59.965	3768.917	3090	36.050	35.352	0.000	3821.623	3774.141	3799.439	3771.053	3742.259
2:37:22	59.97	3767.366	3090	30.899	33.793	0.000	3820.064	3774.119	3799.508	3771.053	3742.355
2:37:24	59.973	3764.786	3090	27.810	31.699	0.000	3817.970	3774.088	3799.569	3771.053	3742.451
2:37:26	59.968	3760.295	3090	32.962	32.141	0.000	3818.412	3774.042	3799.632	3771.053	3742.546
2:37:28	59.965	3759.592	3090	36.050	33.509	0.000	3819.780	3773.994	3799.699	3771.053	3742.641
2:37:30	59.968	3761.894	3090	32.962	33.317	0.000	3819.589	3773.954	3799.764	3771.053	3742.735
2:37:32	59.969	3761.777	3090	31.928	32.831	0.000	3819.102	3773.914	3799.828	3771.053	3742.829
2:37:34	59.967	3760.583	3090	33.991	33.237	0.000	3819.508	3773.870	3799.892	3771.053	3742.922
2:37:36	59.964	3760.157	3090	37.079	34.582	0.000	3820.853	3773.825	3799.961	3771.053	3743.014
2:37:38	59.966	3759.781	3090	35.020	34.735	0.000	3821.007	3773.780	3800.029	3771.053	3743.105
2:37:40	59.979	3759.495	3090	21.630	30.148	0.000	3816.420	3773.733	3800.083	3771.053	3743.196
2:37:42	59.99	3757.773	3090	10.298	23.201	0.000	3809.472	3773.682	3800.113	3771.053	3743.287
2:37:44	59.983	3753.277	3090	17.508	21.208	0.000	3807.480	3773.616	3800.137	3771.053	3743.377
2:37:46	59.974	3753.087	3090	26.781	23.159	0.000	3809.430	3773.550	3800.167	3771.053	3743.466
2:37:48	59.967	3751.637	3090	33.991	26.950	0.000	3813.221	3773.480	3800.208	3771.053	3743.555
2:37:50	59.965	3753.751	3090	36.050	30.135	0.000	3816.406	3773.417	3800.260	3771.053	3743.643
2:37:52	59.962	3758.225	3090	39.138	33.286	0.000	3819.557	3773.368	3800.322	3771.053	3743.730
2:37:54	59.962	3759.250	3090	39.138	35.334	0.000	3821.606	3773.323	3800.389	3771.053	3743.817
2:37:56	59.961	3758.041	3090	40.172	37.027	0.000	3823.299	3773.275	3800.462	3771.053	3743.904
2:37:58	59.961	3760.965	3090	40.172	38.128	0.000	3824.399	3773.236	3800.537	3771.053	3743.990
2:38:00	59.96	3762.022	3090	41.201	39.203	0.000	3825.475	3773.201	3800.616	3771.053	3744.075
2:38:02	59.963	3763.822	3090	38.109	38.820	0.000	3825.091	3773.171	3800.692	3771.053	3744.160
2:38:04	59.959	3763.100	3090	42.230	40.014	0.000	3826.285	3773.140	3800.772	3771.053	3744.244
2:38:06	59.956	3763.858	3090	45.319	41.871	0.000	3828.142	3773.111	3800.858	3771.053	3744.328
2:38:08	59.951	3764.158	3090	50.470	44.880	0.000	3831.151	3773.083	3800.952	3771.053	3744.411
2:38:10	59.953	3766.127	3090	48.411	46.116	0.000	3832.387	3773.062	3801.049	3771.053	3744.494
2:38:12	59.954	3768.339	3090	47.381	46.559	0.000	3832.830	3773.047	3801.147	3771.053	3744.576
2:38:14	59.957	3767.972	3090	44.289	45.765	0.000	3832.036	3773.032	3801.242	3771.053	3744.658
2:38:16	59.956	3767.438	3090	45.319	45.608	0.000	3831.880	3773.014	3801.336	3771.053	3744.739
2:38:18	59.961	3765.606	3090	40.172	43.706	0.000	3829.977	3772.992	3801.424	3771.053	3744.820
2:38:20	59.963	3762.688	3090	38.109	41.747	0.000	3828.018	3772.960	3801.505	3771.053	3744.900
2:38:22	59.961	3761.570	3090	40.172	41.195	0.000	3827.467	3772.926	3801.584	3771.053	3744.980
2:38:24	59.959	3761.920	3090	42.230	41.558	0.000	3827.829	3772.892	3801.663	3771.053	3745.059
2:38:26	59.963	3759.627	3090	38.109	40.350	0.000	3826.622	3772.852	3801.739	3771.053	3745.138
2:38:28	59.963	3758.522	3090	38.109	39.566	0.000	3825.837	3772.809	3801.811	3771.053	3745.216
2:38:30	59.965	3752.429	3090	36.050	38.335	0.000	3824.606	3772.748	3801.880	3771.053	3745.294
2:38:32	59.968	3750.102	3090	32.962	36.454	0.000	3822.726	3772.680	3801.942	3771.053	3745.371

2:38:34	59.968	3753.830	3090	32.962	35.232	0.000	3821.503	3772.624	3802.001	3771.053	3745.448
2:38:36	59.968	3753.510	3090	32.962	34.437	0.000	3820.709	3772.567	3802.056	3771.053	3745.525
2:38:38	59.97	3753.523	3090	30.899	33.199	0.000	3819.470	3772.510	3802.108	3771.053	3745.601
2:38:40	59.973	3752.741	3090	27.810	31.313	0.000	3817.584	3772.452	3802.154	3771.053	3745.676
2:38:42	59.971	3753.178	3090	29.869	30.808	0.000	3817.079	3772.395	3802.198	3771.053	3745.751
2:38:44	59.965	3752.729	3090	36.050	32.642	0.000	3818.914	3772.337	3802.247	3771.053	3745.826
2:38:46	59.967	3753.291	3090	33.991	33.114	0.000	3819.386	3772.281	3802.297	3771.053	3745.900
2:38:48	59.967	3752.872	3090	33.991	33.421	0.000	3819.692	3772.225	3802.348	3771.053	3745.974
2:38:50	59.972	3752.359	3090	28.840	31.818	0.000	3818.089	3772.167	3802.394	3771.053	3746.047
2:38:52	59.976	3749.398	3090	24.718	29.333	0.000	3815.604	3772.101	3802.432	3771.053	3746.120
2:38:54	59.975	3747.476	3090	25.752	28.079	0.000	3814.351	3772.029	3802.467	3771.053	3746.193
2:38:56	59.969	3740.370	3090	31.928	29.426	0.000	3815.698	3771.938	3802.505	3771.053	3746.265
2:38:58	59.973	3741.285	3090	27.810	28.861	0.000	3815.132	3771.849	3802.541	3771.053	3746.336
2:39:00	59.974	3746.651	3090	26.781	28.133	0.000	3814.404	3771.777	3802.576	3771.053	3746.408
2:39:02	59.978	3745.738	3090	22.659	26.217	0.000	3812.488	3771.702	3802.604	3771.053	3746.478
2:39:04	59.981	3743.351	3090	19.571	23.891	0.000	3810.162	3771.621	3802.626	3771.053	3746.549
2:39:06	59.981	3741.618	3090	19.571	22.379	0.000	3808.650	3771.536	3802.643	3771.053	3746.619
2:39:08	59.981	3740.306	3090	19.571	21.396	0.000	3807.667	3771.447	3802.657	3771.053	3746.688
2:39:10	59.982	3738.484	3090	18.542	20.397	0.000	3806.668	3771.354	3802.668	3771.053	3746.758
2:39:12	59.982	3738.901	3090	18.542	19.748	0.000	3806.019	3771.262	3802.678	3771.053	3746.826
2:39:14	59.984	3737.404	3090	16.479	18.604	0.000	3804.875	3771.167	3802.684	3771.053	3746.895
2:39:16	59.982	3737.273	3090	18.542	18.582	0.000	3804.853	3771.071	3802.690	3771.053	3746.963
2:39:18	59.981	3736.308	3090	19.571	18.928	0.000	3805.199	3770.974	3802.697	3771.053	3747.031
2:39:20	59.979	3736.272	3090	21.630	19.874	0.000	3806.145	3770.877	3802.707	3771.053	3747.098
2:39:22	59.98	3735.448	3090	20.600	20.128	0.000	3806.399	3770.778	3802.717	3771.053	3747.165
2:39:24	59.978	3735.650	3090	22.659	21.014	0.000	3807.285	3770.681	3802.730	3771.053	3747.231
2:39:26	59.978	3737.541	3090	22.659	21.590	0.000	3807.861	3770.589	3802.744	3771.053	3747.297
2:39:28	59.98	3738.012	3090	20.600	21.244	0.000	3807.515	3770.499	3802.757	3771.053	3747.363
2:39:30	59.981	3736.748	3090	19.571	20.658	0.000	3806.929	3770.406	3802.769	3771.053	3747.429
2:39:32	59.98	3736.693	3090	20.600	20.638	0.000	3806.909	3770.313	3802.780	3771.053	3747.494
2:39:34	59.978	3736.067	3090	22.659	21.345	0.000	3807.617	3770.220	3802.793	3771.053	3747.559
2:39:36	59.976	3736.094	3090	24.718	22.526	0.000	3808.797	3770.126	3802.810	3771.053	3747.623
2:39:38	59.972	3736.575	3090	28.840	24.736	0.000	3811.007	3770.035	3802.832	3771.053	3747.687
2:39:40	59.971	3738.571	3090	29.869	26.533	0.000	3812.804	3769.949	3802.859	3771.053	3747.751
2:39:42	59.969	3738.875	3090	31.928	28.421	0.000	3814.692	3769.865	3802.891	3771.053	3747.814
2:39:44	59.974	3738.935	3090	26.781	27.847	0.000	3814.118	3769.782	3802.921	3771.053	3747.877
2:39:46	59.975	3738.647	3090	25.752	27.114	0.000	3813.385	3769.698	3802.950	3771.053	3747.940
2:39:48	59.976	3737.684	3090	24.718	26.275	0.000	3812.546	3769.612	3802.975	3771.053	3748.002
2:39:50	59.972	3737.382	3090	28.840	27.173	0.000	3813.444	3769.525	3803.004	3771.053	3748.064
2:39:52	59.969	3737.892	3090	31.928	28.837	0.000	3815.108	3769.441	3803.036	3771.053	3748.125
2:39:54	59.971	3740.017	3090	29.869	29.198	0.000	3815.470	3769.362	3803.069	3771.053	3748.187
2:39:56	59.974	3740.329	3090	26.781	28.352	0.000	3814.624	3769.285	3803.100	3771.053	3748.248
2:39:58	59.972	3742.053	3090	28.840	28.523	0.000	3814.794	3769.213	3803.131	3771.053	3748.308
2:40:00	59.972	3742.424	3090	28.840	28.634	0.000	3814.905	3769.142	3803.162	3771.053	3748.369
2:40:02	59.972	3742.524	3090	28.840	28.706	0.000	3814.977	3769.072	3803.193	3771.053	3748.429
2:40:04	59.977	3742.245	3090	23.689	26.950	0.000	3813.221	3769.001	3803.220	3771.053	3748.488

2:40:06	59.982	3741.723	3090	18.542	24.007	0.000	3810.278	3768.930	3803.238	3771.053	3748.548
2:40:08	59.978	3740.085	3090	22.659	23.535	0.000	3809.807	3768.854	3803.255	3771.053	3748.607
2:40:10	59.976	3740.629	3090	24.718	23.949	0.000	3810.221	3768.780	3803.273	3771.053	3748.666
2:40:12	59.973	3739.964	3090	27.810	25.301	0.000	3811.572	3768.705	3803.295	3771.053	3748.724
2:40:14	59.974	3740.775	3090	26.781	25.819	0.000	3812.090	3768.633	3803.318	3771.053	3748.782
2:40:16	59.977	3742.833	3090	23.689	25.073	0.000	3811.345	3768.566	3803.339	3771.053	3748.840
2:40:18	59.977	3741.268	3090	23.689	24.589	0.000	3810.860	3768.495	3803.358	3771.053	3748.898
2:40:20	59.978	3739.776	3090	22.659	23.913	0.000	3810.185	3768.421	3803.376	3771.053	3748.955
2:40:22	59.979	3738.966	3090	21.630	23.114	0.000	3809.385	3768.346	3803.391	3771.053	3749.012
2:40:24	59.981	3738.706	3090	19.571	21.874	0.000	3808.145	3768.270	3803.403	3771.053	3749.068
2:40:26	59.977	3738.879	3090	23.689	22.509	0.000	3808.780	3768.194	3803.417	3771.053	3749.125
2:40:28	59.974	3739.860	3090	26.781	24.004	0.000	3810.276	3768.122	3803.435	3771.053	3749.181
2:40:30	59.971	3738.102	3090	29.869	26.057	0.000	3812.328	3768.046	3803.457	3771.053	3749.237
2:40:32	59.971	3738.558	3090	29.869	27.391	0.000	3813.663	3767.971	3803.483	3771.053	3749.292
2:40:34	59.971	3743.507	3090	29.869	28.259	0.000	3814.530	3767.909	3803.511	3771.053	3749.347
2:40:36	59.972	3743.419	3090	28.840	28.462	0.000	3814.733	3767.847	3803.539	3771.053	3749.402
2:40:38	59.968	3745.251	3090	32.962	30.037	0.000	3816.308	3767.790	3803.572	3771.053	3749.457
2:40:40	59.966	3745.744	3090	35.020	31.781	0.000	3818.052	3767.735	3803.608	3771.053	3749.511
2:40:42	59.966	3747.340	3090	35.020	32.915	0.000	3819.186	3767.684	3803.647	3771.053	3749.566
2:40:44	59.971	3750.700	3090	29.869	31.849	0.000	3818.120	3767.641	3803.683	3771.053	3749.619
2:40:46	59.973	3749.750	3090	27.810	30.435	0.000	3816.707	3767.597	3803.716	3771.053	3749.673
2:40:48	59.972	3746.217	3090	28.840	29.877	0.000	3816.148	3767.543	3803.747	3771.053	3749.726
2:40:50	59.969	3744.683	3090	31.928	30.595	0.000	3816.866	3767.487	3803.779	3771.053	3749.779
2:40:52	59.972	3743.745	3090	28.840	29.981	0.000	3816.252	3767.428	3803.810	3771.053	3749.832
2:40:54	59.974	3743.149	3090	26.781	28.861	0.000	3815.132	3767.368	3803.838	3771.053	3749.885
2:40:56	59.973	3740.299	3090	27.810	28.493	0.000	3814.764	3767.301	3803.865	3771.053	3749.937
2:40:58	59.97	3739.453	3090	30.899	29.335	0.000	3815.606	3767.233	3803.894	3771.053	3749.989
2:41:00	59.971	3733.376	3090	29.869	29.522	0.000	3815.793	3767.150	3803.923	3771.053	3750.041
2:41:02	59.974	3731.830	3090	26.781	28.563	0.000	3814.834	3767.064	3803.950	3771.053	3750.092
2:41:04	59.982	3737.583	3090	18.542	25.055	0.000	3811.327	3766.992	3803.968	3771.053	3750.143
2:41:06	59.985	3736.229	3090	15.449	21.693	0.000	3807.964	3766.917	3803.977	3771.053	3750.194
2:41:08	59.985	3734.897	3090	15.449	19.508	0.000	3805.779	3766.839	3803.982	3771.053	3750.245
2:41:10	59.985	3733.434	3090	15.449	18.087	0.000	3804.359	3766.758	3803.983	3771.053	3750.296
2:41:12	59.987	3733.115	3090	13.391	16.443	0.000	3802.715	3766.677	3803.980	3771.053	3750.346
2:41:14	59.989	3730.510	3090	11.332	14.654	0.000	3800.926	3766.590	3803.972	3771.053	3750.396
2:41:16	59.989	3729.180	3090	11.332	13.491	0.000	3799.763	3766.500	3803.962	3771.053	3750.446
2:41:18	59.986	3725.459	3090	14.420	13.816	0.000	3800.088	3766.401	3803.953	3771.053	3750.495
2:41:20	59.987	3724.785	3090	13.391	13.667	0.000	3799.939	3766.302	3803.943	3771.053	3750.545
2:41:22	59.99	3720.108	3090	10.298	12.488	0.000	3798.759	3766.192	3803.931	3771.053	3750.594
2:41:24	59.994	3720.938	3090	6.181	10.280	0.000	3796.552	3766.084	3803.913	3771.053	3750.642
2:41:26	59.996	3725.661	3090	4.122	8.125	0.000	3794.396	3765.988	3803.891	3771.053	3750.691
2:41:28	60.001	3725.677	3090	-1.029	4.921	0.000	3791.192	3765.892	3803.861	3771.053	3750.739
2:41:30	60.003	3727.754	3090	-3.088	2.118	0.000	3788.389	3765.802	3803.824	3771.053	3750.788
2:41:32	60.004	3727.825	3090	-4.122	-0.066	0.000	3786.205	3765.713	3803.782	3771.053	3750.835
2:41:34	60.006	3727.683	3090	-6.181	-2.206	0.000	3784.065	3765.623	3803.736	3771.053	3750.883
2:41:36	60.012	3727.231	3090	-12.361	-5.760	0.000	3780.511	3765.533	3803.681	3771.053	3750.931

2:41:38	60.014	3725.012	3090	-14.420	-8.791	0.000	3777.480	3765.438	3803.620	3771.053	3750.978
2:41:40	60.019	3726.446	3090	-19.571	-12.564	0.000	3773.707	3765.347	3803.550	3771.053	3751.025
2:41:42	60.021	3726.016	3090	-21.630	-15.737	0.000	3770.534	3765.255	3803.473	3771.053	3751.072
2:41:44	60.025	3719.123	3090	-25.752	-19.242	0.000	3767.029	3765.148	3803.389	3771.053	3751.118
2:41:46	60.026	3716.375	3090	-26.781	-21.881	0.000	3764.390	3765.035	3803.298	3771.053	3751.165
2:41:48	60.027	3717.333	3090	-27.810	-23.956	0.000	3762.315	3764.924	3803.203	3771.053	3751.211
2:41:50	60.029	3717.560	3090	-29.869	-26.026	0.000	3760.245	3764.815	3803.104	3771.053	3751.257
2:41:52	60.029	3717.142	3090	-29.869	-27.371	0.000	3758.900	3764.705	3803.002	3771.053	3751.302
2:41:54	60.037	3715.166	3090	-38.109	-31.129	0.000	3755.142	3764.591	3802.892	3771.053	3751.348
2:41:56	60.036	3713.632	3090	-37.079	-33.212	0.000	3753.060	3764.474	3802.778	3771.053	3751.393
2:41:58	60.037	3710.283	3090	-38.109	-34.926	0.000	3751.346	3764.350	3802.660	3771.053	3751.438
2:42:00	60.037	3710.158	3090	-38.109	-36.040	0.000	3750.231	3764.227	3802.540	3771.053	3751.483
2:42:02	60.036	3699.356	3090	-37.079	-36.404	0.000	3749.868	3764.079	3802.420	3771.053	3751.528
2:42:04	60.041	3698.591	3090	-42.230	-38.443	0.000	3747.828	3763.930	3802.296	3771.053	3751.572
2:42:06	60.043	3704.591	3090	-44.289	-40.489	0.000	3745.782	3763.796	3802.168	3771.053	3751.617
2:42:08	60.044	3703.275	3090	-45.319	-42.179	0.000	3744.092	3763.659	3802.037	3771.053	3751.661
2:42:10	60.043	3702.482	3090	-44.289	-42.918	0.000	3743.353	3763.521	3801.904	3771.053	3751.705
2:42:12	60.046	3701.316	3090	-47.381	-44.480	0.000	3741.791	3763.380	3801.769	3771.053	3751.748
2:42:14	60.048	3700.826	3090	-49.440	-46.216	0.000	3740.055	3763.240	3801.630	3771.053	3751.792
2:42:16	60.046	3699.529	3090	-47.381	-46.624	0.000	3739.647	3763.097	3801.491	3771.053	3751.835
2:42:18	60.046	3699.726	3090	-47.381	-46.889	0.000	3739.382	3762.955	3801.352	3771.053	3751.878
2:42:20	60.043	3690.100	3090	-44.289	-45.979	0.000	3740.292	3762.793	3801.216	3771.053	3751.921
2:42:22	60.043	3690.477	3090	-44.289	-45.388	0.000	3740.884	3762.632	3801.082	3771.053	3751.964
2:42:24	60.044	3696.865	3090	-45.319	-45.364	0.000	3740.908	3762.485	3800.948	3771.053	3752.006
2:42:26	60.043	3696.877	3090	-44.289	-44.988	0.000	3741.284	3762.340	3800.816	3771.053	3752.049

2:27:24
60.03900146 2:27:24
60.04212523
59.83599854

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-"

Tir
Valı
Value

Value A Pı
Value B Pos

iod (indicates ramp direction during recovery period)

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

20 to 52

	T	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW		T
T-72 sec	2:26:14	60.027	3671.19	350.00	157.63	0.00	10.00	15.00	-103.00	7640.91	-27.810	T-72 sec	2:26:14
T-70 sec	2:26:16	60.026	3668.61	350.00	155.53	0.00	10.00	15.00	-103.00	7641.24	-26.781	T-70 sec	2:26:16
T-68 sec	2:26:18	60.026	3665.23	350.00	155.53	0.00	10.00	15.00	-103.00	7641.57	-26.781	T-68 sec	2:26:18

T-66 sec	2:26:20	60.022	3664.50	350.00	155.53	0.00	10.00	15.00	-103.00	7641.90	-22.659	T-66 sec	2:26:20
T-64 sec	2:26:22	60.019	3666.06	350.00	155.53	0.00	10.00	15.00	-103.00	7642.23	-19.571	T-64 sec	2:26:22
T-62 sec	2:26:24	60.017	3666.82	350.00	155.53	0.00	10.00	15.00	-103.00	7642.56	-17.508	T-62 sec	2:26:24
T-60 sec	2:26:26	60.019	3666.79	350.00	160.45	0.00	10.00	15.00	-103.00	7642.89	-19.571	T-60 sec	2:26:26
T-58 sec	2:26:28	60.020	3670.45	350.00	160.45	0.00	10.00	15.00	-103.00	7643.22	-20.600	T-58 sec	2:26:28
T-56 sec	2:26:30	60.019	3670.27	350.00	160.45	0.00	10.00	15.00	-103.00	7643.55	-19.571	T-56 sec	2:26:30
T-54 sec	2:26:32	60.021	3671.67	350.00	160.45	0.00	10.00	15.00	-103.00	7643.88	-21.630	T-54 sec	2:26:32
T-52 sec	2:26:34	60.021	3672.49	350.00	160.45	0.00	10.00	15.00	-103.00	7644.21	-21.630	T-52 sec	2:26:34
T-50 sec	2:26:36	60.021	3672.69	350.00	163.96	0.00	10.00	15.00	-103.00	7644.54	-21.630	T-50 sec	2:26:36
T-48 sec	2:26:38	60.019	3672.86	350.00	163.96	0.00	10.00	15.00	-103.00	7644.87	-19.571	T-48 sec	2:26:38
T-46 sec	2:26:40	60.018	3672.16	350.00	163.96	0.00	10.00	15.00	-103.00	7645.20	-18.542	T-46 sec	2:26:40
T-44 sec	2:26:42	60.022	3671.41	350.00	163.96	0.00	10.00	15.00	-103.00	7645.53	-22.659	T-44 sec	2:26:42
T-42 sec	2:26:44	60.031	3669.98	350.00	163.96	0.00	10.00	15.00	-103.00	7645.86	-31.928	T-42 sec	2:26:44
T-40 sec	2:26:46	60.037	3666.47	350.00	166.07	0.00	10.00	15.00	-103.00	7646.19	-38.109	T-40 sec	2:26:46
T-38 sec	2:26:48	60.037	3663.76	350.00	166.07	0.00	10.00	15.00	-103.00	7646.52	-38.109	T-38 sec	2:26:48
T-36 sec	2:26:50	60.036	3661.60	350.00	166.07	0.00	10.00	15.00	-103.00	7646.85	-37.079	T-36 sec	2:26:50
T-34 sec	2:26:52	60.037	3660.67	350.00	166.07	0.00	10.00	15.00	-103.00	7647.18	-38.109	T-34 sec	2:26:52
T-32 sec	2:26:54	60.046	3651.49	350.00	166.07	0.00	10.00	15.00	-103.00	7647.51	-47.381	T-32 sec	2:26:54
T-30 sec	2:26:56	60.048	3649.19	350.00	163.77	0.00	10.00	15.00	-103.00	7647.84	-49.440	T-30 sec	2:26:56
T-28 sec	2:26:58	60.048	3650.03	350.00	163.77	0.00	10.00	15.00	-103.00	7648.17	-49.440	T-28 sec	2:26:58
T-26 sec	2:27:00	60.043	3648.25	350.00	163.77	0.00	10.00	15.00	-103.00	7648.50	-44.289	T-26 sec	2:27:00
T-24 sec	2:27:02	60.041	3649.51	350.00	163.77	0.00	10.00	15.00	-103.00	7648.83	-42.230	T-24 sec	2:27:02
T-22 sec	2:27:04	60.041	3654.29	350.00	163.77	0.00	10.00	15.00	-103.00	7649.16	-42.230	T-22 sec	2:27:04
T-20 sec	2:27:06	60.041	3655.01	350.00	165.10	0.00	10.00	15.00	-103.00	7649.49	-42.230	T-20 sec	2:27:06
T-18 sec	2:27:08	60.039	3651.87	350.00	165.10	0.00	10.00	15.00	-103.00	7649.82	-40.172	T-18 sec	2:27:08
T-16 sec	2:27:10	60.041	3651.06	350.00	165.10	0.00	10.00	15.00	-103.00	7650.15	-42.230	T-16 sec	2:27:10
T-14 sec	2:27:12	60.043	3649.19	350.00	165.10	0.00	10.00	15.00	-103.00	7650.48	-44.289	T-14 sec	2:27:12
T-12 sec	2:27:14	60.045	3648.24	350.00	165.10	0.00	10.00	15.00	-103.00	7650.81	-46.348	T-12 sec	2:27:14
T-10 sec	2:27:16	60.046	3645.39	350.00	165.48	0.00	10.00	15.00	-103.00	7651.14	-47.381	T-10 sec	2:27:16
T-08 sec	2:27:18	60.041	3644.63	350.00	165.48	0.00	10.00	15.00	-103.00	7651.47	-42.230	T-08 sec	2:27:18
T-06 sec	2:27:20	60.041	3645.45	350.00	165.48	0.00	10.00	15.00	-103.00	7651.80	-42.230	T-06 sec	2:27:20
T-04 sec	2:27:22	60.041	3640.68	350.00	165.48	0.00	10.00	15.00	-103.00	7652.13	-42.230	T-04 sec	2:27:22
T-02 sec	2:27:24	60.039	3641.19	350.00	165.48	0.00	10.00	15.00	-103.00	7652.46	-40.172	T-02 sec	2:27:24
T+0 sec	2:27:26	59.978	3659.46	350.00	206.46	0.00	10.00	15.00	-103.00	7652.79	22.659	T+0 sec	2:27:26
T+02 sec	2:27:28	59.852	3696.36	350.00	206.46	0.00	10.00	0.00	-103.00	7616.00	152.439	T+02 sec	2:27:28
T+04 sec	2:27:30	59.836	3734.90	335.00	206.46	0.00	10.00	0.00	-103.00	7626.00	168.922	T+04 sec	2:27:30
T+06 sec	2:27:32	59.869	3734.67	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	134.931	T+06 sec	2:27:32
T+08 sec	2:27:34	59.869	3734.67	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	134.931	T+08 sec	2:27:34
T+10 sec	2:27:36	59.892	3737.16	335.00	206.46	0.00	10.00	0.00	-103.00	7632.00	111.242	T+10 sec	2:27:36
T+12 sec	2:27:38	59.891	3761.25	335.00	211.26	0.00	10.00	0.00	-103.00	7632.00	112.271	T+12 sec	2:27:38
T+14 sec	2:27:40	59.880	3766.11	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	123.599	T+14 sec	2:27:40
T+16 sec	2:27:42	59.876	3766.19	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	127.721	T+16 sec	2:27:42
T+18 sec	2:27:44	59.875	3768.88	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	128.750	T+18 sec	2:27:44
T+20 sec	2:27:46	59.883	3769.93	335.00	211.26	1.00	10.00	0.00	-103.00	7632.00	120.511	T+20 sec	2:27:46
T+22 sec	2:27:48	59.887	3780.62	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	116.389	T+22 sec	2:27:48
T+24 sec	2:27:50	59.886	3781.59	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	117.418	T+24 sec	2:27:50

T+26 sec	2:27:52	59.885	3782.50	335.00	214.35	1.00	10.00	0.00	-103.00	7632.00	118.452	T+26 sec	2:27:52
T+28 sec	2:27:54	59.887	3784.96	335.00	214.35	2.00	10.00	0.00	-103.00	7632.00	116.389	T+28 sec	2:27:54
T+30 sec	2:27:56	59.888	3784.73	335.00	214.35	3.00	10.00	0.00	-103.00	7632.00	115.359	T+30 sec	2:27:56
T+32 sec	2:27:58	59.890	3784.42	335.00	212.17	4.00	10.00	0.00	-103.00	7632.00	113.301	T+32 sec	2:27:58
T+34 sec	2:28:00	59.895	3788.07	335.00	212.17	5.00	10.00	0.00	-103.00	7632.00	108.150	T+34 sec	2:28:00
T+36 sec	2:28:02	59.894	3788.33	335.00	212.17	6.00	10.00	0.00	-103.00	7632.00	109.179	T+36 sec	2:28:02
T+38 sec	2:28:04	59.893	3788.87	335.00	212.17	7.00	10.00	0.00	-103.00	7632.00	110.208	T+38 sec	2:28:04
T+40 sec	2:28:06	59.894	3788.47	335.00	212.17	8.00	10.00	0.00	-103.00	7632.00	109.179	T+40 sec	2:28:06
T+42 sec	2:28:08	59.894	3792.28	335.00	215.60	9.00	10.00	0.00	-103.00	7632.00	109.179	T+42 sec	2:28:08
T+44 sec	2:28:10	59.891	3793.07	335.00	215.60	10.00	10.00	0.00	-103.00	7632.00	112.271	T+44 sec	2:28:10
T+46 sec	2:28:12	59.890	3794.37	335.00	215.60	11.00	10.00	0.00	-103.00	7632.00	113.301	T+46 sec	2:28:12
T+48 sec	2:28:14	59.885	3799.43	335.00	215.60	12.00	10.00	0.00	-103.00	7632.00	118.452	T+48 sec	2:28:14
T+50 sec	2:28:16	59.885	3800.43	335.00	215.60	13.00	10.00	0.00	-103.00	7632.00	118.452	T+50 sec	2:28:16
T+52 sec	2:28:18	59.888	3799.96	335.00	218.33	14.00	10.00	0.00	-103.00	7632.00	115.359	T+52 sec	2:28:18
T+54 sec	2:28:20	59.887	3803.63	335.00	218.33	15.00	10.00	0.00	-103.00	7632.00	116.389	T+54 sec	2:28:20
T+56 sec	2:28:22	59.888	3802.93	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	115.359	T+56 sec	2:28:22
T+58 sec	2:28:24	59.888	3802.95	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	115.359	T+58 sec	2:28:24
T+60 sec	2:28:26	59.890	3804.39	335.00	218.33	16.00	10.00	0.00	-103.00	7632.00	113.301	T+60 sec	2:28:26
T+62 sec	2:28:28	59.889	3805.50	335.00	217.38	16.00	10.00	0.00	-103.00	7632.00	114.330	T+62 sec	2:28:28
T+64 sec	2:28:30	59.882	3805.62	335.00	217.38	16.00	10.00	0.00	-103.00	7632.00	121.540	T+64 sec	2:28:30
T+66 sec	2:28:32	59.873	3809.24	335.00	217.38	16.00	10.00	0.00	-103.00	7631.00	130.809	T+66 sec	2:28:32
T+68 sec	2:28:34	59.857	3811.50	335.00	217.38	16.00	10.00	0.00	-103.00	7625.00	147.292	T+68 sec	2:28:34
T+70 sec	2:28:36	59.849	3814.86	335.00	217.38	16.00	10.00	0.00	-103.00	7623.00	155.531	T+70 sec	2:28:36
T+72 sec	2:28:38	59.852	3815.89	335.00	214.83	16.00	10.00	0.00	-103.00	7621.00	152.439	T+72 sec	2:28:38
T+74 sec	2:28:40	59.858	3825.64	335.00	214.83	16.00	10.00	0.00	-103.00	7623.00	146.258	T+74 sec	2:28:40
T+76 sec	2:28:42	59.863	3826.05	335.00	214.83	16.00	10.00	0.00	-103.00	7625.00	141.111	T+76 sec	2:28:42
T+78 sec	2:28:44	59.866	3826.00	335.00	214.83	16.00	10.00	0.00	-103.00	7627.00	138.019	T+78 sec	2:28:44
T+80 sec	2:28:46	59.865	3827.52	335.00	214.83	16.00	10.00	0.00	-103.00	7628.00	139.048	T+80 sec	2:28:46
T+82 sec	2:28:48	59.867	3826.75	335.00	227.66	16.00	10.00	0.00	-103.00	7628.00	136.989	T+82 sec	2:28:48
T+84 sec	2:28:50	59.866	3826.78	335.00	227.66	16.00	10.00	0.00	-103.00	7629.00	138.019	T+84 sec	2:28:50
T+86 sec	2:28:52	59.871	3826.45	335.00	227.66	16.00	10.00	0.00	-103.00	7630.00	132.872	T+86 sec	2:28:52
T+88 sec	2:28:54	59.874	3825.71	335.00	227.66	16.00	10.00	0.00	-103.00	7631.00	129.779	T+88 sec	2:28:54
T+90 sec	2:28:56	59.879	3823.83	335.00	227.66	16.00	10.00	0.00	-103.00	7635.00	124.628	T+90 sec	2:28:56
T+92 sec	2:28:58	59.880	3822.51	335.00	225.02	16.00	10.00	0.00	-103.00	7638.00	123.599	T+92 sec	2:28:58
T+94 sec	2:29:00	59.883	3819.08	335.00	225.02	16.00	10.00	0.00	-103.00	7639.00	120.511	T+94 sec	2:29:00
T+96 sec	2:29:02	59.886	3818.06	335.00	225.02	16.00	10.00	0.00	-103.00	7642.00	117.418	T+96 sec	2:29:02
T+98 sec	2:29:04	59.890	3816.81	335.00	225.02	16.00	10.00	0.00	-103.00	7644.00	113.301	T+98 sec	2:29:04
T+100 sec	2:29:06	59.892	3815.01	335.00	225.02	16.00	10.00	0.00	-103.00	7645.00	111.242	T+100 sec	2:29:06
T+102 sec	2:29:08	59.889	3813.78	335.00	228.37	16.00	10.00	0.00	-103.00	7647.00	114.330	T+102 sec	2:29:08
T+104 sec	2:29:10	59.893	3811.84	335.00	228.37	16.00	10.00	0.00	-103.00	7648.00	110.208	T+104 sec	2:29:10
T+106 sec	2:29:12	59.899	3809.65	335.00	228.37	16.00	10.00	0.00	-103.00	7649.00	104.032	T+106 sec	2:29:12
T+108 sec	2:29:14	59.903	3806.97	335.00	228.37	16.00	10.00	0.00	-103.00	7650.00	99.910	T+108 sec	2:29:14
T+110 sec	2:29:16	59.902	3805.59	335.00	228.37	16.00	10.00	0.00	-103.00	7651.00	100.940	T+110 sec	2:29:16
T+112 sec	2:29:18	59.902	3804.19	335.00	234.08	16.00	10.00	0.00	-103.00	7652.00	100.940	T+112 sec	2:29:18
T+114 sec	2:29:20	59.904	3796.08	335.00	234.08	16.00	10.00	0.00	-103.00	7653.00	98.881	T+114 sec	2:29:20

T+116 sec	2:29:22	59.907	3793.98	335.00	234.08	16.00	10.00	0.00	-103.00	7654.00	95.788	T+116 sec	2:29:22
T+118 sec	2:29:24	59.911	3792.17	335.00	234.08	16.00	10.00	0.00	-103.00	7655.00	91.671	T+118 sec	2:29:24
T+120 sec	2:29:26	59.916	3791.50	335.00	234.08	16.00	10.00	0.00	-103.00	7655.00	86.520	T+120 sec	2:29:26
T+122 sec	2:29:28	59.916	3789.53	335.00	228.80	16.00	10.00	0.00	-103.00	7656.00	86.520	T+122 sec	2:29:28
T+124 sec	2:29:30	59.917	3788.13	335.00	228.80	16.00	10.00	0.00	-103.00	7656.00	85.490	T+124 sec	2:29:30
T+126 sec	2:29:32	59.918	3784.56	335.00	228.80	16.00	10.00	0.00	-103.00	7657.00	84.461	T+126 sec	2:29:32
T+128 sec	2:29:34	59.920	3783.03	335.00	228.80	16.00	10.00	0.00	-103.00	7657.00	82.402	T+128 sec	2:29:34
T+130 sec	2:29:36	59.921	3781.70	335.00	228.80	16.00	10.00	0.00	-103.00	7658.00	81.369	T+130 sec	2:29:36
T+132 sec	2:29:38	59.920	3776.36	335.00	229.47	16.00	10.00	0.00	-103.00	7658.00	82.402	T+132 sec	2:29:38
T+134 sec	2:29:40	59.917	3775.64	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	85.490	T+134 sec	2:29:40
T+136 sec	2:29:42	59.920	3774.60	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	82.402	T+136 sec	2:29:42
T+138 sec	2:29:44	59.921	3773.33	335.00	229.47	16.00	10.00	0.00	-103.00	7659.00	81.369	T+138 sec	2:29:44
T+140 sec	2:29:46	59.923	3773.96	335.00	229.47	16.00	10.00	0.00	-103.00	7660.00	79.310	T+140 sec	2:29:46
T+142 sec	2:29:48	59.926	3772.72	335.00	228.98	16.00	10.00	0.00	-103.00	7660.00	76.221	T+142 sec	2:29:48
T+144 sec	2:29:50	59.925	3771.67	335.00	228.98	16.00	10.00	0.00	-103.00	7661.00	77.251	T+144 sec	2:29:50
T+146 sec	2:29:52	59.928	3769.63	335.00	228.98	16.00	10.00	0.00	-103.00	7661.00	74.159	T+146 sec	2:29:52
T+148 sec	2:29:54	59.927	3768.71	335.00	228.98	16.00	10.00	0.00	-103.00	7662.00	75.192	T+148 sec	2:29:54
T+150 sec	2:29:56	59.932	3767.64	335.00	228.98	16.00	10.00	0.00	-103.00	7662.00	70.041	T+150 sec	2:29:56
T+152 sec	2:29:58	59.927	3767.02	335.00	219.98	16.00	10.00	0.00	-103.00	7663.00	75.192	T+152 sec	2:29:58
T+154 sec	2:30:00	59.928	3767.41	335.00	219.98	16.00	10.00	0.00	-103.00	7663.00	74.159	T+154 sec	2:30:00
T+156 sec	2:30:02	59.931	3766.79	335.00	219.98	16.00	10.00	0.00	-103.00	7664.00	71.070	T+156 sec	2:30:02
T+158 sec	2:30:04	59.929	3766.26	335.00	219.98	16.00	10.00	0.00	-103.00	7664.00	73.129	T+158 sec	2:30:04
T+160 sec	2:30:06	59.931	3765.67	335.00	219.98	16.00	10.00	0.00	-103.00	7665.00	71.070	T+160 sec	2:30:06
T+162 sec	2:30:08	59.933	3766.12	335.00	229.09	16.00	10.00	0.00	-103.00	7666.00	69.011	T+162 sec	2:30:08
T+164 sec	2:30:10	59.937	3764.24	335.00	229.09	16.00	10.00	0.00	-103.00	7666.00	64.890	T+164 sec	2:30:10
T+166 sec	2:30:12	59.937	3765.10	335.00	229.09	16.00	10.00	0.00	-103.00	7667.00	64.890	T+166 sec	2:30:12
T+168 sec	2:30:14	59.945	3762.94	335.00	229.09	16.00	10.00	0.00	-103.00	7668.00	56.650	T+168 sec	2:30:14
T+170 sec	2:30:16	59.949	3758.39	335.00	229.09	16.00	10.00	0.00	-103.00	7668.00	52.529	T+170 sec	2:30:16
T+172 sec	2:30:18	59.947	3753.92	335.00	229.66	16.00	10.00	0.00	-103.00	7669.00	54.591	T+172 sec	2:30:18
T+174 sec	2:30:20	59.942	3749.87	335.00	229.66	16.00	10.00	0.00	-103.00	7669.00	59.739	T+174 sec	2:30:20
T+176 sec	2:30:22	59.941	3746.89	335.00	229.66	16.00	10.00	0.00	-103.00	7670.00	60.768	T+176 sec	2:30:22
T+178 sec	2:30:24	59.942	3747.88	335.00	229.66	16.00	10.00	0.00	-103.00	7670.00	59.739	T+178 sec	2:30:24
T+180 sec	2:30:26	59.945	3749.59	335.00	229.66	16.00	10.00	0.00	-103.00	7671.00	56.650	T+180 sec	2:30:26
	2:30:28	59.948	3748.66	335.00	229.23	16.00	10.00	0.00	-103.00	7671.00	53.558		
	2:30:30	59.947	3746.71	335.00	229.23	16.00	10.00	0.00	-103.00	7672.00	54.591		
	2:30:32	59.949	3749.08	335.00	229.23	16.00	10.00	0.00	-103.00	7673.00	52.529		
	2:30:34	59.951	3742.74	335.00	229.23	16.00	10.00	0.00	-103.00	7673.00	50.470		
	2:30:36	59.952	3740.26	350.00	229.23	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:38	59.953	3736.14	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	48.411		
	2:30:40	59.951	3731.38	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	50.470		
	2:30:42	59.952	3727.84	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:44	59.952	3725.95	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:46	59.952	3722.65	350.00	231.41	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:48	59.955	3720.58	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	46.348		
	2:30:50	59.952	3718.00	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	49.440		
	2:30:52	59.954	3718.14	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	47.381		

2:30:54	59.952	3715.75	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	49.440
2:30:56	59.953	3713.69	350.00	218.62	16.00	10.00	0.00	-103.00	7673.00	48.411
2:30:58	59.953	3713.48	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	48.411
2:31:00	59.952	3710.85	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	49.440
2:31:02	59.954	3710.81	350.00	213.54	16.00	10.00	0.00	-103.00	7673.00	47.381
2:31:04	59.954	3712.09	350.00	213.54	16.00	10.00	0.00	-103.00	7674.00	47.381
2:31:06	59.959	3714.62	350.00	213.54	16.00	10.00	0.00	-103.00	7675.00	42.230
2:31:08	59.957	3715.13	350.00	225.65	16.00	10.00	0.00	-103.00	7676.00	44.289
2:31:10	59.956	3716.17	350.00	225.65	16.00	10.00	0.00	-103.00	7677.00	45.319
2:31:12	59.954	3716.46	350.00	225.65	16.00	10.00	0.00	-103.00	7678.00	47.381
2:31:14	59.956	3716.98	350.00	225.65	16.00	10.00	0.00	-103.00	7679.00	45.319
2:31:16	59.955	3717.76	350.00	225.65	16.00	10.00	0.00	-103.00	7680.00	46.348
2:31:18	59.958	3722.36	350.00	212.57	16.00	10.00	0.00	-103.00	7681.00	43.260
2:31:20	59.961	3721.97	350.00	212.57	16.00	10.00	0.00	-103.00	7682.00	40.172
2:31:22	59.962	3722.66	350.00	212.57	16.00	10.00	0.00	-103.00	7684.00	39.138
2:31:24	59.962	3722.27	350.00	212.57	16.00	10.00	0.00	-103.00	7685.00	39.138
2:31:26	59.968	3722.28	350.00	212.57	16.00	10.00	0.00	-103.00	7687.00	32.962
2:31:28	59.966	3721.79	350.00	219.90	16.00	10.00	0.00	-103.00	7689.00	35.020
2:31:30	59.966	3723.09	350.00	219.90	16.00	10.00	0.00	-103.00	7690.00	35.020
2:31:32	59.968	3723.98	350.00	219.90	16.00	10.00	0.00	-103.00	7692.00	32.962
2:31:34	59.970	3723.43	350.00	219.90	16.00	10.00	0.00	-103.00	7692.00	30.899
2:31:36	59.974	3723.89	350.00	219.90	16.00	10.00	0.00	-103.00	7693.00	26.781
2:31:38	59.970	3725.40	350.00	231.18	16.00	10.00	0.00	-103.00	7693.00	30.899
2:31:40	59.969	3727.12	350.00	231.18	16.00	10.00	0.00	-103.00	7694.00	31.928
2:31:42	59.969	3728.05	350.00	231.18	16.00	10.00	0.00	-103.00	7694.00	31.928
2:31:44	59.970	3731.13	350.00	231.18	16.00	10.00	0.00	-103.00	7695.00	30.899
2:31:46	59.971	3732.53	350.00	231.18	16.00	10.00	0.00	-103.00	7695.00	29.869
2:31:48	59.973	3733.33	350.00	226.63	16.00	10.00	0.00	-103.00	7695.00	27.810
2:31:50	59.973	3736.54	350.00	226.63	16.00	10.00	0.00	-103.00	7696.00	27.810
2:31:52	59.976	3736.91	350.00	226.63	16.00	10.00	0.00	-103.00	7696.00	24.718
2:31:54	59.978	3736.82	350.00	226.63	16.00	10.00	0.00	-103.00	7697.00	22.659
2:31:56	59.978	3738.70	350.00	226.63	16.00	10.00	0.00	-103.00	7697.00	22.659
2:31:58	59.976	3739.94	350.00	227.26	16.00	10.00	0.00	-103.00	7697.00	24.718
2:32:00	59.978	3740.88	350.00	227.26	16.00	10.00	0.00	-103.00	7698.00	22.659
2:32:02	59.976	3741.79	350.00	227.26	16.00	10.00	0.00	-103.00	7698.00	24.718
2:32:04	59.978	3745.23	350.00	227.26	16.00	10.00	0.00	-103.00	7698.33	22.659
2:32:06	59.977	3746.61	350.00	227.26	16.00	10.00	0.00	-103.00	7698.66	23.689
2:32:08	59.980	3748.30	350.00	229.29	16.00	10.00	0.00	-103.00	7698.99	20.600
2:32:10	59.982	3750.72	350.00	229.29	16.00	10.00	0.00	-103.00	7699.32	18.542
2:32:12	59.981	3751.56	350.00	229.29	16.00	10.00	0.00	-103.00	7699.65	19.571
2:32:14	59.980	3752.75	350.00	229.29	16.00	10.00	0.00	-103.00	7699.98	20.600
2:32:16	59.979	3755.60	350.00	229.29	16.00	10.00	0.00	-103.00	7700.31	21.630
2:32:18	59.980	3756.41	350.00	221.46	16.00	10.00	0.00	-103.00	7700.64	20.600
2:32:20	59.979	3756.98	350.00	221.46	16.00	10.00	0.00	-103.00	7700.97	21.630
2:32:22	59.983	3760.41	350.00	221.46	16.00	10.00	0.00	-103.00	7701.30	17.508
2:32:24	59.983	3760.98	350.00	221.46	16.00	10.00	0.00	-103.00	7701.63	17.508

2:32:26	59.984	3761.41	350.00	221.46	16.00	10.00	0.00	-103.00	7701.96	16.479
2:32:28	59.988	3762.74	350.00	241.27	16.00	10.00	0.00	-103.00	7702.29	12.361
2:32:30	59.989	3763.21	350.00	241.27	16.00	10.00	0.00	-103.00	7702.62	11.332
2:32:32	59.987	3764.96	350.00	241.27	16.00	10.00	0.00	-103.00	7702.95	13.391
2:32:34	59.987	3766.09	350.00	241.27	16.00	10.00	0.00	-103.00	7703.28	13.391
2:32:36	59.991	3766.43	350.00	241.27	16.00	10.00	0.00	-103.00	7703.61	9.269
2:32:38	59.993	3767.25	350.00	243.07	16.00	10.00	0.00	-103.00	7703.94	7.210
2:32:40	59.992	3767.79	350.00	243.07	16.00	10.00	0.00	-103.00	7704.27	8.239
2:32:42	59.991	3768.63	350.00	243.07	16.00	10.00	0.00	-103.00	7704.60	9.269
2:32:44	59.989	3771.15	350.00	243.07	16.00	10.00	0.00	-103.00	7704.93	11.332
2:32:46	59.986	3772.44	350.00	243.07	16.00	10.00	0.00	-103.00	7705.26	14.420
2:32:48	59.983	3773.69	350.00	241.67	16.00	10.00	0.00	-103.00	7705.59	17.508
2:32:50	59.983	3774.67	350.00	241.67	16.00	10.00	0.00	-103.00	7705.92	17.508
2:32:52	59.988	3775.84	350.00	241.67	16.00	10.00	0.00	-103.00	7706.25	12.361
2:32:54	59.993	3775.36	350.00	241.67	16.00	10.00	0.00	-103.00	7706.58	7.210
2:32:56	59.996	3774.87	350.00	241.67	16.00	10.00	0.00	-103.00	7706.91	4.122
2:32:58	59.998	3775.49	350.00	228.15	16.00	10.00	0.00	-103.00	7707.24	2.059
2:33:00	59.999	3776.42	350.00	228.15	16.00	10.00	0.00	-103.00	7707.57	1.029
2:33:02	60.001	3778.55	350.00	228.15	16.00	10.00	0.00	-103.00	7707.90	-1.029
2:33:04	59.999	3779.69	350.00	228.15	16.00	10.00	0.00	-103.00	7708.23	1.029
2:33:06	59.999	3781.26	350.00	228.15	16.00	10.00	0.00	-103.00	7708.56	1.029
2:33:08	59.999	3780.59	350.00	235.13	16.00	10.00	0.00	-103.00	7708.89	1.029
2:33:10	60.002	3783.09	350.00	235.13	16.00	10.00	0.00	-103.00	7709.22	-2.059
2:33:12	60.005	3783.90	350.00	235.13	16.00	10.00	0.00	-103.00	7709.55	-5.151
2:33:14	60.007	3784.42	350.00	235.13	16.00	10.00	0.00	-103.00	7709.88	-7.210
2:33:16	60.008	3785.77	350.00	235.13	16.00	10.00	0.00	-103.00	7710.21	-8.239
2:33:18	60.011	3785.46	350.00	246.43	16.00	10.00	0.00	-103.00	7710.54	-11.332
2:33:20	60.014	3786.85	350.00	246.43	16.00	10.00	0.00	-103.00	7710.87	-14.420
2:33:22	60.017	3786.30	350.00	246.43	16.00	10.00	0.00	-103.00	7711.20	-17.508
2:33:24	60.019	3787.26	350.00	246.43	16.00	10.00	0.00	-103.00	7711.53	-19.571
2:33:26	60.021	3787.52	350.00	246.43	16.00	10.00	0.00	-103.00	7711.86	-21.630
2:33:28	60.017	3787.96	350.00	236.55	16.00	10.00	0.00	-103.00	7712.19	-17.508
2:33:30	60.017	3788.03	350.00	236.55	16.00	10.00	0.00	-103.00	7712.52	-17.508
2:33:32	60.019	3788.61	350.00	236.55	16.00	10.00	0.00	-103.00	7712.85	-19.571
2:33:34	60.023	3789.22	350.00	236.55	16.00	10.00	0.00	-103.00	7713.18	-23.689
2:33:36	60.024	3787.54	350.00	236.55	16.00	10.00	0.00	-103.00	7713.51	-24.718
2:33:38	60.025	3785.84	350.00	230.30	16.00	10.00	0.00	-103.00	7713.84	-25.752
2:33:40	60.021	3786.08	350.00	230.30	16.00	10.00	0.00	-103.00	7714.17	-21.630
2:33:42	60.019	3787.93	350.00	230.30	16.00	10.00	0.00	-103.00	7714.50	-19.571
2:33:44	60.024	3788.76	350.00	230.30	16.00	10.00	0.00	-103.00	7714.83	-24.718
2:33:46	60.024	3786.87	350.00	230.30	16.00	10.00	0.00	-103.00	7715.16	-24.718
2:33:48	60.021	3786.55	350.00	231.18	16.00	10.00	0.00	-103.00	7715.49	-21.630
2:33:50	60.020	3787.36	350.00	231.18	16.00	10.00	0.00	-103.00	7715.82	-20.600
2:33:52	60.025	3785.02	350.00	231.18	16.00	10.00	0.00	-103.00	7716.15	-25.752
2:33:54	60.024	3785.61	350.00	231.18	16.00	10.00	0.00	-103.00	7716.48	-24.718
2:33:56	60.020	3785.95	350.00	231.18	16.00	10.00	0.00	-103.00	7716.81	-20.600

2:33:58	60.020	3785.80	350.00	225.62	16.00	10.00	0.00	-103.00	7717.14	-20.600
2:34:00	60.022	3786.86	350.00	225.62	16.00	10.00	0.00	-103.00	7717.47	-22.659
2:34:02	60.022	3786.88	350.00	225.62	16.00	10.00	0.00	-103.00	7717.80	-22.659
2:34:04	60.022	3785.25	350.00	225.62	16.00	10.00	0.00	-103.00	7718.13	-22.659
2:34:06	60.021	3785.73	350.00	225.62	16.00	10.00	0.00	-103.00	7718.46	-21.630
2:34:08	60.021	3786.35	350.00	230.73	16.00	10.00	0.00	-103.00	7718.79	-21.630
2:34:10	60.023	3785.82	350.00	230.73	16.00	10.00	0.00	-103.00	7719.12	-23.689
2:34:12	60.023	3785.80	350.00	230.73	16.00	10.00	0.00	-103.00	7719.45	-23.689
2:34:14	60.022	3786.28	350.00	230.73	16.00	10.00	0.00	-103.00	7719.78	-22.659
2:34:16	60.019	3786.94	350.00	230.73	16.00	10.00	0.00	-103.00	7720.11	-19.571
2:34:18	60.016	3787.63	350.00	234.85	16.00	10.00	0.00	-103.00	7720.44	-16.479
2:34:20	60.018	3789.44	350.00	234.85	16.00	10.00	0.00	-103.00	7720.77	-18.542
2:34:22	60.018	3789.67	350.00	234.85	16.00	10.00	0.00	-103.00	7721.10	-18.542
2:34:24	60.018	3789.40	350.00	234.85	16.00	10.00	0.00	-103.00	7721.43	-18.542
2:34:26	60.019	3788.48	350.00	234.85	16.00	10.00	0.00	-103.00	7721.76	-19.571
2:34:28	60.019	3789.18	350.00	228.96	16.00	10.00	0.00	-103.00	7722.09	-19.571
2:34:30	60.016	3789.37	350.00	228.96	16.00	10.00	0.00	-103.00	7722.42	-16.479
2:34:32	60.015	3789.00	350.00	228.96	16.00	10.00	0.00	-103.00	7722.75	-15.449
2:34:34	60.016	3788.66	350.00	228.96	16.00	10.00	0.00	-103.00	7723.08	-16.479
2:34:36	60.014	3788.93	350.00	228.96	16.00	10.00	0.00	-103.00	7723.41	-14.420
2:34:38	60.013	3790.67	350.00	231.18	16.00	10.00	0.00	-103.00	7723.74	-13.391
2:34:40	60.012	3790.81	350.00	231.18	16.00	10.00	0.00	-103.00	7724.07	-12.361
2:34:42	60.012	3790.41	350.00	231.18	16.00	10.00	0.00	-103.00	7724.40	-12.361
2:34:44	60.010	3789.77	350.00	231.18	16.00	10.00	0.00	-103.00	7724.73	-10.298
2:34:46	60.007	3791.54	350.00	231.18	16.00	10.00	0.00	-103.00	7725.06	-7.210
2:34:48	60.007	3792.95	350.00	236.49	16.00	10.00	0.00	-103.00	7725.39	-7.210
2:34:50	60.009	3791.03	350.00	236.49	16.00	10.00	0.00	-103.00	7725.72	-9.269
2:34:52	60.009	3791.44	350.00	236.49	16.00	10.00	0.00	-103.00	7726.05	-9.269
2:34:54	60.010	3791.43	350.00	236.49	16.00	10.00	0.00	-103.00	7726.38	-10.298
2:34:56	60.003	3790.60	350.00	236.49	16.00	10.00	0.00	-103.00	7726.71	-3.088
2:34:58	59.999	3790.46	350.00	245.04	16.00	10.00	0.00	-103.00	7727.04	1.029
2:35:00	59.995	3790.22	350.00	245.04	16.00	10.00	0.00	-103.00	7727.37	5.151
2:35:02	59.992	3789.58	350.00	245.04	16.00	10.00	0.00	-103.00	7727.70	8.239
2:35:04	59.991	3788.46	350.00	245.04	16.00	10.00	0.00	-103.00	7728.03	9.269
2:35:06	59.992	3788.10	350.00	245.04	16.00	10.00	0.00	-103.00	7728.36	8.239
2:35:08	59.992	3788.06	350.00	223.61	16.00	10.00	0.00	-103.00	7728.69	8.239
2:35:10	59.988	3788.19	350.00	223.61	16.00	10.00	0.00	-103.00	7729.02	12.361
2:35:12	59.986	3788.50	350.00	223.61	16.00	10.00	0.00	-103.00	7729.35	14.420
2:35:14	59.985	3788.54	350.00	223.61	16.00	10.00	0.00	-103.00	7729.68	15.449
2:35:16	59.984	3788.57	350.00	223.61	16.00	10.00	0.00	-103.00	7730.01	16.479
2:35:18	59.985	3788.10	350.00	231.12	16.00	10.00	0.00	-103.00	7730.34	15.449
2:35:20	59.984	3787.13	350.00	231.12	16.00	10.00	0.00	-103.00	7730.67	16.479
2:35:22	59.982	3786.45	350.00	231.12	16.00	10.00	0.00	-103.00	7731.00	18.542
2:35:24	59.981	3787.73	350.00	231.12	16.00	10.00	0.00	-103.00	7731.33	19.571
2:35:26	59.982	3788.81	350.00	231.12	16.00	10.00	0.00	-103.00	7731.66	18.542
2:35:28	59.979	3789.29	350.00	237.21	16.00	10.00	0.00	-103.00	7731.99	21.630

2:35:30	59.977	3788.26	350.00	237.21	16.00	10.00	0.00	-103.00	7732.32	23.689
2:35:32	59.976	3788.41	350.00	237.21	16.00	10.00	0.00	-103.00	7732.65	24.718
2:35:34	59.976	3790.47	350.00	237.21	16.00	10.00	0.00	-103.00	7732.98	24.718
2:35:36	59.979	3790.66	350.00	237.21	16.00	10.00	0.00	-103.00	7733.31	21.630
2:35:38	59.982	3790.42	350.00	240.52	16.00	10.00	0.00	-103.00	7733.64	18.542
2:35:40	59.978	3789.67	350.00	240.52	16.00	10.00	0.00	-103.00	7733.97	22.659
2:35:42	59.976	3789.27	350.00	240.52	16.00	10.00	0.00	-103.00	7734.30	24.718
2:35:44	59.974	3789.15	350.00	240.52	16.00	10.00	0.00	-103.00	7734.63	26.781
2:35:46	59.976	3790.43	350.00	240.52	16.00	10.00	0.00	-103.00	7734.96	24.718
2:35:48	59.977	3789.91	350.00	237.57	16.00	10.00	0.00	-103.00	7735.29	23.689
2:35:50	59.977	3786.24	350.00	237.57	16.00	10.00	0.00	-103.00	7735.62	23.689
2:35:52	59.975	3787.44	350.00	237.57	16.00	10.00	0.00	-103.00	7735.95	25.752
2:35:54	59.973	3788.96	350.00	237.57	16.00	10.00	0.00	-103.00	7736.28	27.810
2:35:56	59.969	3790.60	350.00	237.57	16.00	10.00	0.00	-103.00	7736.61	31.928
2:35:58	59.970	3791.88	350.00	231.58	16.00	10.00	0.00	-103.00	7736.94	30.899
2:36:00	59.971	3792.91	350.00	231.58	16.00	10.00	0.00	-103.00	7737.27	29.869
2:36:02	59.973	3792.31	350.00	231.58	16.00	10.00	0.00	-103.00	7737.60	27.810
2:36:04	59.978	3789.13	350.00	231.58	16.00	10.00	0.00	-103.00	7737.93	22.659
2:36:06	59.981	3788.08	350.00	231.58	16.00	10.00	0.00	-103.00	7738.26	19.571
2:36:08	59.978	3787.84	350.00	235.85	16.00	10.00	0.00	-103.00	7738.59	22.659
2:36:10	59.975	3787.14	350.00	235.85	16.00	10.00	0.00	-103.00	7738.92	25.752
2:36:12	59.972	3787.16	350.00	235.85	16.00	10.00	0.00	-103.00	7739.25	28.840
2:36:14	59.976	3787.00	350.00	235.85	16.00	10.00	0.00	-103.00	7739.58	24.718
2:36:16	59.975	3787.40	350.00	235.85	16.00	10.00	0.00	-103.00	7739.91	25.752
2:36:18	59.973	3786.49	350.00	233.56	16.00	10.00	0.00	-103.00	7740.24	27.810
2:36:20	59.969	3787.08	350.00	233.56	16.00	10.00	0.00	-103.00	7740.57	31.928
2:36:22	59.966	3789.21	350.00	233.56	16.00	10.00	0.00	-103.00	7740.90	35.020
2:36:24	59.965	3790.51	350.00	233.56	16.00	10.00	0.00	-103.00	7741.23	36.050
2:36:26	59.966	3791.22	350.00	233.56	16.00	10.00	0.00	-103.00	7741.56	35.020
2:36:28	59.969	3792.22	350.00	219.01	16.00	10.00	0.00	-103.00	7741.89	31.928
2:36:30	59.970	3790.96	350.00	219.01	16.00	10.00	0.00	-103.00	7742.22	30.899
2:36:32	59.968	3788.82	350.00	219.01	16.00	10.00	0.00	-103.00	7742.55	32.962
2:36:34	59.965	3789.03	350.00	219.01	16.00	10.00	0.00	-103.00	7742.88	36.050
2:36:36	59.964	3789.17	350.00	219.01	16.00	10.00	0.00	-103.00	7743.21	37.079
2:36:38	59.970	3787.39	350.00	205.34	16.00	10.00	0.00	-103.00	7743.54	30.899
2:36:40	59.972	3785.69	350.00	205.34	16.00	10.00	0.00	-103.00	7743.87	28.840
2:36:42	59.967	3784.83	350.00	205.34	16.00	10.00	0.00	-103.00	7744.20	33.991
2:36:44	59.967	3785.01	350.00	205.34	16.00	10.00	0.00	-103.00	7744.53	33.991
2:36:46	59.969	3784.32	350.00	205.34	16.00	10.00	0.00	-103.00	7744.86	31.928
2:36:48	59.968	3782.81	350.00	236.29	16.00	10.00	0.00	-103.00	7745.19	32.962
2:36:50	59.969	3782.11	350.00	236.29	16.00	10.00	0.00	-103.00	7745.52	31.928
2:36:52	59.967	3779.35	350.00	236.29	16.00	10.00	0.00	-103.00	7745.85	33.991
2:36:54	59.967	3779.06	350.00	236.29	16.00	10.00	0.00	-103.00	7746.18	33.991
2:36:56	59.966	3778.63	350.00	236.29	16.00	10.00	0.00	-103.00	7746.51	35.020
2:36:58	59.965	3779.21	350.00	223.02	16.00	10.00	0.00	-103.00	7746.84	36.050
2:37:00	59.971	3779.33	350.00	223.02	16.00	10.00	0.00	-103.00	7747.17	29.869

2:37:02	59.967	3776.43	350.00	223.02	16.00	10.00	0.00	-103.00	7747.50	33.991
2:37:04	59.965	3775.65	350.00	223.02	16.00	10.00	0.00	-103.00	7747.83	36.050
2:37:06	59.962	3776.60	350.00	223.02	16.00	10.00	0.00	-103.00	7748.16	39.138
2:37:08	59.964	3776.56	350.00	223.02	16.00	10.00	0.00	-103.00	7748.49	37.079
2:37:10	59.970	3776.02	350.00	223.02	16.00	10.00	0.00	-103.00	7748.82	30.899
2:37:12	59.967	3773.17	350.00	223.02	16.00	10.00	0.00	-103.00	7749.15	33.991
2:37:14	59.969	3771.73	350.00	223.02	16.00	10.00	0.00	-103.00	7749.48	31.928
2:37:16	59.968	3768.79	350.00	223.02	16.00	10.00	0.00	-103.00	7749.81	32.962
2:37:18	59.963	3768.50	350.00	223.02	16.00	10.00	0.00	-103.00	7750.14	38.109
2:37:20	59.965	3768.92	350.00	223.02	16.00	10.00	0.00	-103.00	7750.47	36.050
2:37:22	59.970	3767.37	350.00	223.02	16.00	10.00	0.00	-103.00	7750.80	30.899
2:37:24	59.973	3764.79	350.00	223.02	16.00	10.00	0.00	-103.00	7751.13	27.810
2:37:26	59.968	3760.30	350.00	223.02	16.00	10.00	0.00	-103.00	7751.46	32.962
2:37:28	59.965	3759.59	350.00	223.02	16.00	10.00	0.00	-103.00	7751.79	36.050
2:37:30	59.968	3761.89	350.00	223.02	16.00	10.00	0.00	-103.00	7752.12	32.962
2:37:32	59.969	3761.78	350.00	223.02	16.00	10.00	0.00	-103.00	7752.45	31.928
2:37:34	59.967	3760.58	350.00	223.02	16.00	10.00	0.00	-103.00	7752.78	33.991
2:37:36	59.964	3760.16	350.00	223.02	16.00	10.00	0.00	-103.00	7753.11	37.079
2:37:38	59.966	3759.78	350.00	223.02	16.00	10.00	0.00	-103.00	7753.44	35.020
2:37:40	59.979	3759.49	350.00	223.02	16.00	10.00	0.00	-103.00	7753.77	21.630
2:37:42	59.990	3757.77	350.00	223.02	16.00	10.00	0.00	-103.00	7754.10	10.298
2:37:44	59.983	3753.28	350.00	223.02	16.00	10.00	0.00	-103.00	7754.43	17.508
2:37:46	59.974	3753.09	350.00	223.02	16.00	10.00	0.00	-103.00	7754.76	26.781
2:37:48	59.967	3751.64	350.00	223.02	16.00	10.00	0.00	-103.00	7755.09	33.991
2:37:50	59.965	3753.75	350.00	223.02	16.00	10.00	0.00	-103.00	7755.42	36.050
2:37:52	59.962	3758.22	350.00	223.02	16.00	10.00	0.00	-103.00	7755.75	39.138
2:37:54	59.962	3759.25	350.00	223.02	16.00	10.00	0.00	-103.00	7756.08	39.138
2:37:56	59.961	3758.04	350.00	223.02	16.00	10.00	0.00	-103.00	7756.41	40.172
2:37:58	59.961	3760.96	350.00	223.02	16.00	10.00	0.00	-103.00	7756.74	40.172
2:38:00	59.960	3762.02	350.00	223.02	16.00	10.00	0.00	-103.00	7757.07	41.201
2:38:02	59.963	3763.82	350.00	223.02	16.00	10.00	0.00	-103.00	7757.40	38.109
2:38:04	59.959	3763.10	350.00	223.02	16.00	10.00	0.00	-103.00	7757.73	42.230
2:38:06	59.956	3763.86	350.00	223.02	16.00	10.00	0.00	-103.00	7758.06	45.319
2:38:08	59.951	3764.16	350.00	223.02	16.00	10.00	0.00	-103.00	7758.39	50.470
2:38:10	59.953	3766.13	350.00	223.02	16.00	10.00	0.00	-103.00	7758.72	48.411
2:38:12	59.954	3768.34	350.00	223.02	16.00	10.00	0.00	-103.00	7759.05	47.381
2:38:14	59.957	3767.97	350.00	223.02	16.00	10.00	0.00	-103.00	7759.38	44.289
2:38:16	59.956	3767.44	350.00	223.02	16.00	10.00	0.00	-103.00	7759.71	45.319
2:38:18	59.961	3765.61	350.00	223.02	16.00	10.00	0.00	-103.00	7760.04	40.172
2:38:20	59.963	3762.69	350.00	223.02	16.00	10.00	0.00	-103.00	7760.37	38.109
2:38:22	59.961	3761.57	350.00	223.02	16.00	10.00	0.00	-103.00	7760.70	40.172
2:38:24	59.959	3761.92	350.00	223.02	16.00	10.00	0.00	-103.00	7761.03	42.230
2:38:26	59.963	3759.63	350.00	223.02	16.00	10.00	0.00	-103.00	7761.36	38.109
2:38:28	59.963	3758.52	350.00	223.02	16.00	10.00	0.00	-103.00	7761.69	38.109
2:38:30	59.965	3752.43	350.00	223.02	16.00	10.00	0.00	-103.00	7762.02	36.050
2:38:32	59.968	3750.10	350.00	223.02	16.00	10.00	0.00	-103.00	7762.35	32.962

2:38:34	59.968	3753.83	350.00	223.02	16.00	10.00	0.00	-103.00	7762.68	32.962
2:38:36	59.968	3753.51	350.00	223.02	16.00	10.00	0.00	-103.00	7763.01	32.962
2:38:38	59.970	3753.52	350.00	223.02	16.00	10.00	0.00	-103.00	7763.34	30.899
2:38:40	59.973	3752.74	350.00	223.02	16.00	10.00	0.00	-103.00	7763.67	27.810
2:38:42	59.971	3753.18	350.00	223.02	16.00	10.00	0.00	-103.00	7764.00	29.869
2:38:44	59.965	3752.73	350.00	223.02	16.00	10.00	0.00	-103.00	7764.33	36.050
2:38:46	59.967	3753.29	350.00	223.02	16.00	10.00	0.00	-103.00	7764.66	33.991
2:38:48	59.967	3752.87	350.00	223.02	16.00	10.00	0.00	-103.00	7764.99	33.991
2:38:50	59.972	3752.36	350.00	223.02	16.00	10.00	0.00	-103.00	7765.32	28.840
2:38:52	59.976	3749.40	350.00	223.02	16.00	10.00	0.00	-103.00	7765.65	24.718
2:38:54	59.975	3747.48	350.00	223.02	16.00	10.00	0.00	-103.00	7765.98	25.752
2:38:56	59.969	3740.37	350.00	223.02	16.00	10.00	0.00	-103.00	7766.31	31.928
2:38:58	59.973	3741.29	350.00	223.02	16.00	10.00	0.00	-103.00	7766.64	27.810
2:39:00	59.974	3746.65	350.00	223.02	16.00	10.00	0.00	-103.00	7766.97	26.781
2:39:02	59.978	3745.74	350.00	223.02	16.00	10.00	0.00	-103.00	7767.30	22.659
2:39:04	59.981	3743.35	350.00	223.02	16.00	10.00	0.00	-103.00	7767.63	19.571
2:39:06	59.981	3741.62	350.00	223.02	16.00	10.00	0.00	-103.00	7767.96	19.571
2:39:08	59.981	3740.31	350.00	223.02	16.00	10.00	0.00	-103.00	7768.29	19.571
2:39:10	59.982	3738.48	350.00	223.02	16.00	10.00	0.00	-103.00	7768.62	18.542
2:39:12	59.982	3738.90	350.00	223.02	16.00	10.00	0.00	-103.00	7768.95	18.542
2:39:14	59.984	3737.40	350.00	223.02	16.00	10.00	0.00	-103.00	7769.28	16.479
2:39:16	59.982	3737.27	350.00	223.02	16.00	10.00	0.00	-103.00	7769.61	18.542
2:39:18	59.981	3736.31	350.00	223.02	16.00	10.00	0.00	-103.00	7769.94	19.571
2:39:20	59.979	3736.27	350.00	223.02	16.00	10.00	0.00	-103.00	7770.27	21.630
2:39:22	59.980	3735.45	350.00	223.02	16.00	10.00	0.00	-103.00	7770.60	20.600
2:39:24	59.978	3735.65	350.00	223.02	16.00	10.00	0.00	-103.00	7770.93	22.659
2:39:26	59.978	3737.54	350.00	223.02	16.00	10.00	0.00	-103.00	7771.26	22.659
2:39:28	59.980	3738.01	350.00	223.02	16.00	10.00	0.00	-103.00	7771.59	20.600
2:39:30	59.981	3736.75	350.00	223.02	16.00	10.00	0.00	-103.00	7771.92	19.571
2:39:32	59.980	3736.69	350.00	223.02	16.00	10.00	0.00	-103.00	7772.25	20.600
2:39:34	59.978	3736.07	350.00	223.02	16.00	10.00	0.00	-103.00	7772.58	22.659
2:39:36	59.976	3736.09	350.00	223.02	16.00	10.00	0.00	-103.00	7772.91	24.718
2:39:38	59.972	3736.57	350.00	223.02	16.00	10.00	0.00	-103.00	7773.24	28.840
2:39:40	59.971	3738.57	350.00	223.02	16.00	10.00	0.00	-103.00	7773.57	29.869
2:39:42	59.969	3738.87	350.00	223.02	16.00	10.00	0.00	-103.00	7773.90	31.928
2:39:44	59.974	3738.93	350.00	223.02	16.00	10.00	0.00	-103.00	7774.23	26.781
2:39:46	59.975	3738.65	350.00	223.02	16.00	10.00	0.00	-103.00	7774.56	25.752
2:39:48	59.976	3737.68	350.00	223.02	16.00	10.00	0.00	-103.00	7774.89	24.718
2:39:50	59.972	3737.38	350.00	223.02	16.00	10.00	0.00	-103.00	7775.22	28.840
2:39:52	59.969	3737.89	350.00	223.02	16.00	10.00	0.00	-103.00	7775.55	31.928
2:39:54	59.971	3740.02	350.00	223.02	16.00	10.00	0.00	-103.00	7775.88	29.869
2:39:56	59.974	3740.33	350.00	223.02	16.00	10.00	0.00	-103.00	7776.21	26.781
2:39:58	59.972	3742.05	350.00	223.02	16.00	10.00	0.00	-103.00	7776.54	28.840
2:40:00	59.972	3742.42	350.00	223.02	16.00	10.00	0.00	-103.00	7776.87	28.840
2:40:02	59.972	3742.52	350.00	223.02	16.00	10.00	0.00	-103.00	7777.20	28.840
2:40:04	59.977	3742.25	350.00	223.02	16.00	10.00	0.00	-103.00	7777.53	23.689

2:40:06	59.982	3741.72	350.00	223.02	16.00	10.00	0.00	-103.00	7777.86	18.542
2:40:08	59.978	3740.09	350.00	223.02	16.00	10.00	0.00	-103.00	7778.19	22.659
2:40:10	59.976	3740.63	350.00	223.02	16.00	10.00	0.00	-103.00	7778.52	24.718
2:40:12	59.973	3739.96	350.00	223.02	16.00	10.00	0.00	-103.00	7778.85	27.810
2:40:14	59.974	3740.78	350.00	223.02	16.00	10.00	0.00	-103.00	7779.18	26.781
2:40:16	59.977	3742.83	350.00	223.02	16.00	10.00	0.00	-103.00	7779.51	23.689
2:40:18	59.977	3741.27	350.00	223.02	16.00	10.00	0.00	-103.00	7779.84	23.689
2:40:20	59.978	3739.78	350.00	223.02	16.00	10.00	0.00	-103.00	7780.17	22.659
2:40:22	59.979	3738.97	350.00	223.02	16.00	10.00	0.00	-103.00	7780.50	21.630
2:40:24	59.981	3738.71	350.00	223.02	16.00	10.00	0.00	-103.00	7780.83	19.571
2:40:26	59.977	3738.88	350.00	223.02	16.00	10.00	0.00	-103.00	7781.16	23.689
2:40:28	59.974	3739.86	350.00	223.02	16.00	10.00	0.00	-103.00	7781.49	26.781
2:40:30	59.971	3738.10	350.00	223.02	16.00	10.00	0.00	-103.00	7781.82	29.869
2:40:32	59.971	3738.56	350.00	223.02	16.00	10.00	0.00	-103.00	7782.15	29.869
2:40:34	59.971	3743.51	350.00	223.02	16.00	10.00	0.00	-103.00	7782.48	29.869
2:40:36	59.972	3743.42	350.00	223.02	16.00	10.00	0.00	-103.00	7782.81	28.840
2:40:38	59.968	3745.25	350.00	223.02	16.00	10.00	0.00	-103.00	7783.14	32.962
2:40:40	59.966	3745.74	350.00	223.02	16.00	10.00	0.00	-103.00	7783.47	35.020
2:40:42	59.966	3747.34	350.00	223.02	16.00	10.00	0.00	-103.00	7783.80	35.020
2:40:44	59.971	3750.70	350.00	223.02	16.00	10.00	0.00	-103.00	7784.13	29.869
2:40:46	59.973	3749.75	350.00	223.02	16.00	10.00	0.00	-103.00	7784.46	27.810
2:40:48	59.972	3746.22	350.00	223.02	16.00	10.00	0.00	-103.00	7784.79	28.840
2:40:50	59.969	3744.68	350.00	223.02	16.00	10.00	0.00	-103.00	7785.12	31.928
2:40:52	59.972	3743.75	350.00	223.02	16.00	10.00	0.00	-103.00	7785.45	28.840
2:40:54	59.974	3743.15	350.00	223.02	16.00	10.00	0.00	-103.00	7785.78	26.781
2:40:56	59.973	3740.30	350.00	223.02	16.00	10.00	0.00	-103.00	7786.11	27.810
2:40:58	59.970	3739.45	350.00	223.02	16.00	10.00	0.00	-103.00	7786.44	30.899
2:41:00	59.971	3733.38	350.00	223.02	16.00	10.00	0.00	-103.00	7786.77	29.869
2:41:02	59.974	3731.83	350.00	223.02	16.00	10.00	0.00	-103.00	7787.10	26.781
2:41:04	59.982	3737.58	350.00	223.02	16.00	10.00	0.00	-103.00	7787.43	18.542
2:41:06	59.985	3736.23	350.00	223.02	16.00	10.00	0.00	-103.00	7787.76	15.449
2:41:08	59.985	3734.90	350.00	223.02	16.00	10.00	0.00	-103.00	7788.09	15.449
2:41:10	59.985	3733.43	350.00	223.02	16.00	10.00	0.00	-103.00	7788.42	15.449
2:41:12	59.987	3733.12	350.00	223.02	16.00	10.00	0.00	-103.00	7788.75	13.391
2:41:14	59.989	3730.51	350.00	223.02	16.00	10.00	0.00	-103.00	7789.08	11.332
2:41:16	59.989	3729.18	350.00	223.02	16.00	10.00	0.00	-103.00	7789.41	11.332
2:41:18	59.986	3725.46	350.00	223.02	16.00	10.00	0.00	-103.00	7789.74	14.420
2:41:20	59.987	3724.78	350.00	223.02	16.00	10.00	0.00	-103.00	7790.07	13.391
2:41:22	59.990	3720.11	350.00	223.02	16.00	10.00	0.00	-103.00	7790.40	10.298
2:41:24	59.994	3720.94	350.00	223.02	16.00	10.00	0.00	-103.00	7790.73	6.181
2:41:26	59.996	3725.66	350.00	223.02	16.00	10.00	0.00	-103.00	7791.06	4.122
2:41:28	60.001	3725.68	350.00	223.02	16.00	10.00	0.00	-103.00	7791.39	-1.029
2:41:30	60.003	3727.75	350.00	223.02	16.00	10.00	0.00	-103.00	7791.72	-3.088
2:41:32	60.004	3727.82	350.00	223.02	16.00	10.00	0.00	-103.00	7792.05	-4.122
2:41:34	60.006	3727.68	350.00	223.02	16.00	10.00	0.00	-103.00	7792.38	-6.181
2:41:36	60.012	3727.23	350.00	223.02	16.00	10.00	0.00	-103.00	7792.71	-12.361

2:41:38	60.014	3725.01	350.00	223.02	16.00	10.00	0.00	-103.00	7793.04	-14.420
2:41:40	60.019	3726.45	350.00	223.02	16.00	10.00	0.00	-103.00	7793.37	-19.571
2:41:42	60.021	3726.02	350.00	223.02	16.00	10.00	0.00	-103.00	7793.70	-21.630
2:41:44	60.025	3719.12	350.00	223.02	16.00	10.00	0.00	-103.00	7794.03	-25.752
2:41:46	60.026	3716.37	350.00	223.02	16.00	10.00	0.00	-103.00	7794.36	-26.781
2:41:48	60.027	3717.33	350.00	223.02	16.00	10.00	0.00	-103.00	7794.69	-27.810
2:41:50	60.029	3717.56	350.00	223.02	16.00	10.00	0.00	-103.00	7795.02	-29.869
2:41:52	60.029	3717.14	350.00	223.02	16.00	10.00	0.00	-103.00	7795.35	-29.869
2:41:54	60.037	3715.17	350.00	223.02	16.00	10.00	0.00	-103.00	7795.68	-38.109
2:41:56	60.036	3713.63	350.00	223.02	16.00	10.00	0.00	-103.00	7796.01	-37.079
2:41:58	60.037	3710.28	350.00	223.02	16.00	10.00	0.00	-103.00	7796.34	-38.109
2:42:00	60.037	3710.16	350.00	223.02	16.00	10.00	0.00	-103.00	7796.67	-38.109
2:42:02	60.036	3699.36	350.00	223.02	16.00	10.00	0.00	-103.00	7797.00	-37.079
2:42:04	60.041	3698.59	350.00	223.02	16.00	10.00	0.00	-103.00	7797.33	-42.230
2:42:06	60.043	3704.59	350.00	223.02	16.00	10.00	0.00	-103.00	7797.66	-44.289
2:42:08	60.044	3703.28	350.00	223.02	16.00	10.00	0.00	-103.00	7797.99	-45.319
2:42:10	60.043	3702.48	350.00	223.02	16.00	10.00	0.00	-103.00	7798.32	-44.289
2:42:12	60.046	3701.32	350.00	223.02	16.00	10.00	0.00	-103.00	7798.65	-47.381
2:42:14	60.048	3700.83	350.00	223.02	16.00	10.00	0.00	-103.00	7798.98	-49.440
2:42:16	60.046	3699.53	350.00	223.02	16.00	10.00	0.00	-103.00	7799.31	-47.381
2:42:18	60.046	3699.73	350.00	223.02	16.00	10.00	0.00	-103.00	7799.64	-47.381
2:42:20	60.043	3690.10	350.00	223.02	16.00	10.00	0.00	-103.00	7799.97	-44.289
2:42:22	60.043	3690.48	350.00	223.02	16.00	10.00	0.00	-103.00	7800.30	-44.289
2:42:24	60.044	3696.86	350.00	223.02	16.00	10.00	0.00	-103.00	7800.63	-45.319
2:42:26	60.043	3696.88	350.00	223.02	16.00	10.00	0.00	-103.00	7800.96	-44.289

Date:	Monday, October 12, 2009	
Time of T(0)	2:27:26	
ne of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	2:33:00	
ue A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	60.042	Hz
: B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.889	Hz
Pre to Post Perturbation Delta Frequency Actual	-0.153	Hz
re-Perturbation Average Interchange MW [T(-2) to T(-16)]	3645.73	MW
t-Perturbation Average Interchange MW [T(+20 to T(+52)]	3803.35	MW
Pre to Post Perturbation Interchange Delta MW Actual	157.63	MW
EPFR Pre-Perturbation Average	-43.39	MW
EPFR Post-Perturbation Average	114.21	MW
EPFR Unadjusted	157.60	MW
EPFR Adjusted	198.04	MW
Pre JOU Dynamic Schedules MW	350.00	MW
Pre Non-Conforming Load MW	165.34	MW
Pre Pumped Hydro MW	0.00	MW
Pre Transferred Frequency Response MW	-4.21	MW
Pre Contingent BA Lost Generation MW	15.00	MW
Sum of Pre Perturbation Adjustments	526.12	MW
Post JOU Dynamic Schedules MW	335.00	MW
Post Non-Conforming Load MW	214.13	MW
Post Pumped Hydro MW	6.35	MW
Post Transferred Frequency Response MW	11.09	MW
Post Contingent BA Lost Generation MW	0.00	MW
Sum of Post Perturbation Adjustments	566.57	MW
Net Total Adjustments MW	40.45	MW

Frequency Response Initiative - Additional Primary Frequency Respons

			Actual		JOU	Non-
Frequency @ T(+46)	59.890	Hz				
Frequency @ T(+76)	59.863	Hz				
Frequency @ T(+106)	59.899	Hz	Primary	Un-adjusted	Dynamic	Conforming
Frequency @ T(+136)	59.920	Hz	Freq Response	P.U.	Schedules	Load
Frequency @ T(+166)	59.937	Hz	MW	Performance	Adjustment	Adjustment
EPFR @ T(+46)	113.30	MW	158.51	1.399	-15.00	50.26
EPFR @ T(+76)	141.11	MW	182.41	1.293	-15.00	49.49
EPFR @ T(+106)	104.03	MW	164.54	1.582	-15.00	63.03
EPFR @ T(+136)	82.40	MW	129.49	1.571	-15.00	64.13
EPFR @ T(+166)	64.89	MW	119.99	1.849	-15.00	63.75

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-103.00	MW/0.1 Hz
Post-Perturbation Bias Setting	-103.00	MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	-43.39	MW
EPFR for Bias Setting Post-Perturbation Average	114.21	MW
EPFR for Bias Setting Delta	157.60	MW
Primary Frequency Response Delivery % of Bias	100.02%	
Pre-Perturbation BA Load	7651.3	MW
Post-Perturbation BA Load	7632.0	MW
Pre to Post Perturbation BA Load Change	-19.305	MW
Load Dampening Frequency Response	-12.617	MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	12.25%	
Average Bias Setting when Hz is greater than +/-0.036 Hz	-103.00	MW/0.1 Hz

2 second Average Period Evaluation

Initial P.U. Performance for FRO	1.000	P.U.
Initial P.U. Performance Adjusted for FRO	0.744	P.U.

Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Transferred Frequency Response Rec (-) Del (+) MW/0.1 Hz	Contingent BA Lost Generation Load (-) Gen (+) MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected Net Actual Interchange MW	Actual Primary Freq Response MW	Actual Primary Freq Response Beta MW/0.1 Hz
												0.0270
												0.0260
												0.0260

												0.0220
												0.0190
												0.0170
												0.0190
												0.0200
												0.0190
												0.0210
												0.0210
												0.0210
												0.0190
												0.0180
												0.0220
												0.0310
												0.0370
												0.0370
												0.0360
												0.0370
												0.0460
												0.0480
												0.0480
												0.0430
												0.0410
												0.0410
												0.0410
												0.0390
60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0410
60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0430
60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0450
60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0460
60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0410
60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0410
60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0410
60.042	3645.73	350.000	165.336	0.000	10.000	15.000	-103.00	7651.31	-43.389			0.0390
												0.0220
											51.252	-26.96 0.1480
											89.794	-43.56 0.1640
											89.563	-51.73 0.1310
											89.563	-51.73 0.1310
											92.047	-61.31 0.1080
											116.139	-76.85 0.1090
											121.003	-74.64 0.1200
											121.084	-72.89 0.1240
											123.767	-74.06 0.1250
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	124.815	-78.44 0.1170
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	135.511	-87.36 0.1130
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	136.482	-87.42 0.1140

59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	137.389	-87.44	0.1150
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.852	-90.15	0.1130
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.620	-90.59	0.1120
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	139.309	-91.57	0.1100
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	142.962	-97.17	0.1050
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.218	-96.69	0.1060
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.758	-96.40	0.1070
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	143.362	-96.78	0.1060
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	147.166	-99.35	0.1060
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	147.964	-97.91	0.1090
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	149.264	-98.12	0.1100
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	154.318	-98.21	0.1150
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	155.317	-98.85	0.1150
59.889	3788.35	335.000	214.128	6.353	10.000	0.000	-103.00	7632.00	114.209	3843.77	154.849	-100.47	0.1120
											158.515	-102.19	0.1130
											157.815	-102.39	0.1120
											157.841	-102.41	0.1120
											159.278	-104.70	0.1100
											160.386	-104.74	0.1110
											160.507	-100.24	0.1180
											164.127	-97.05	0.1270
											166.393	-89.88	0.1430
											169.752	-87.90	0.1510
											170.779	-89.82	0.1480
											180.532	-98.05	0.1420
											180.943	-101.01	0.1370
											180.892	-102.71	0.1340
											182.414	-102.99	0.1350
											181.643	-103.72	0.1330
											181.673	-103.15	0.1340
											181.344	-105.97	0.1290
											180.603	-107.42	0.1260
											178.716	-109.56	0.1210
											177.395	-109.42	0.1200
											173.971	-109.33	0.1170
											172.945	-110.77	0.1140
											171.705	-112.87	0.1100
											169.900	-113.17	0.1080
											168.673	-110.15	0.1110
											166.728	-111.81	0.1070
											164.542	-114.96	0.1010
											161.862	-116.34	0.0970
											160.483	-114.53	0.0980
											159.078	-113.53	0.0980
											150.968	-109.30	0.0960

148.865	-110.17	0.0930
147.059	-112.15	0.0890
146.392	-116.07	0.0840
144.424	-114.51	0.0840
143.022	-114.30	0.0830
139.453	-112.35	0.0820
137.918	-112.93	0.0800
136.591	-112.77	0.0790
131.248	-107.47	0.0800
130.525	-104.32	0.0830
129.494	-106.03	0.0800
128.224	-105.86	0.0790
128.848	-108.16	0.0770
127.612	-109.89	0.0740
126.560	-108.05	0.0750
124.520	-109.11	0.0720
123.597	-107.36	0.0730
122.533	-111.27	0.0680
121.911	-105.89	0.0730
122.298	-107.16	0.0720
121.678	-109.50	0.0690
121.149	-107.09	0.0710
120.562	-108.49	0.0690
121.012	-110.89	0.0670
119.133	-113.32	0.0630
119.995	-114.15	0.0630
117.825	-121.31	0.0550
113.277	-121.64	0.0510
108.812	-114.39	0.0530
104.757	-104.63	0.0580
101.779	-100.65	0.0590
102.765	-102.64	0.0580
104.483	-107.58	0.0550
103.551	-110.02	0.0520
101.596	-106.80	0.0530
103.967	-111.64	0.0510
97.631	-107.14	0.0490
95.149	-105.57	0.0480
91.029	-102.14	0.0470
86.272	-94.67	0.0490
82.728	-91.79	0.0480
80.842	-89.70	0.0480
77.539	-86.03	0.0480
75.468	-86.62	0.0450
72.886	-80.87	0.0480
73.032	-82.87	0.0460

70.643	-78.38	0.0480
68.584	-76.95	0.0470
68.374	-76.72	0.0470
65.738	-72.94	0.0480
65.700	-74.55	0.0460
66.982	-76.01	0.0460
69.512	-83.62	0.0410
70.020	-82.26	0.0430
71.058	-82.51	0.0440
71.351	-80.96	0.0460
71.870	-83.45	0.0440
72.649	-83.39	0.0450
77.251	-91.83	0.0420
76.863	-94.74	0.0390
77.548	-96.79	0.0380
77.157	-96.30	0.0380
77.168	-104.10	0.0320
76.677	-100.72	0.0340
77.981	-102.44	0.0340
78.874	-106.40	0.0320
78.324	-108.60	0.0300
78.783	-115.64	0.0260
80.293	-111.33	0.0300
82.011	-112.15	0.0310
82.943	-113.43	0.0310
86.020	-119.27	0.0300
87.420	-122.91	0.0290
88.217	-127.62	0.0270
91.425	-132.26	0.0270
91.797	-138.83	0.0240
91.712	-143.02	0.0220
93.589	-145.95	0.0220
94.834	-143.42	0.0240
95.767	-149.35	0.0220
96.684	-146.22	0.0240
100.124	-156.14	0.0220
101.498	-155.85	0.0230
103.190	-166.10	0.0200
105.606	-175.64	0.0180
106.448	-174.14	0.0190
107.637	-173.26	0.0200
110.489	-175.03	0.0210
111.297	-179.15	0.0200
111.865	-177.21	0.0210
115.295	-195.01	0.0170
115.872	-195.98	0.0170

116.297	-200.08	0.0160
117.627	-217.32	0.0120
118.102	-222.30	0.0110
119.847	-217.41	0.0130
120.975	-219.45	0.0130
121.323	-237.31	0.0090
122.141	-248.63	0.0070
122.682	-244.75	0.0080
123.523	-241.61	0.0090
126.036	-237.24	0.0110
127.335	-226.88	0.0140
128.585	-217.48	0.0170
129.558	-219.13	0.0170
130.731	-241.53	0.0120
130.253	-265.15	0.0070
129.756	-281.30	0.0040
130.382	-295.49	0.0020
131.310	-304.49	0.0010
132.827		0.0010
133.965		0.0010
135.529		0.0010
134.868		0.0010
137.365		0.0020
138.168		0.0050
138.694		0.0070
140.041		0.0080
139.736		0.0110
141.123		0.0140
140.577		0.0170
141.532		0.0190
141.789		0.0210
142.228		0.0170
142.303		0.0170
142.880		0.0190
143.489		0.0230
141.810		0.0240
140.115		0.0250
140.350		0.0210
142.203		0.0190
143.033		0.0240
141.148		0.0240
140.823		0.0210
141.631		0.0200
139.291		0.0250
139.887		0.0240
140.222		0.0200

140.077	0.0200
141.137	0.0220
141.150	0.0220
139.527	0.0220
139.999	0.0210
140.620	0.0210
140.094	0.0230
140.071	0.0230
140.557	0.0220
141.212	0.0190
141.900	0.0160
143.717	0.0180
143.946	0.0180
143.677	0.0180
142.752	0.0190
143.456	0.0190
143.642	0.0160
143.278	0.0150
142.938	0.0160
143.206	0.0140
144.940	0.0130
145.078	0.0120
144.684	0.0120
144.042	0.0100
145.813	0.0070
147.218	0.0070
145.300	0.0090
145.716	0.0090
145.699	0.0100
144.876	0.0030
144.730	0.0010
144.489	0.0050
143.858	0.0080
142.730	0.0090
142.378	0.0080
142.330	0.0080
142.462	0.0120
142.770	0.0140
142.813	0.0150
142.844	0.0160
142.374	0.0150
141.406	0.0160
140.726	0.0180
142.005	0.0190
143.086	0.0180
143.558	0.0210

142.529	0.0230
142.683	0.0240
144.740	0.0240
144.938	0.0210
144.693	0.0180
143.947	0.0220
143.540	0.0240
143.421	0.0260
144.703	0.0240
144.187	0.0230
140.516	0.0230
141.715	0.0250
143.236	0.0270
144.875	0.0310
146.150	0.0300
147.184	0.0290
146.584	0.0270
143.398	0.0220
142.353	0.0190
142.117	0.0220
141.408	0.0250
141.437	0.0280
141.269	0.0240
141.678	0.0250
140.760	0.0270
141.352	0.0310
143.487	0.0340
144.785	0.0350
145.494	0.0340
146.491	0.0310
145.232	0.0300
143.097	0.0320
143.299	0.0350
143.440	0.0360
141.667	0.0300
139.963	0.0280
139.104	0.0330
139.282	0.0330
138.593	0.0310
137.082	0.0320
136.383	0.0310
133.625	0.0330
133.329	0.0330
132.906	0.0340
133.485	0.0350
133.608	0.0290

130.702	0.0330
129.920	0.0350
130.870	0.0380
130.832	0.0360
130.296	0.0300
127.443	0.0330
126.003	0.0310
123.066	0.0320
122.776	0.0370
123.190	0.0350
121.639	0.0300
119.059	0.0270
114.568	0.0320
113.865	0.0350
116.167	0.0320
116.050	0.0310
114.855	0.0330
114.430	0.0360
114.054	0.0340
113.768	0.0210
112.046	0.0100
107.550	0.0170
107.360	0.0260
105.910	0.0330
108.024	0.0350
112.498	0.0380
113.523	0.0380
112.314	0.0390
115.238	0.0390
116.295	0.0400
118.095	0.0370
117.373	0.0410
118.131	0.0440
118.431	0.0490
120.400	0.0470
122.612	0.0460
122.245	0.0430
121.710	0.0440
119.879	0.0390
116.961	0.0370
115.843	0.0390
116.193	0.0410
113.900	0.0370
112.795	0.0370
106.702	0.0350
104.375	0.0320

108.103	0.0320
107.783	0.0320
107.796	0.0300
107.014	0.0270
107.451	0.0290
107.002	0.0350
107.563	0.0330
107.145	0.0330
106.632	0.0280
103.671	0.0240
101.749	0.0250
94.643	0.0310
95.558	0.0270
100.924	0.0260
100.011	0.0220
97.624	0.0190
95.891	0.0190
94.579	0.0190
92.757	0.0180
93.174	0.0180
91.677	0.0160
91.546	0.0180
90.581	0.0190
90.545	0.0210
89.721	0.0200
89.923	0.0220
91.813	0.0220
92.285	0.0200
91.021	0.0190
90.966	0.0200
90.340	0.0220
90.367	0.0240
90.848	0.0280
92.844	0.0290
93.148	0.0310
93.208	0.0260
92.920	0.0250
91.957	0.0240
91.655	0.0280
92.165	0.0310
94.290	0.0290
94.602	0.0260
96.326	0.0280
96.697	0.0280
96.797	0.0280
96.518	0.0230

95.996	0.0180
94.358	0.0220
94.902	0.0240
94.237	0.0270
95.048	0.0260
97.105	0.0230
95.541	0.0230
94.049	0.0220
93.239	0.0210
92.979	0.0190
93.152	0.0230
94.133	0.0260
92.375	0.0290
92.831	0.0290
97.780	0.0290
97.692	0.0280
99.524	0.0320
100.017	0.0340
101.613	0.0340
104.973	0.0290
104.023	0.0270
100.490	0.0280
98.956	0.0310
98.018	0.0280
97.422	0.0260
94.572	0.0270
93.726	0.0300
87.649	0.0290
86.103	0.0260
91.855	0.0180
90.502	0.0150
89.170	0.0150
87.707	0.0150
87.388	0.0130
84.783	0.0110
83.453	0.0110
79.732	0.0140
79.058	0.0130
74.381	0.0100
75.211	0.0060
79.934	0.0040
79.950	0.0010
82.027	0.0030
82.098	0.0040
81.956	0.0060
81.504	0.0120

79.285	0.0140
80.719	0.0190
80.289	0.0210
73.396	0.0250
70.647	0.0260
71.605	0.0270
71.833	0.0290
71.415	0.0290
69.439	0.0370
67.905	0.0360
64.556	0.0370
64.431	0.0370
53.629	0.0360
52.864	0.0410
58.864	0.0430
57.548	0.0440
56.755	0.0430
55.589	0.0460
55.099	0.0480
53.802	0.0460
53.999	0.0460
44.373	0.0430
44.750	0.0430
51.137	0.0440
51.150	0.0430

se Evaluation Points

Pumped Hydro Adjustment	Transferred Frequency Response Adjustment	Contingent BA Lost Generation Adjustment	Adjusted P.U. Performance
11.00	15.21	-15.00	0.856
16.00	17.91	-15.00	0.808
16.00	14.31	-15.00	0.829
16.00	12.21	-15.00	0.633
16.00	10.51	-15.00	0.689

-103
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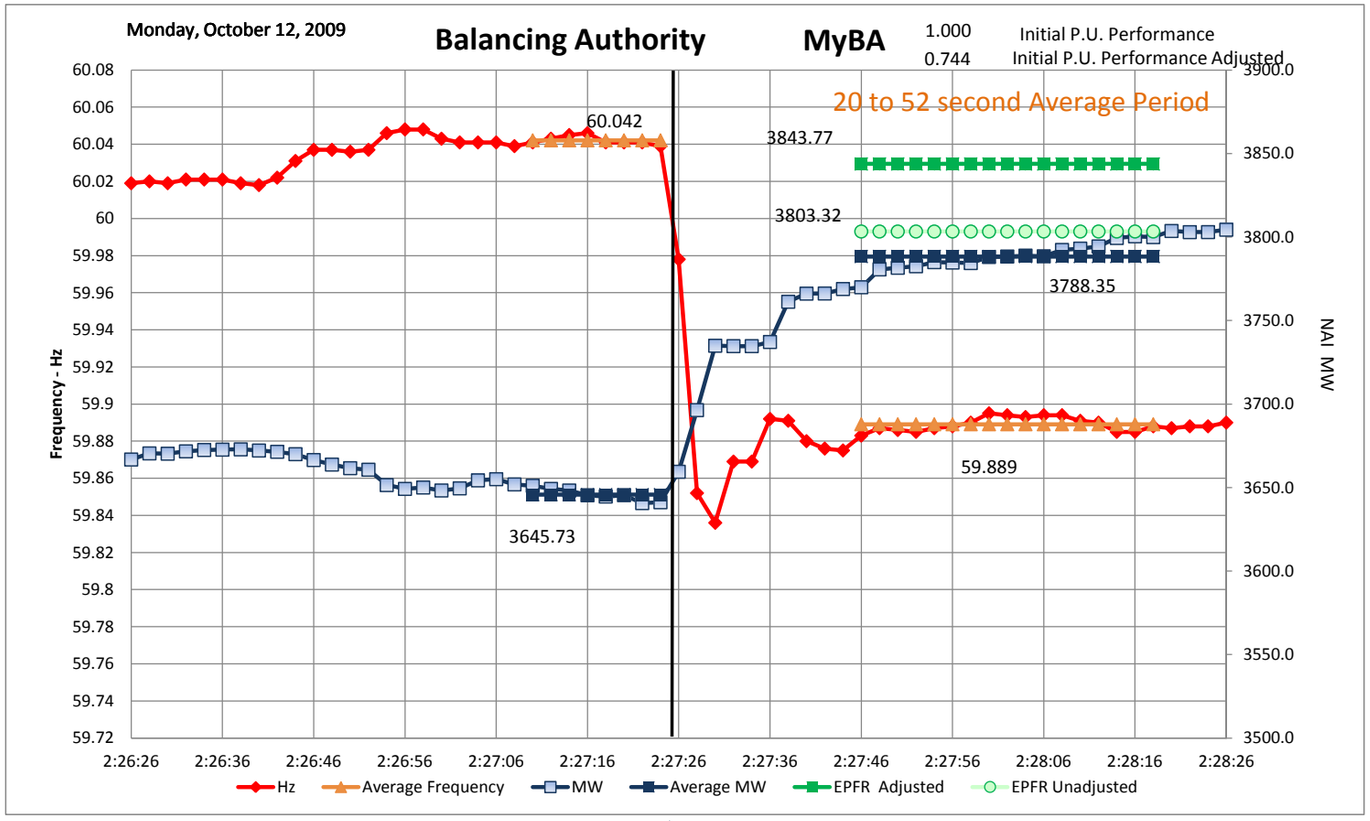


T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

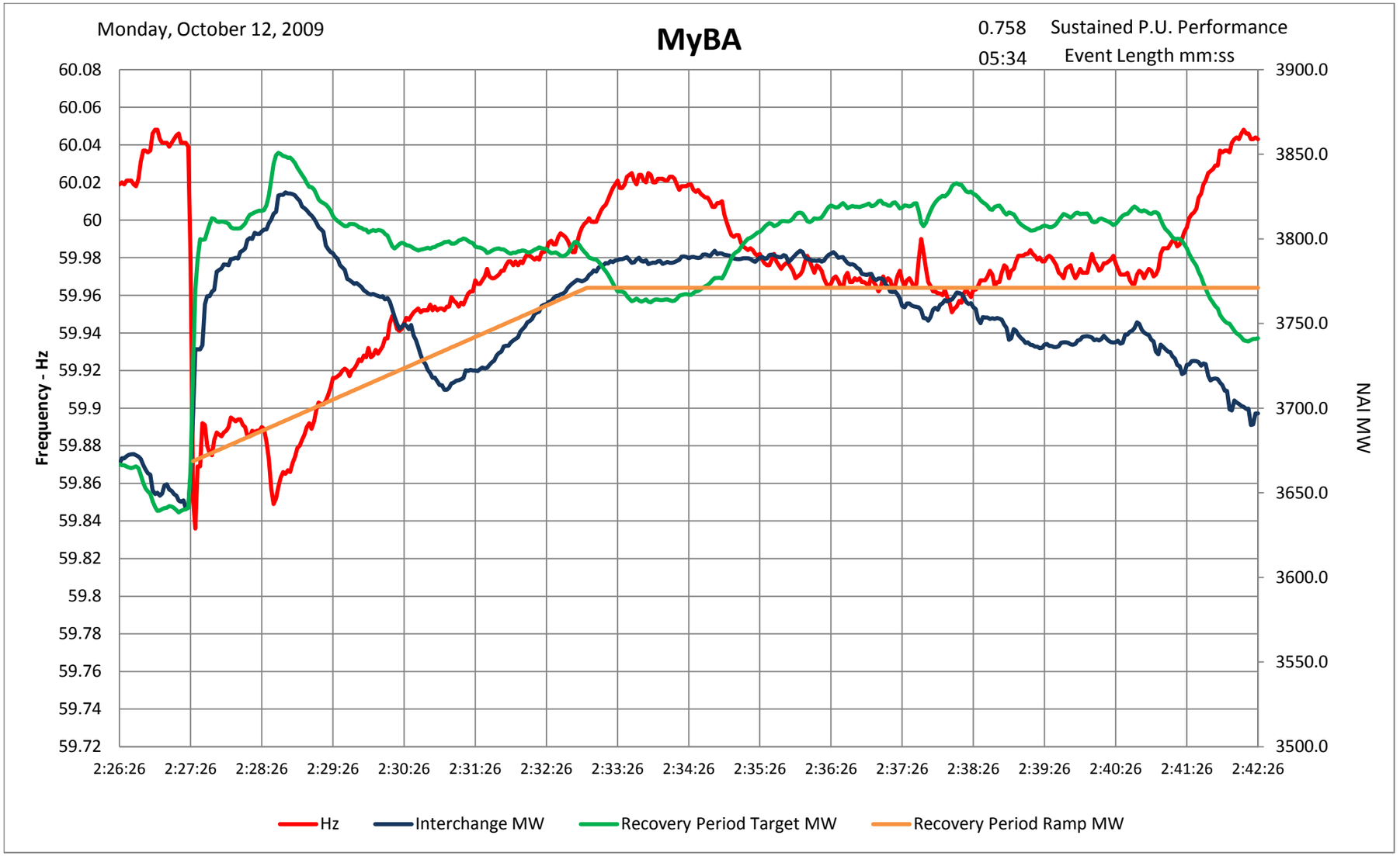
# of rows to shift T(0)

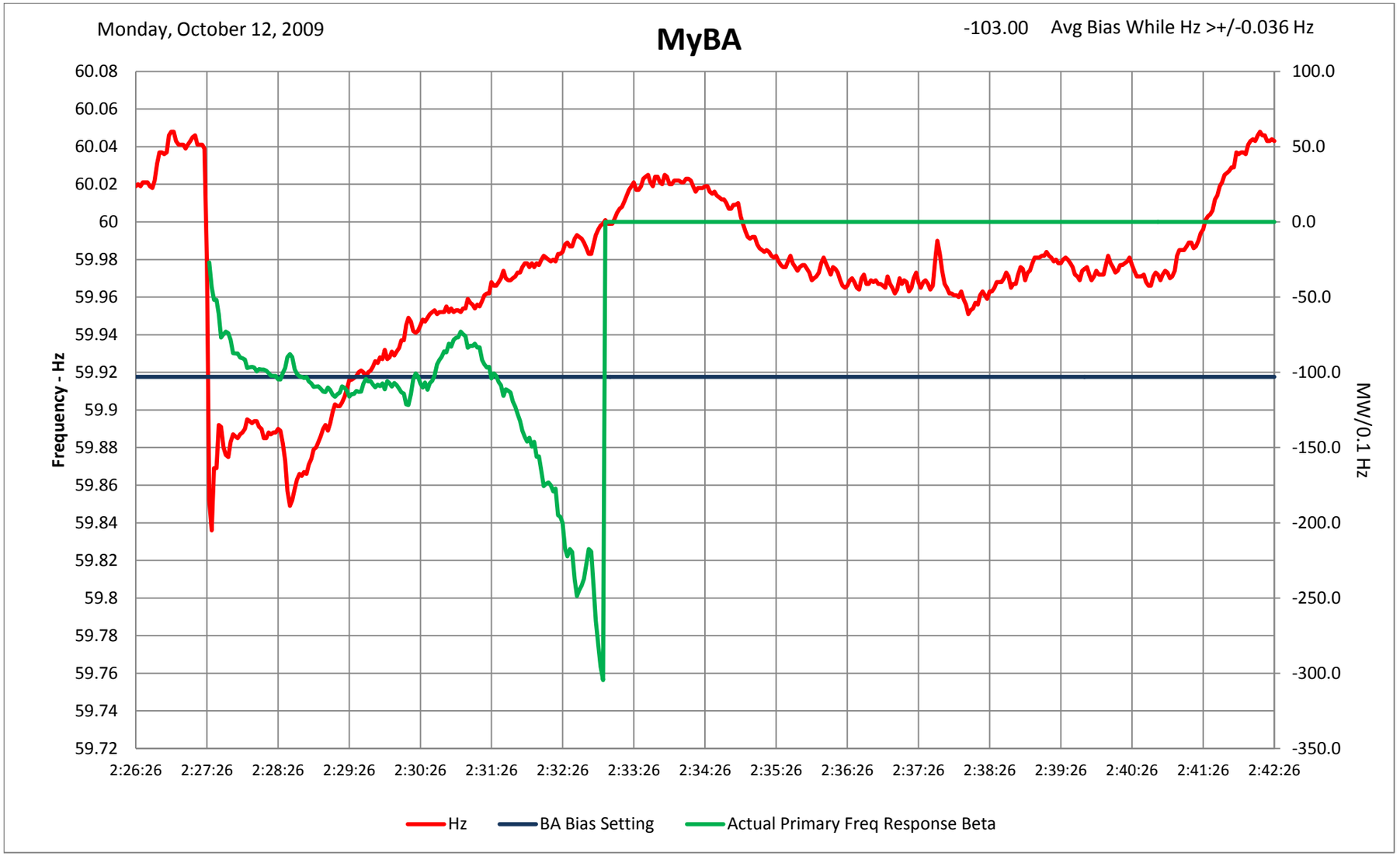
1

A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.


Monday, October 12, 2009
MyBA
0.758 Sustained P.U. Performance
05:34 Event Length mm:ss
Frequency - Hz
NAI MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
3900.0
3850.0
3800.0
3750.0
3700.0
3650.0
3600.0
3550.0
3500.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Interchange MW
Recovery Period Target MW
Recovery Period Ramp MW


Monday, October 12, 2009
MyBA
-103.00 Avg Bias While Hz >+/-0.036 Hz
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
-250.0
-300.0
-350.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
BA Bias Setting
Actual Primary Freq Response Beta

Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Value A Data BA Performance Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW
Monday, October 12, 2009	2:27:26	60.039	60.042	2:27:26	59.836	60.042	3645.73	350.00	165.34	0.00	0.00	-4.21	15.00

Value B 20 to 52 second Average Period Evaluation

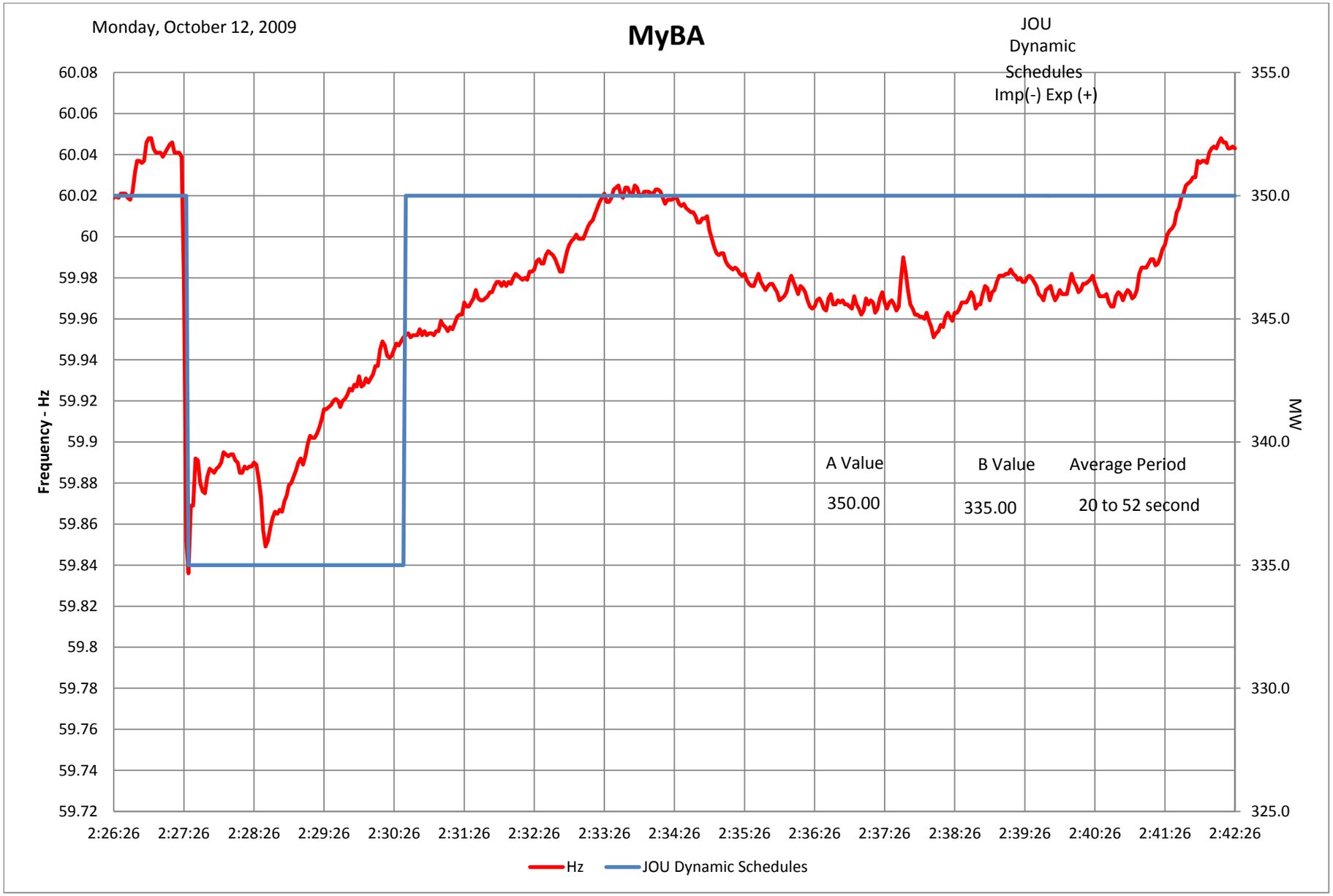
BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Net Actual Interchange MW	JOU Dynamic Schedules Imp(-) Exp (+) MW	Non-Conforming Load Load (-) MW	Pumped Hydro Load (-) Gen (+) MW	Not Used	Transferred Frequency Response Rec (-) Del (+) MW	Contingent BA Lost Generation Load (-) Gen (+) MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.
-103.00	7651.305	-43.39	59.889	3803.35	335.00	165.34	6.35	0.00	11.09	0.00	0.744	1.000	0.758

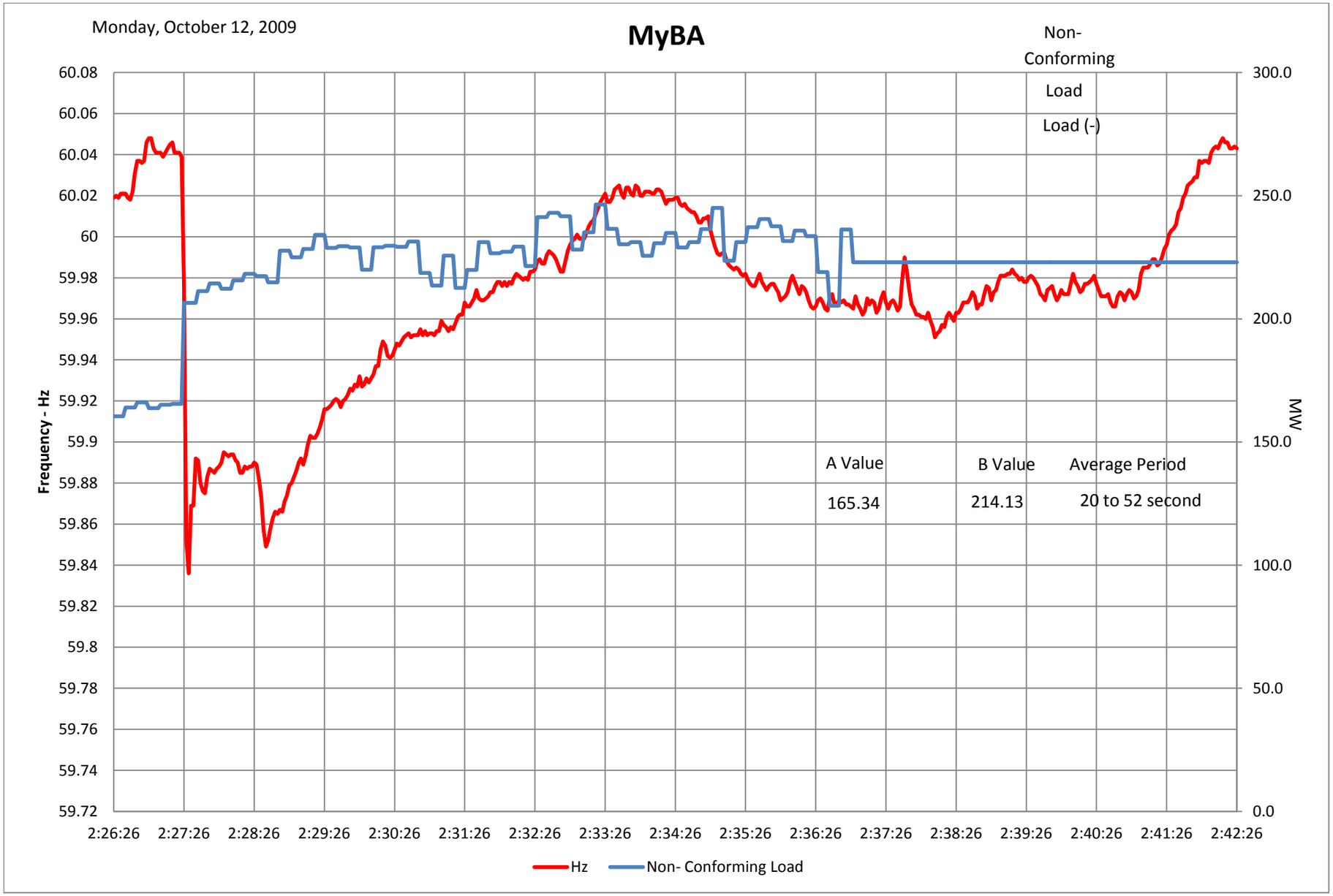
				Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points									
BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.
-103.00	7632.00	114.21	-103.00	1.399	1.293	1.582	1.571	1.849	0.856	0.808	0.829	0.633	0.689

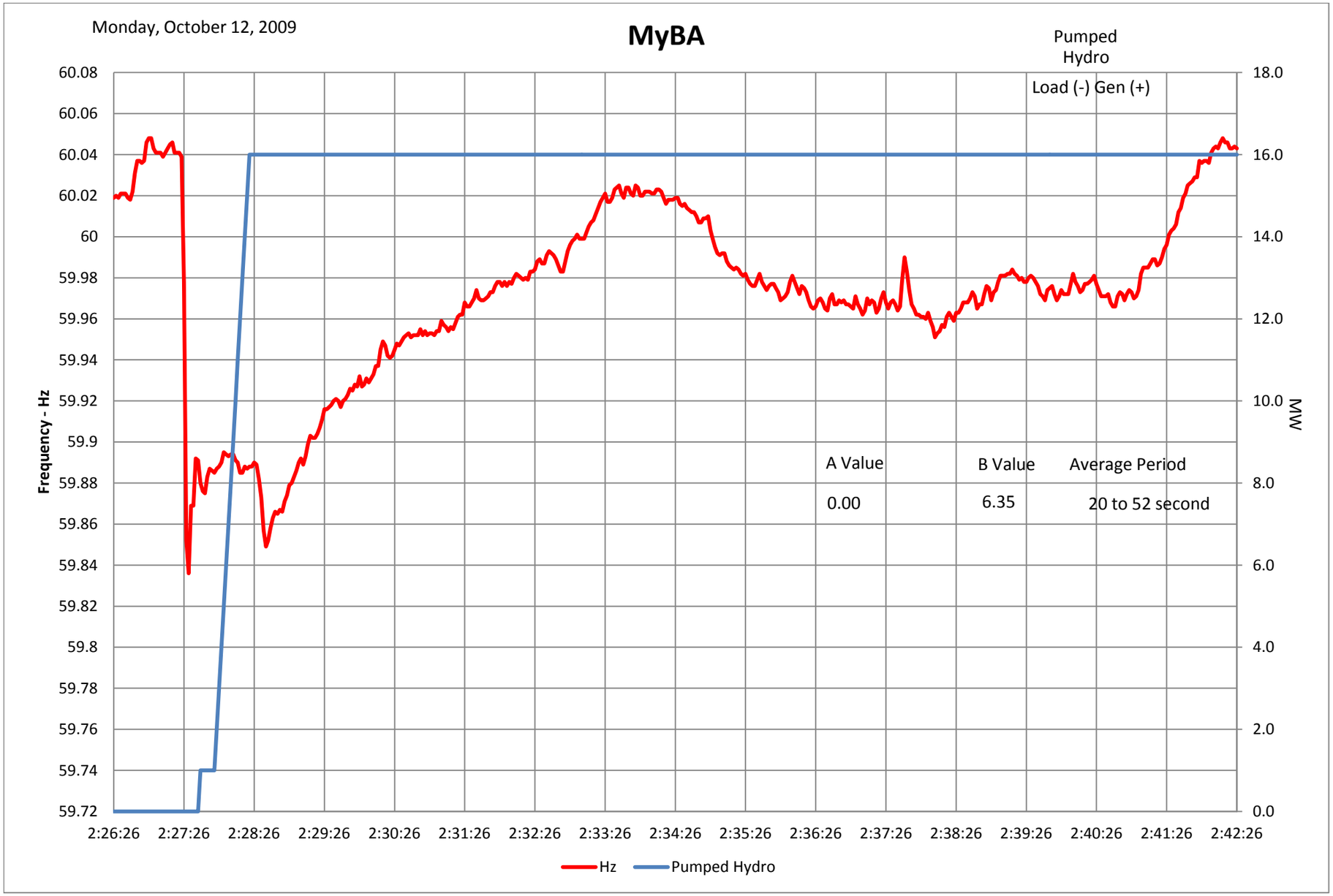
Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
-103.00	-103.00

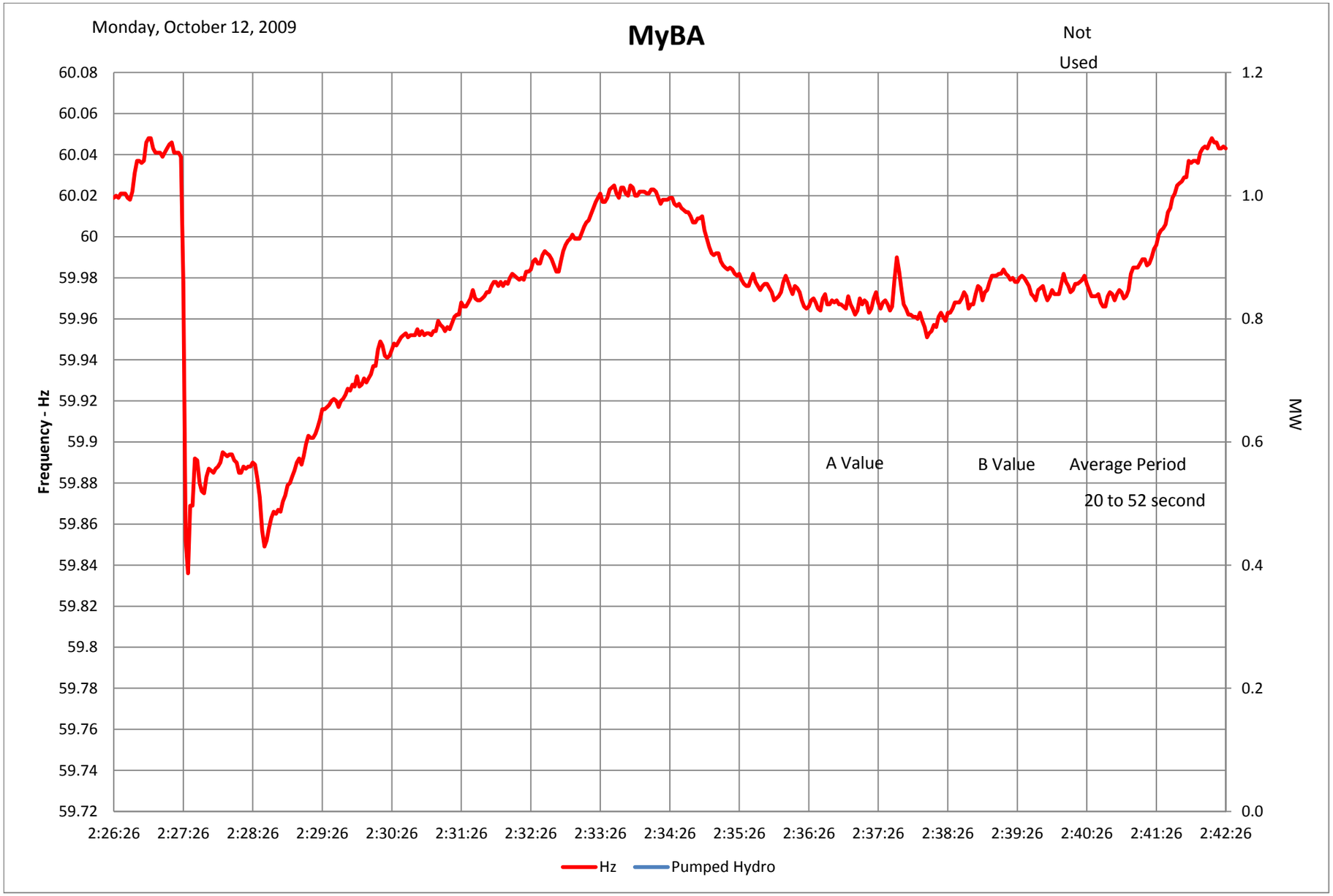
Steps	**To be completed for each event evaluated.**
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order: Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Net Actual Interchange Column D: Joint Owned Unit dynamic schedule Column E: Non Conforming Load Column F: Pumped Hydro Column G: Not Used Column H: Transferred Frequency Response Column I: Contingent BA Lost load or generation Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D, E, F and H are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data. Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time. If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary. To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events) This value controls the end of the "Sustained Frequency Response" evaluation period. Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

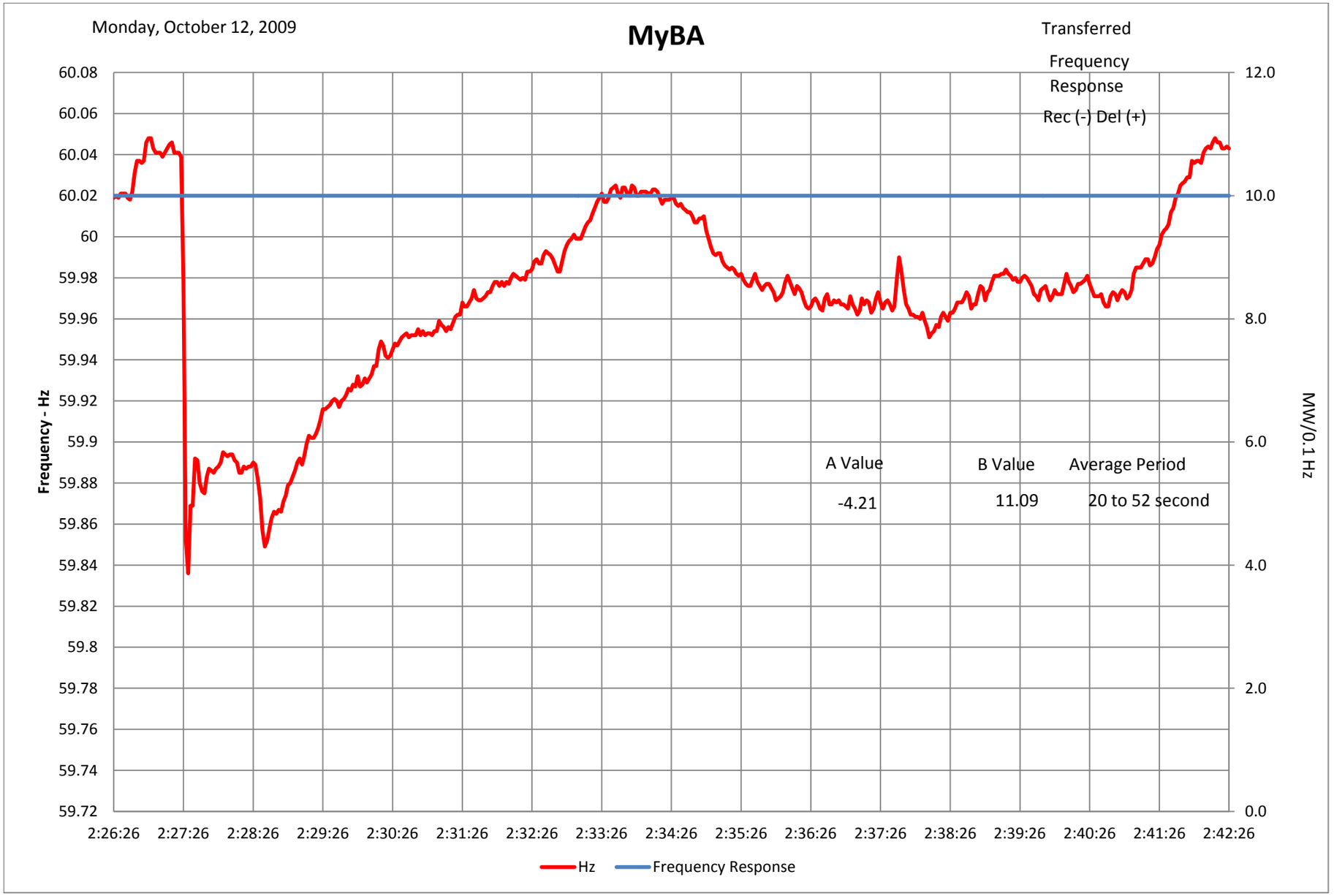
Steps	**To be completed the first time you use Form 2 for your BA.**
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "NYISO".
B	For informational and educational purposes, a "Sustained" performance evaluation is provided in the "Evaluation" worksheet and in the "Sustained" Graph. This evaluation uses a Time Constant (TC) to model the frequency response of your BA. The time constant is located in cell "L13" of the "Evaluation" spreadsheet and should be edited for the types of generators in your BA. Presently this time constant is set at 0.35. The higher the value of the time constant, the faster the delivery of frequency response is expected. Setting the TC to 1.0 effectively turns off the delay and instantaneous frequency response will be modeled. Do not set higher than 1.0. This time constant is only used in the "Sustained" evaluation and is not used for the Field Trial evaluation of performance to the FRO. A typical setting for this time constant is 0.08 to 0.15 for hydro units, 0.10 to 0.20 for large steam turbines and 0.20 to 0.40 for combustion turbines. By observing the slope of your "Interchange Actual" on the "Sustained" Graph, adjust the time constant until the initial slope of the "Target" is similar to the slope of the NAI data. When set appropriately, the "Target" trend on the "Sustained" graph will model what the Net Actua Interchange should have done during the event recovery period based on your Bias setting during the event.

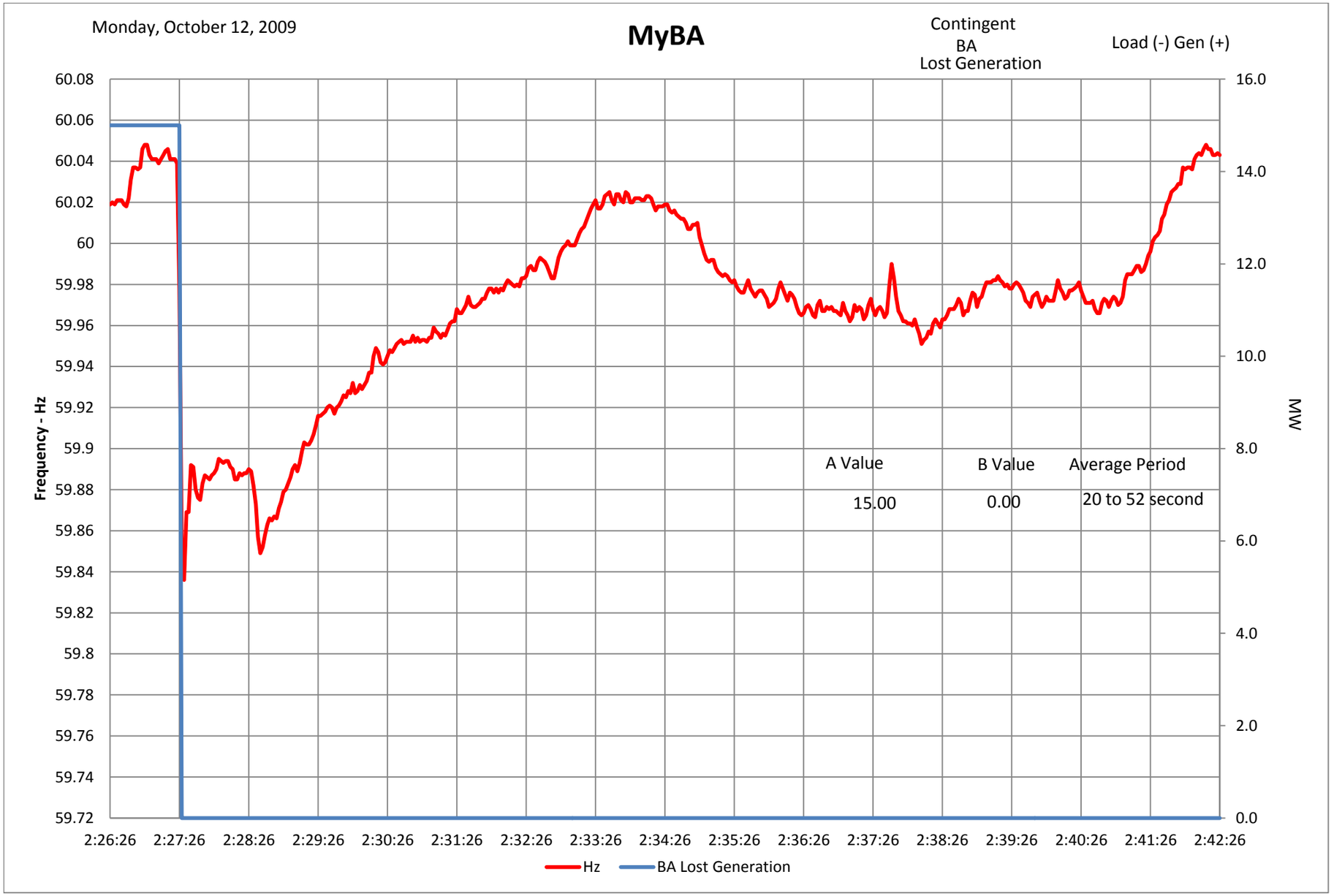

Monday, October 12, 2009
MyBA
JOU Dynamic Schedules Imp(-) Exp (+)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
355.0
350.0
345.0
340.0
335.0
330.0
325.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
350.00
B Value
335.00
Average Period
20 to 52 second
Hz
JOU Dynamic Schedules

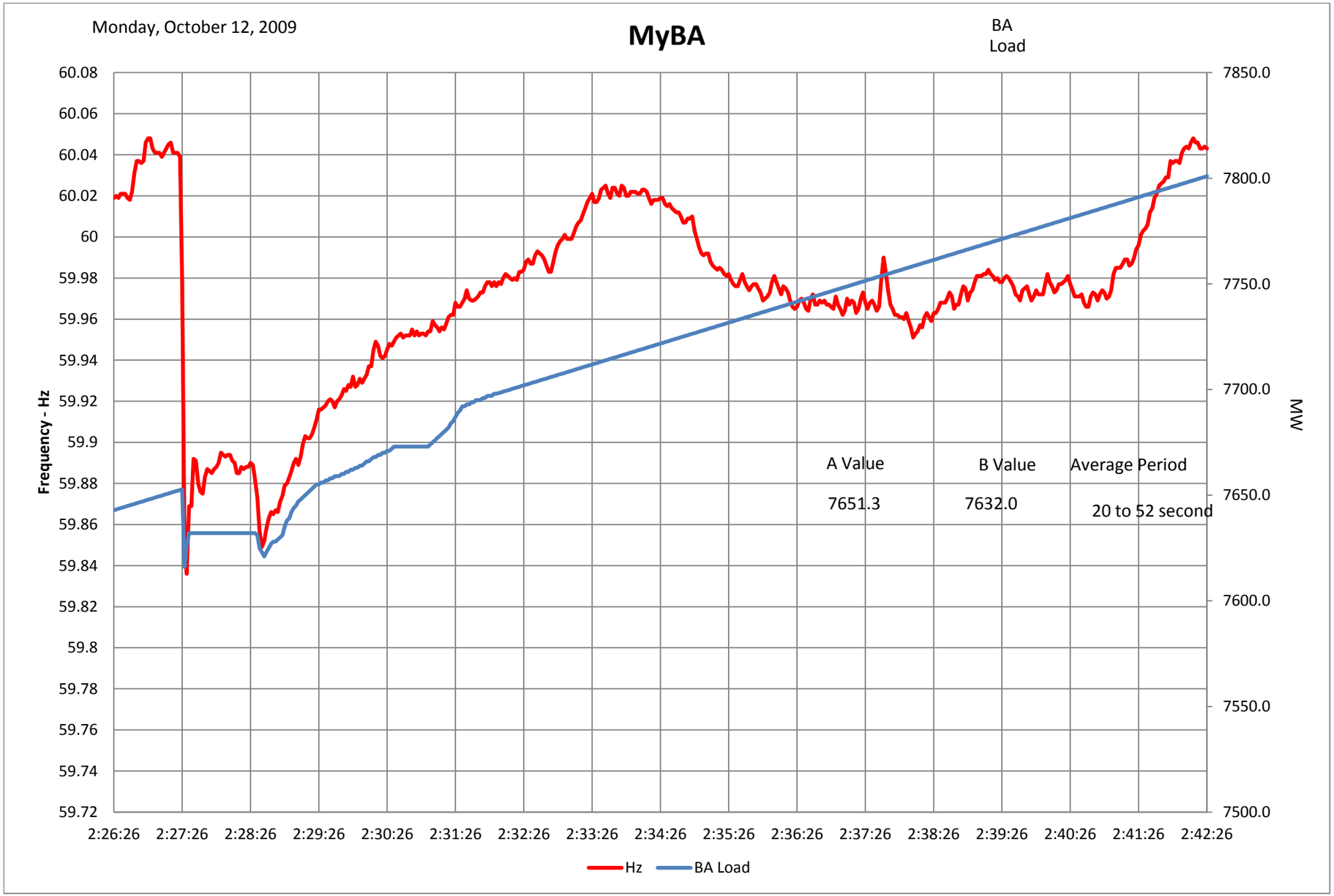

Monday, October 12, 2009
MyBA
Non-
Conforming
Load
Load (-)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
300.0
250.0
200.0
150.0
100.0
50.0
0.0
MW
A Value
165.34
B Value
214.13
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Non- Conforming Load

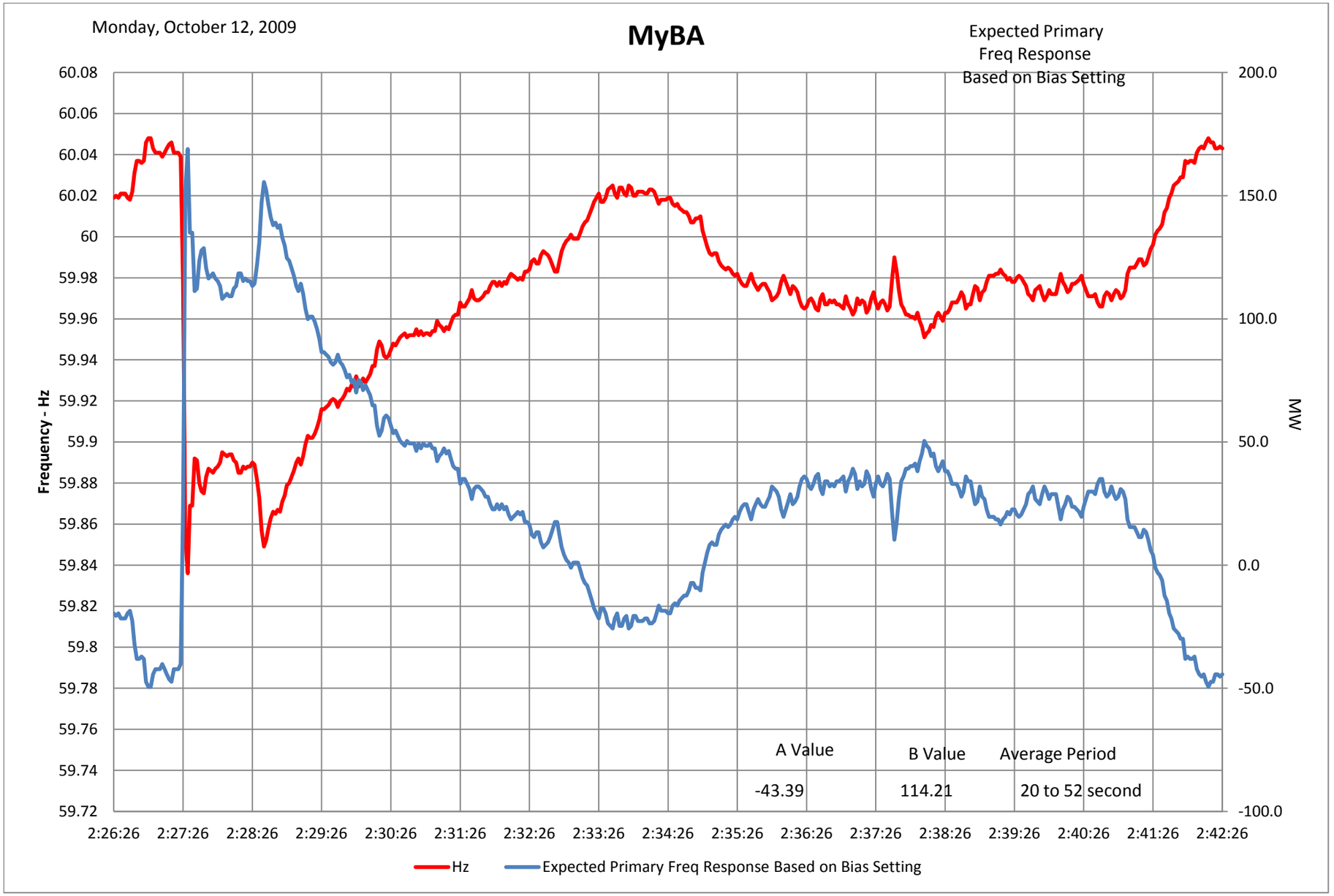

Monday, October 12, 2009
MyBA
Pumped Hydro
Load (-) Gen (+)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
0.00
B Value
6.35
Average Period
20 to 52 second
Hz
Pumped Hydro


Monday, October 12, 2009
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
1.2
1.0
0.8
0.6
0.4
0.2
0.0
MW
A Value
B Value
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Pumped Hydro


Monday, October 12, 2009
MyBA
Transferred
Frequency
Response
Rec (-) Del (+)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
12.0
10.0
8.0
6.0
4.0
2.0
0.0
MW/0.1 Hz
A Value
-4.21
B Value
11.09
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
Frequency Response


Monday, October 12, 2009
MyBA
Contingent
BA
Lost Generation
Load (-) Gen (+)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
MW
A Value
15.00
B Value
0.00
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
BA Lost Generation


Monday, October 12, 2009
MyBA
BA Load
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
Frequency - Hz
7850.0
7800.0
7750.0
7700.0
7650.0
7600.0
7550.0
7500.0
MW
A Value
7651.3
B Value
7632.0
Average Period
20 to 52 second
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
Hz
BA Load


Monday, October 12, 2009
MyBA
Expected Primary
Freq Response
Based on Bias Setting
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
59.74
59.72
200.0
150.0
100.0
50.0
0.0
-50.0
-100.0
2:26:26
2:27:26
2:28:26
2:29:26
2:30:26
2:31:26
2:32:26
2:33:26
2:34:26
2:35:26
2:36:26
2:37:26
2:38:26
2:39:26
2:40:26
2:41:26
2:42:26
A Value
B Value
Average Period
-43.39
114.21
20 to 52 second
Hz
Expected Primary Freq Response Based on Bias Setting

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 t(0) 8:10:30 t(Recovery) 03:52 Event Length mm:ss	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078 Delta Hz	004540 Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 07:40:00	60.0097	471		0	0				-653	29756.85		0				
05/16/11 07:40:02	60.00745	471		0	0				-653	29756.85	0	0	0	-0.002	0.002	
05/16/11 07:40:04	60.00452	471		0	0				-653	29756.82	0	0	0	-0.003	0.003	
05/16/11 07:40:06	60.00259	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:08	60.00034	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:10	59.99872	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:12	59.9971	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:14	59.99548	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:16	59.99353	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:18	59.99063	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:20	59.9874	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:22	59.98416	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:24	59.98093	471		0	0				-653	29766.37	0	0	0	-0.003	0.003	
05/16/11 07:40:26	59.97867	471		0	0				-653	29766.37	0	0	0	-0.002	0.002	
05/16/11 07:40:28	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:30	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:32	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:34	59.97577	471		0	0				-653	29780.98	0	0	0	-0.003	0.003	
05/16/11 07:40:36	59.97382	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:38	59.97223	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:40	59.97223	471		0	0				-653	29780.98	0	0	0	0.000	0.000	
05/16/11 07:40:42	59.97318	471		0	0				-653	29780.98	0	0	0	0.001	0.001	
05/16/11 07:40:44	59.97351	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:46	59.97415	471		0	0				-653	29780.95	0	0	0	0.001	0.001	
05/16/11 07:40:48	59.97287	471		0	0				-653	29780.95	0	0	0	-0.001	0.001	
05/16/11 07:40:50	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:52	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:54	59.96832	471		0	0				-653	29770.34	0	0	0	-0.005	0.005	
05/16/11 07:40:56	59.96768	471		0	0				-653	29770.34	0	0	0	-0.001	0.001	
05/16/11 07:40:58	59.96899	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:00	59.97028	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:02	59.97223	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:04	59.97382	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:06	59.97479	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:08	59.9761	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:10	59.97769	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:12	59.97998	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:14	59.98318	471		0	0				-653	29782.73	0	0	0	0.003	0.003	
05/16/11 07:41:16	59.98578	471		0	0				-653	29782.73	0	0	0	0.003	0.003	
05/16/11 07:41:18	59.9874	471		0	0				-653	29782.73	0	0	0	0.002	0.002	
05/16/11 07:41:20	59.98868	471		0	0				-653	29782.73	0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:41:22	59.98999	471		0	0				-653	29782.73
05/16/11 07:41:24	59.99191	471		0	0				-653	29782.82
05/16/11 07:41:26	59.99353	471		0	0				-653	29782.82
05/16/11 07:41:28	59.99612	471		0	0				-653	29782.82
05/16/11 07:41:30	59.99805	471		0	0				-653	29782.82
05/16/11 07:41:32	59.99902	471		0	0				-653	29782.82
05/16/11 07:41:34	59.99902	471		0	0				-653	29786.15
05/16/11 07:41:36	59.99774	471		0	0				-653	29786.15
05/16/11 07:41:38	59.99646	471		0	0				-653	29786.15
05/16/11 07:41:40	59.99579	471		0	0				-653	29786.15
05/16/11 07:41:42	59.99612	471		0	0				-653	29786.15
05/16/11 07:41:44	59.9971	471		0	0				-653	29786.21
05/16/11 07:41:46	59.99774	471		0	0				-653	29786.21
05/16/11 07:41:48	59.99838	471		0	0				-653	29786.21
05/16/11 07:41:50	59.99936	471		0	0				-653	29786.21
05/16/11 07:41:52	60	471		0	0				-653	29786.21
05/16/11 07:41:54	60.00064	471		0	0				-653	29778.98
05/16/11 07:41:56	60.00128	471		0	0				-653	29778.98
05/16/11 07:41:58	60.00226	471		0	0				-653	29778.98
05/16/11 07:42:00	60.00388	471		0	0				-653	29778.98
05/16/11 07:42:02	60.00647	471		0	0				-653	29778.98
05/16/11 07:42:04	60.0097	471		0	0				-653	29778.92
05/16/11 07:42:06	60.01358	471		0	0				-653	29778.92
05/16/11 07:42:08	60.01614	471		0	0				-653	29778.92
05/16/11 07:42:10	60.01776	471		0	0				-653	29778.92
05/16/11 07:42:12	60.01776	471		0	0				-653	29778.92
05/16/11 07:42:14	60.01486	471		0	0				-653	29787.9
05/16/11 07:42:16	60.01163	471		0	0				-653	29787.9
05/16/11 07:42:18	60.00903	471		0	0				-653	29787.9
05/16/11 07:42:20	60.00775	471		0	0				-653	29787.9
05/16/11 07:42:22	60.00775	471		0	0				-653	29787.9
05/16/11 07:42:24	60.00903	471		0	0				-653	29787.84
05/16/11 07:42:26	60.00903	471		0	0				-653	29787.84
05/16/11 07:42:28	60.01324	471		0	0				-653	29787.84
05/16/11 07:42:30	60.01486	471		0	0				-653	29787.84
05/16/11 07:42:32	60.0152	471		0	0				-653	29787.84
05/16/11 07:42:34	60.0152	471		0	0				-653	29813.39
05/16/11 07:42:36	60.01486	471		0	0				-653	29813.39
05/16/11 07:42:38	60.01422	471		0	0				-653	29813.39
05/16/11 07:42:40	60.01358	471		0	0				-653	29813.39
05/16/11 07:42:42	60.01227	471		0	0				-653	29813.39

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004541 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:42:44	60.01099	471		0	0				-653	29813.33
05/16/11 07:42:46	60.00873	471		0	0				-653	29813.33
05/16/11 07:42:48	60.00647	471		0	0				-653	29813.33
05/16/11 07:42:50	60.00485	471		0	0				-653	29813.33
05/16/11 07:42:52	60.00354	471		0	0				-653	29813.33
05/16/11 07:42:54	60.00195	471		0	0				-653	29797.46
05/16/11 07:42:56	60	471		0	0				-653	29797.46
05/16/11 07:42:58	59.99774	471		0	0				-653	29797.46
05/16/11 07:43:00	59.99612	471		0	0				-653	29797.46
05/16/11 07:43:02	59.99646	471		0	0				-653	29797.46
05/16/11 07:43:04	59.99741	471		0	0				-653	29797.52
05/16/11 07:43:06	59.99838	471		0	0				-653	29797.52
05/16/11 07:43:08	59.99936	471		0	0				-653	29797.52
05/16/11 07:43:10	59.99902	471		0	0				-653	29797.52
05/16/11 07:43:12	59.99872	471		0	0				-653	29797.52
05/16/11 07:43:14	59.99774	471		0	0				-653	29780.33
05/16/11 07:43:16	59.99646	471		0	0				-653	29780.33
05/16/11 07:43:18	59.99677	471		0	0				-653	29780.33
05/16/11 07:43:20	59.99677	471		0	0				-653	29780.33
05/16/11 07:43:22	59.99774	471		0	0				-653	29780.33
05/16/11 07:43:24	59.99805	471		0	0				-653	29780.27
05/16/11 07:43:26	59.99774	471		0	0				-653	29780.27
05/16/11 07:43:28	59.99579	471		0	0				-653	29780.27
05/16/11 07:43:30	59.99387	471		0	0				-653	29780.27
05/16/11 07:43:32	59.99255	471		0	0				-653	29780.27
05/16/11 07:43:34	59.99127	471		0	0				-653	29785.63
05/16/11 07:43:36	59.98999	471		0	0				-653	29785.63
05/16/11 07:43:38	59.98965	471		0	0				-653	29785.63
05/16/11 07:43:40	59.98837	471		0	0				-653	29785.63
05/16/11 07:43:42	59.98709	471		0	0				-653	29785.63
05/16/11 07:43:44	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:46	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:48	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:50	59.98676	471		0	0				-653	29785.63
05/16/11 07:43:52	59.98676	471		0	0				-653	29785.63
05/16/11 07:43:54	59.98642	471		0	0				-653	29787.12
05/16/11 07:43:56	59.98611	471		0	0				-653	29787.12
05/16/11 07:43:58	59.98611	471		0	0				-653	29787.12
05/16/11 07:44:00	59.98514	471		0	0				-653	29787.12
05/16/11 07:44:02	59.98416	471		0	0				-653	29787.12
05/16/11 07:44:04	59.98352	471		0	0				-653	29787.12

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:44:06	59.98224	471		0	0				-653	29787.12
05/16/11 07:44:08	59.98029	471		0	0				-653	29787.12
05/16/11 07:44:10	59.979	471		0	0				-653	29787.12
05/16/11 07:44:12	59.97769	471		0	0				-653	29787.12
05/16/11 07:44:14	59.97675	471		0	0				-653	29780.67
05/16/11 07:44:16	59.97641	471		0	0				-653	29780.67
05/16/11 07:44:18	59.97739	471		0	0				-653	29780.67
05/16/11 07:44:20	59.97998	471		0	0				-653	29780.67
05/16/11 07:44:22	59.98318	471		0	0				-653	29780.67
05/16/11 07:44:24	59.98611	471		0	0				-653	29780.76
05/16/11 07:44:26	59.98837	471		0	0				-653	29780.76
05/16/11 07:44:28	59.9903	471		0	0				-653	29780.76
05/16/11 07:44:30	59.99191	471		0	0				-653	29780.76
05/16/11 07:44:32	59.99353	471		0	0				-653	29780.76
05/16/11 07:44:34	59.99579	471		0	0				-653	29777.7
05/16/11 07:44:36	60	471		0	0				-653	29777.7
05/16/11 07:44:38	60.00354	471		0	0				-653	29777.7
05/16/11 07:44:40	60.00647	471		0	0				-653	29777.7
05/16/11 07:44:42	60.00839	471		0	0				-653	29777.7
05/16/11 07:44:44	60.00903	471		0	0				-653	29777.7
05/16/11 07:44:46	60.00873	471		0	0				-653	29777.7
05/16/11 07:44:48	60.00873	471		0	0				-653	29777.7
05/16/11 07:44:50	60.00937	471		0	0				-653	29777.7
05/16/11 07:44:52	60.01099	471		0	0				-653	29777.7
05/16/11 07:44:54	60.01453	471		0	0				-653	29788.63
05/16/11 07:44:56	60.0181	471		0	0				-653	29788.63
05/16/11 07:44:58	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:00	60.02036	471		0	0				-653	29788.63
05/16/11 07:45:02	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:04	60.02002	471		0	0				-653	29788.63
05/16/11 07:45:06	60.01907	471		0	0				-653	29788.63
05/16/11 07:45:08	60.0181	471		0	0				-653	29788.63
05/16/11 07:45:10	60.01712	471		0	0				-653	29788.63
05/16/11 07:45:12	60.01712	471		0	0				-653	29788.63
05/16/11 07:45:14	60.01712	471		0	0				-653	29788.51
05/16/11 07:45:16	60.01453	471		0	0				-653	29788.51
05/16/11 07:45:18	60.01358	471		0	0				-653	29788.51
05/16/11 07:45:20	60.01227	471		0	0				-653	29788.51
05/16/11 07:45:22	60.01163	471		0	0				-653	29788.51
05/16/11 07:45:24	60.01065	471		0	0				-653	29788.51
05/16/11 07:45:26	60.0097	471		0	0				-653	29788.51

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004543 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:45:28	60.00839	471		0	0				-653	29788.51
05/16/11 07:45:30	60.00745	471		0	0				-653	29788.51
05/16/11 07:45:32	60.00775	471		0	0				-653	29788.51
05/16/11 07:45:34	60.00839	471		0	0				-653	29780.62
05/16/11 07:45:36	60.00839	471		0	0				-653	29780.62
05/16/11 07:45:38	60.00809	471		0	0				-653	29780.62
05/16/11 07:45:40	60.00745	471		0	0				-653	29780.62
05/16/11 07:45:42	60.00711	471		0	0				-653	29780.62
05/16/11 07:45:44	60.00839	471		0	0				-653	29780.56
05/16/11 07:45:46	60.00937	471		0	0				-653	29780.56
05/16/11 07:45:48	60.0097	471		0	0				-653	29780.56
05/16/11 07:45:50	60.01001	471		0	0				-653	29780.56
05/16/11 07:45:52	60.01065	471		0	0				-653	29780.56
05/16/11 07:45:54	60.01196	471		0	0				-653	29784.96
05/16/11 07:45:56	60.01324	471		0	0				-653	29784.96
05/16/11 07:45:58	60.01453	471		0	0				-653	29784.96
05/16/11 07:46:00	60.01614	471		0	0				-653	29784.96
05/16/11 07:46:02	60.01712	471		0	0				-653	29784.96
05/16/11 07:46:04	60.01712	471		0	0				-653	29784.93
05/16/11 07:46:06	60.01614	471		0	0				-653	29784.93
05/16/11 07:46:08	60.01584	471		0	0				-653	29784.93
05/16/11 07:46:10	60.01614	471		0	0				-653	29784.93
05/16/11 07:46:12	60.01584	471		0	0				-653	29784.93
05/16/11 07:46:14	60.01486	471		0	0				-653	29760.42
05/16/11 07:46:16	60.01422	471		0	0				-653	29760.42
05/16/11 07:46:18	60.01227	471		0	0				-653	29760.42
05/16/11 07:46:20	60.0097	471		0	0				-653	29760.42
05/16/11 07:46:22	60.00711	471		0	0				-653	29760.42
05/16/11 07:46:24	60.00583	471		0	0				-653	29760.42
05/16/11 07:46:26	60.00516	471		0	0				-653	29760.42
05/16/11 07:46:28	60.00516	471		0	0				-653	29760.42
05/16/11 07:46:30	60.00485	471		0	0				-653	29760.42
05/16/11 07:46:32	60.00388	471		0	0				-653	29760.42
05/16/11 07:46:34	60.00259	471		0	0				-653	29782.35
05/16/11 07:46:36	59.99902	471		0	0				-653	29782.35
05/16/11 07:46:38	59.9971	471		0	0				-653	29782.35
05/16/11 07:46:40	59.99646	471		0	0				-653	29782.35
05/16/11 07:46:42	59.99579	471		0	0				-653	29782.35
05/16/11 07:46:44	59.99417	471		0	0				-653	29782.44
05/16/11 07:46:46	59.99225	471		0	0				-653	29782.44
05/16/11 07:46:48	59.9903	471		0	0				-653	29782.44

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	004544 Highest Delta Hz	Rows of data to shift to align T(0)
805	59.999	0.078	-0.078	0.009	1
921	8:06:38	t(0)			
806	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
0	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:46:50	59.98804	471		0	0				-653	29782.44
05/16/11 07:46:52	59.98709	471		0	0				-653	29782.44
05/16/11 07:46:54	59.98676	471		0	0				-653	29785.52
05/16/11 07:46:56	59.98578	471		0	0				-653	29785.52
05/16/11 07:46:58	59.9845	471		0	0				-653	29785.52
05/16/11 07:47:00	59.98288	471		0	0				-653	29785.52
05/16/11 07:47:02	59.98224	471		0	0				-653	29785.52
05/16/11 07:47:04	59.98224	471		0	0				-653	29785.55
05/16/11 07:47:06	59.98224	471		0	0				-653	29785.55
05/16/11 07:47:08	59.98254	471		0	0				-653	29785.55
05/16/11 07:47:10	59.98386	471		0	0				-653	29785.55
05/16/11 07:47:12	59.9848	471		0	0				-653	29785.55
05/16/11 07:47:14	59.98578	471		0	0				-653	29788.21
05/16/11 07:47:16	59.98642	471		0	0				-653	29788.21
05/16/11 07:47:18	59.98999	471		0	0				-653	29788.21
05/16/11 07:47:20	59.99225	471		0	0				-653	29788.21
05/16/11 07:47:22	59.99323	471		0	0				-653	29788.21
05/16/11 07:47:24	59.99646	471		0	0				-653	29788.06
05/16/11 07:47:26	59.99902	471		0	0				-653	29788.06
05/16/11 07:47:28	60.00064	471		0	0				-653	29788.06
05/16/11 07:47:30	60.00647	471		0	0				-653	29788.06
05/16/11 07:47:32	60.00903	471		0	0				-653	29788.06
05/16/11 07:47:34	60.01099	471		0	0				-653	29776.11
05/16/11 07:47:36	60.01132	471		0	0				-653	29776.11
05/16/11 07:47:38	60.01291	471		0	0				-653	29776.11
05/16/11 07:47:40	60.01324	471		0	0				-653	29776.11
05/16/11 07:47:42	60.01324	471		0	0				-653	29776.11
05/16/11 07:47:44	60.01422	471		0	0				-653	29776.17
05/16/11 07:47:46	60.0181	471		0	0				-653	29776.17
05/16/11 07:47:48	60.01907	471		0	0				-653	29776.17
05/16/11 07:47:50	60.02133	471		0	0				-653	29776.17
05/16/11 07:47:52	60.02197	471		0	0				-653	29776.17
05/16/11 07:47:54	60.02164	471		0	0				-653	29794.69
05/16/11 07:47:56	60.01971	471		0	0				-653	29794.69
05/16/11 07:47:58	60.01907	471		0	0				-653	29794.69
05/16/11 07:48:00	60.01746	471		0	0				-653	29794.69
05/16/11 07:48:02	60.01776	471		0	0				-653	29794.69
05/16/11 07:48:04	60.0184	471		0	0				-653	29794.66
05/16/11 07:48:06	60.01776	471		0	0				-653	29794.66
05/16/11 07:48:08	60.0152	471		0	0				-653	29794.66
05/16/11 07:48:10	60.01389	471		0	0				-653	29794.66

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004545 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta Hz	Absolute Delta Hz	
806	03:52 Event Length mm:ss				
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.006	0.006	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:48:12	60.01422	471		0	0				-653	29794.66
05/16/11 07:48:14	60.0152	471		0	0				-653	29804.78
05/16/11 07:48:16	60.01614	471		0	0				-653	29804.78
05/16/11 07:48:18	60.01614	471		0	0				-653	29804.78
05/16/11 07:48:20	60.01422	471		0	0				-653	29804.78
05/16/11 07:48:22	60.01196	471		0	0				-653	29804.78
05/16/11 07:48:24	60.01035	471		0	0				-653	29804.86
05/16/11 07:48:26	60.00809	471		0	0				-653	29804.86
05/16/11 07:48:28	60.00613	471		0	0				-653	29804.86
05/16/11 07:48:30	60.00516	471		0	0				-653	29804.86
05/16/11 07:48:32	60.00452	471		0	0				-653	29804.86
05/16/11 07:48:34	60.00354	471		0	0				-653	29800.12
05/16/11 07:48:36	60.00128	471		0	0				-653	29800.12
05/16/11 07:48:38	60	471		0	0				-653	29800.12
05/16/11 07:48:40	59.99936	471		0	0				-653	29800.12
05/16/11 07:48:42	59.99838	471		0	0				-653	29800.12
05/16/11 07:48:44	59.99741	471		0	0				-653	29800.18
05/16/11 07:48:46	59.99579	471		0	0				-653	29800.18
05/16/11 07:48:48	59.99515	471		0	0				-653	29800.18
05/16/11 07:48:50	59.99646	471		0	0				-653	29800.18
05/16/11 07:48:52	59.99872	471		0	0				-653	29800.18
05/16/11 07:48:54	60.00128	471		0	0				-653	29799.82
05/16/11 07:48:56	60.00323	471		0	0				-653	29799.82
05/16/11 07:48:58	60.00421	471		0	0				-653	29799.82
05/16/11 07:49:00	60.00485	471		0	0				-653	29799.82
05/16/11 07:49:02	60.00549	471		0	0				-653	29799.82
05/16/11 07:49:04	60.00583	471		0	0				-653	29799.79
05/16/11 07:49:06	60.00583	471		0	0				-653	29799.79
05/16/11 07:49:08	60.00549	471		0	0				-653	29799.79
05/16/11 07:49:10	60.00388	471		0	0				-653	29799.79
05/16/11 07:49:12	60.00226	471		0	0				-653	29799.79
05/16/11 07:49:14	60.00226	471		0	0				-653	29795.67
05/16/11 07:49:16	60	471		0	0				-653	29795.67
05/16/11 07:49:18	60	471		0	0				-653	29795.67
05/16/11 07:49:20	60	471		0	0				-653	29795.67
05/16/11 07:49:22	60	471		0	0				-653	29795.67
05/16/11 07:49:24	60.00452	471		0	0				-653	29795.55
05/16/11 07:49:26	60.00583	471		0	0				-653	29795.55
05/16/11 07:49:28	60.00613	471		0	0				-653	29795.55
05/16/11 07:49:30	60.00583	471		0	0				-653	29795.55
05/16/11 07:49:32	60.00516	471		0	0				-653	29795.55

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004546 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.005	0.005	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:49:34	60.00388	471		0	0				-653	29783.53
05/16/11 07:49:36	60.00195	471		0	0				-653	29783.53
05/16/11 07:49:38	60.00128	471		0	0				-653	29783.53
05/16/11 07:49:40	60.00098	471		0	0				-653	29783.53
05/16/11 07:49:42	60.00034	471		0	0				-653	29783.53
05/16/11 07:49:44	60	471		0	0				-653	29783.47
05/16/11 07:49:46	59.99902	471		0	0				-653	29783.47
05/16/11 07:49:48	59.99872	471		0	0				-653	29783.47
05/16/11 07:49:50	59.99838	471		0	0				-653	29783.47
05/16/11 07:49:52	59.99612	471		0	0				-653	29783.47
05/16/11 07:49:54	59.99579	471		0	0				-653	29788.38
05/16/11 07:49:56	59.99515	471		0	0				-653	29788.38
05/16/11 07:49:58	59.99387	471		0	0				-653	29788.38
05/16/11 07:50:00	59.99225	471		0	0				-653	29788.38
05/16/11 07:50:02	59.99225	471		0	0				-653	29788.38
05/16/11 07:50:04	59.99484	471		0	0				-653	29788.38
05/16/11 07:50:06	59.99646	471		0	0				-653	29788.38
05/16/11 07:50:08	59.9971	471		0	0				-653	29788.38
05/16/11 07:50:10	59.99548	471		0	0				-653	29788.38
05/16/11 07:50:12	59.99289	471		0	0				-653	29788.38
05/16/11 07:50:14	59.98999	471		0	0				-653	29790.16
05/16/11 07:50:16	59.98773	471		0	0				-653	29790.16
05/16/11 07:50:18	59.98642	471		0	0				-653	29790.16
05/16/11 07:50:20	59.98547	471		0	0				-653	29790.16
05/16/11 07:50:22	59.98547	471		0	0				-653	29790.16
05/16/11 07:50:24	59.98611	471		0	0				-653	29790.07
05/16/11 07:50:26	59.98611	471		0	0				-653	29790.07
05/16/11 07:50:28	59.98676	471		0	0				-653	29790.07
05/16/11 07:50:30	59.98709	471		0	0				-653	29790.07
05/16/11 07:50:32	59.9874	471		0	0				-653	29790.07
05/16/11 07:50:34	59.98676	471		0	0				-653	29777.49
05/16/11 07:50:36	59.98611	471		0	0				-653	29777.49
05/16/11 07:50:38	59.98642	471		0	0				-653	29777.49
05/16/11 07:50:40	59.9874	471		0	0				-653	29777.49
05/16/11 07:50:42	59.98804	471		0	0				-653	29777.49
05/16/11 07:50:44	59.9874	471		0	0				-653	29777.49
05/16/11 07:50:46	59.98676	471		0	0				-653	29777.49
05/16/11 07:50:48	59.9848	471		0	0				-653	29777.49
05/16/11 07:50:50	59.98288	471		0	0				-653	29777.49
05/16/11 07:50:52	59.98062	471		0	0				-653	29777.49
05/16/11 07:50:54	59.97998	471		0	0				-653	29782.49

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004547 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:50:56	59.97931	471		0	0				-653	29782.49
05/16/11 07:50:58	59.979	471		0	0				-653	29782.49
05/16/11 07:51:00	59.97931	471		0	0				-653	29782.49
05/16/11 07:51:02	59.98093	471		0	0				-653	29782.49
05/16/11 07:51:04	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:06	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:08	59.9819	471		0	0				-653	29782.46
05/16/11 07:51:10	59.98126	471		0	0				-653	29782.46
05/16/11 07:51:12	59.97964	471		0	0				-653	29782.46
05/16/11 07:51:14	59.97705	471		0	0				-653	29756.13
05/16/11 07:51:16	59.97479	471		0	0				-653	29756.13
05/16/11 07:51:18	59.97351	471		0	0				-653	29756.13
05/16/11 07:51:20	59.97287	471		0	0				-653	29756.13
05/16/11 07:51:22	59.97223	471		0	0				-653	29756.13
05/16/11 07:51:24	59.97189	471		0	0				-653	29756.18
05/16/11 07:51:26	59.97125	471		0	0				-653	29756.18
05/16/11 07:51:28	59.97156	471		0	0				-653	29756.18
05/16/11 07:51:30	59.97318	471		0	0				-653	29756.18
05/16/11 07:51:32	59.97415	471		0	0				-653	29756.18
05/16/11 07:51:34	59.97479	471		0	0				-653	29777.58
05/16/11 07:51:36	59.97382	471		0	0				-653	29777.58
05/16/11 07:51:38	59.97287	471		0	0				-653	29777.58
05/16/11 07:51:40	59.97318	471		0	0				-653	29777.58
05/16/11 07:51:42	59.97449	471		0	0				-653	29777.58
05/16/11 07:51:44	59.97675	471		0	0				-653	29777.4
05/16/11 07:51:46	59.97803	471		0	0				-653	29777.4
05/16/11 07:51:48	59.97998	471		0	0				-653	29777.4
05/16/11 07:51:50	59.98093	471		0	0				-653	29777.4
05/16/11 07:51:52	59.98093	471		0	0				-653	29777.4
05/16/11 07:51:54	59.97964	471		0	0				-653	29802.24
05/16/11 07:51:56	59.97803	471		0	0				-653	29802.24
05/16/11 07:51:58	59.97705	471		0	0				-653	29802.24
05/16/11 07:52:00	59.97739	471		0	0				-653	29802.24
05/16/11 07:52:02	59.97836	471		0	0				-653	29802.24
05/16/11 07:52:04	59.97931	471		0	0				-653	29802.18
05/16/11 07:52:06	59.98126	471		0	0				-653	29802.18
05/16/11 07:52:08	59.98416	471		0	0				-653	29802.18
05/16/11 07:52:10	59.98611	471		0	0				-653	29802.18
05/16/11 07:52:12	59.98709	471		0	0				-653	29802.18
05/16/11 07:52:14	59.9874	471		0	0				-653	29802.29
05/16/11 07:52:16	59.98804	471		0	0				-653	29802.29

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004548 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:52:18	59.98804	471		0	0				-653	29802.29
05/16/11 07:52:20	59.98773	471		0	0				-653	29802.29
05/16/11 07:52:22	59.9874	471		0	0				-653	29802.29
05/16/11 07:52:24	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:26	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:28	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:30	59.98773	471		0	0				-653	29802.32
05/16/11 07:52:32	59.98901	471		0	0				-653	29802.32
05/16/11 07:52:34	59.98965	471		0	0				-653	29795.02
05/16/11 07:52:36	59.98935	471		0	0				-653	29795.02
05/16/11 07:52:38	59.98837	471		0	0				-653	29795.02
05/16/11 07:52:40	59.98868	471		0	0				-653	29795.02
05/16/11 07:52:42	59.98868	471		0	0				-653	29795.02
05/16/11 07:52:44	59.9874	471		0	0				-653	29795.05
05/16/11 07:52:46	59.98611	471		0	0				-653	29795.05
05/16/11 07:52:48	59.98611	471		0	0				-653	29795.05
05/16/11 07:52:50	59.98709	471		0	0				-653	29795.05
05/16/11 07:52:52	59.98837	471		0	0				-653	29795.05
05/16/11 07:52:54	59.98935	471		0	0				-653	29781.42
05/16/11 07:52:56	59.98999	471		0	0				-653	29781.42
05/16/11 07:52:58	59.99127	471		0	0				-653	29781.42
05/16/11 07:53:00	59.99255	471		0	0				-653	29781.42
05/16/11 07:53:02	59.99387	471		0	0				-653	29781.42
05/16/11 07:53:04	59.99387	471		0	0				-653	29781.45
05/16/11 07:53:06	59.99289	471		0	0				-653	29781.45
05/16/11 07:53:08	59.99097	471		0	0				-653	29781.45
05/16/11 07:53:10	59.98868	471		0	0				-653	29781.45
05/16/11 07:53:12	59.98642	471		0	0				-653	29781.45
05/16/11 07:53:14	59.98386	471		0	0				-653	29802.43
05/16/11 07:53:16	59.9816	471		0	0				-653	29802.43
05/16/11 07:53:18	59.97931	471		0	0				-653	29802.43
05/16/11 07:53:20	59.97675	471		0	0				-653	29802.43
05/16/11 07:53:22	59.97415	471		0	0				-653	29802.43
05/16/11 07:53:24	59.97287	471		0	0				-653	29802.4
05/16/11 07:53:26	59.97223	471		0	0				-653	29802.4
05/16/11 07:53:28	59.97318	471		0	0				-653	29802.4
05/16/11 07:53:30	59.97449	471		0	0				-653	29802.4
05/16/11 07:53:32	59.97351	471		0	0				-653	29802.4
05/16/11 07:53:34	59.97253	471		0	0				-653	29804.4
05/16/11 07:53:36	59.97253	471		0	0				-653	29804.4
05/16/11 07:53:38	59.97223	471		0	0				-653	29804.4

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004549 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:53:40	59.97156	471		0	0				-653	29804.4
05/16/11 07:53:42	59.97189	471		0	0				-653	29804.4
05/16/11 07:53:44	59.97318	471		0	0				-653	29804.4
05/16/11 07:53:46	59.97479	471		0	0				-653	29804.4
05/16/11 07:53:48	59.9761	471		0	0				-653	29804.4
05/16/11 07:53:50	59.97803	471		0	0				-653	29804.4
05/16/11 07:53:52	59.98062	471		0	0				-653	29804.4
05/16/11 07:53:54	59.98254	471		0	0				-653	29797.32
05/16/11 07:53:56	59.98416	471		0	0				-653	29797.32
05/16/11 07:53:58	59.98611	471		0	0				-653	29797.32
05/16/11 07:54:00	59.98804	471		0	0				-653	29797.32
05/16/11 07:54:02	59.9903	471		0	0				-653	29797.32
05/16/11 07:54:04	59.99161	471		0	0				-653	29797.29
05/16/11 07:54:06	59.99323	471		0	0				-653	29797.29
05/16/11 07:54:08	59.99484	471		0	0				-653	29797.29
05/16/11 07:54:10	59.99579	471		0	0				-653	29797.29
05/16/11 07:54:12	59.99515	471		0	0				-653	29797.29
05/16/11 07:54:14	59.99612	471		0	0				-653	29823.76
05/16/11 07:54:16	59.99805	471		0	0				-653	29823.76
05/16/11 07:54:18	59.99936	471		0	0				-653	29823.76
05/16/11 07:54:20	60.00064	471		0	0				-653	29823.76
05/16/11 07:54:22	60.00098	471		0	0				-653	29823.76
05/16/11 07:54:24	60.00064	471		0	0				-653	29818.41
05/16/11 07:54:26	60	471		0	0				-653	29818.41
05/16/11 07:54:28	59.99902	471		0	0				-653	29818.41
05/16/11 07:54:30	59.99872	471		0	0				-653	29818.41
05/16/11 07:54:32	59.99936	471		0	0				-653	29818.41
05/16/11 07:54:34	60.00034	471		0	0				-653	29808.89
05/16/11 07:54:36	60.00162	471		0	0				-653	29808.89
05/16/11 07:54:38	60.00354	471		0	0				-653	29808.89
05/16/11 07:54:40	60.00485	471		0	0				-653	29808.89
05/16/11 07:54:42	60.00421	471		0	0				-653	29808.89
05/16/11 07:54:44	60.00195	471		0	0				-653	29814.89
05/16/11 07:54:46	59.99902	471		0	0				-653	29814.89
05/16/11 07:54:48	59.99646	471		0	0				-653	29814.89
05/16/11 07:54:50	59.99417	471		0	0				-653	29814.89
05/16/11 07:54:52	59.99323	471		0	0				-653	29814.89
05/16/11 07:54:54	59.99127	471		0	0				-653	29826.47
05/16/11 07:54:56	59.98935	471		0	0				-653	29826.47
05/16/11 07:54:58	59.98709	471		0	0				-653	29826.47
05/16/11 07:55:00	59.98578	471		0	0				-653	29826.47

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004550 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta Hz	Absolute Delta Hz	
806	03:52 Event Length mm:ss				
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:55:02	59.98547	471		0	0				-653	29826.47
05/16/11 07:55:04	59.98547	471		0	0				-653	29826.41
05/16/11 07:55:06	59.98514	471		0	0				-653	29826.41
05/16/11 07:55:08	59.9845	471		0	0				-653	29826.41
05/16/11 07:55:10	59.9845	471		0	0				-653	29826.41
05/16/11 07:55:12	59.9848	471		0	0				-653	29826.41
05/16/11 07:55:14	59.9848	471		0	0				-653	29834.18
05/16/11 07:55:16	59.98611	471		0	0				-653	29834.18
05/16/11 07:55:18	59.9874	471		0	0				-653	29834.18
05/16/11 07:55:20	59.98868	471		0	0				-653	29834.18
05/16/11 07:55:22	59.98837	471		0	0				-653	29834.18
05/16/11 07:55:24	59.98837	471		0	0				-653	29836.13
05/16/11 07:55:26	59.98578	471		0	0				-653	29836.13
05/16/11 07:55:28	59.9845	471		0	0				-653	29836.13
05/16/11 07:55:30	59.9848	471		0	0				-653	29836.13
05/16/11 07:55:32	59.98547	471		0	0				-653	29836.13
05/16/11 07:55:34	59.98642	471		0	0				-653	29821.84
05/16/11 07:55:36	59.98773	471		0	0				-653	29821.84
05/16/11 07:55:38	59.98965	471		0	0				-653	29821.84
05/16/11 07:55:40	59.99063	471		0	0				-653	29821.84
05/16/11 07:55:42	59.99063	471		0	0				-653	29821.84
05/16/11 07:55:44	59.99063	471		0	0				-653	29821.87
05/16/11 07:55:46	59.99063	471		0	0				-653	29821.87
05/16/11 07:55:48	59.98642	471		0	0				-653	29821.87
05/16/11 07:55:50	59.9845	471		0	0				-653	29821.87
05/16/11 07:55:52	59.98224	471		0	0				-653	29821.87
05/16/11 07:55:54	59.98062	471		0	0				-653	29831.33
05/16/11 07:55:56	59.97739	471		0	0				-653	29831.33
05/16/11 07:55:58	59.97641	471		0	0				-653	29831.33
05/16/11 07:56:00	59.97641	471		0	0				-653	29831.33
05/16/11 07:56:02	59.9761	471		0	0				-653	29831.33
05/16/11 07:56:04	59.97543	471		0	0				-653	29831.33
05/16/11 07:56:06	59.97577	471		0	0				-653	29831.33
05/16/11 07:56:08	59.97675	471		0	0				-653	29831.33
05/16/11 07:56:10	59.97705	471		0	0				-653	29831.33
05/16/11 07:56:12	59.97705	471		0	0				-653	29831.33
05/16/11 07:56:14	59.97705	471		0	0				-653	29835.51
05/16/11 07:56:16	59.97675	471		0	0				-653	29835.51
05/16/11 07:56:18	59.97705	471		0	0				-653	29835.51
05/16/11 07:56:20	59.97739	471		0	0				-653	29835.51
05/16/11 07:56:22	59.97803	471		0	0				-653	29835.51

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004551 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:56:24	59.97803	471		0	0				-653	29856.55
05/16/11 07:56:26	59.97867	471		0	0				-653	29856.55
05/16/11 07:56:28	59.97964	471		0	0				-653	29856.55
05/16/11 07:56:30	59.9816	471		0	0				-653	29856.55
05/16/11 07:56:32	59.98352	471		0	0				-653	29856.55
05/16/11 07:56:34	59.98642	471		0	0				-653	29846.76
05/16/11 07:56:36	59.9903	471		0	0				-653	29846.76
05/16/11 07:56:38	59.99451	471		0	0				-653	29846.76
05/16/11 07:56:40	59.99741	471		0	0				-653	29846.76
05/16/11 07:56:42	59.99838	471		0	0				-653	29846.76
05/16/11 07:56:44	59.99805	471		0	0				-653	29860.05
05/16/11 07:56:46	59.99677	471		0	0				-653	29860.05
05/16/11 07:56:48	59.99612	471		0	0				-653	29860.05
05/16/11 07:56:50	59.99548	471		0	0				-653	29860.05
05/16/11 07:56:52	59.99612	471		0	0				-653	29860.05
05/16/11 07:56:54	59.99936	471		0	0				-653	29873.15
05/16/11 07:56:56	60.00323	471		0	0				-653	29873.15
05/16/11 07:56:58	60.00745	471		0	0				-653	29873.15
05/16/11 07:57:00	60.01163	471		0	0				-653	29873.15
05/16/11 07:57:02	60.01453	471		0	0				-653	29873.15
05/16/11 07:57:04	60.01746	471		0	0				-653	29873.15
05/16/11 07:57:06	60.01907	471		0	0				-653	29873.15
05/16/11 07:57:08	60.01938	471		0	0				-653	29873.15
05/16/11 07:57:10	60.01938	471		0	0				-653	29873.15
05/16/11 07:57:12	60.01938	471		0	0				-653	29873.15
05/16/11 07:57:14	60.02036	471		0	0				-653	29889.67
05/16/11 07:57:16	60.02197	471		0	0				-653	29889.67
05/16/11 07:57:18	60.02423	471		0	0				-653	29889.67
05/16/11 07:57:20	60.02682	471		0	0				-653	29889.67
05/16/11 07:57:22	60.02811	471		0	0				-653	29889.67
05/16/11 07:57:24	60.02939	471		0	0				-653	29886.6
05/16/11 07:57:26	60.03036	471		0	0				-653	29886.6
05/16/11 07:57:28	60.02875	471		0	0				-653	29886.6
05/16/11 07:57:30	60.02682	471		0	0				-653	29886.6
05/16/11 07:57:32	60.02457	471		0	0				-653	29886.6
05/16/11 07:57:34	60.02261	471		0	0				-653	29891.67
05/16/11 07:57:36	60.02231	471		0	0				-653	29891.67
05/16/11 07:57:38	60.02295	471		0	0				-653	29891.67
05/16/11 07:57:40	60.02359	471		0	0				-653	29891.67
05/16/11 07:57:42	60.02261	471		0	0				-653	29891.67
05/16/11 07:57:44	60.02164	471		0	0				-653	29891.64

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004552 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:57:46	60.01971	471		0	0				-653	29891.64
05/16/11 07:57:48	60.01776	471		0	0				-653	29891.64
05/16/11 07:57:50	60.01746	471		0	0				-653	29891.64
05/16/11 07:57:52	60.01682	471		0	0				-653	29891.64
05/16/11 07:57:54	60.01712	471		0	0				-653	29891.51
05/16/11 07:57:56	60.0184	471		0	0				-653	29891.51
05/16/11 07:57:58	60.01874	471		0	0				-653	29891.51
05/16/11 07:58:00	60.0181	471		0	0				-653	29891.51
05/16/11 07:58:02	60.01682	471		0	0				-653	29891.51
05/16/11 07:58:04	60.0152	471		0	0				-653	29891.6
05/16/11 07:58:06	60.0152	471		0	0				-653	29891.6
05/16/11 07:58:08	60.0155	471		0	0				-653	29891.6
05/16/11 07:58:10	60.0155	471		0	0				-653	29891.6
05/16/11 07:58:12	60.01453	471		0	0				-653	29891.6
05/16/11 07:58:14	60.01453	471		0	0				-653	29884.5
05/16/11 07:58:16	60.0152	471		0	0				-653	29884.5
05/16/11 07:58:18	60.01584	471		0	0				-653	29884.5
05/16/11 07:58:20	60.01614	471		0	0				-653	29884.5
05/16/11 07:58:22	60.01584	471		0	0				-653	29884.5
05/16/11 07:58:24	60.0152	471		0	0				-653	29881.79
05/16/11 07:58:26	60.0155	471		0	0				-653	29881.79
05/16/11 07:58:28	60.01614	471		0	0				-653	29881.79
05/16/11 07:58:30	60.01776	471		0	0				-653	29881.79
05/16/11 07:58:32	60.01907	471		0	0				-653	29881.79
05/16/11 07:58:34	60.02069	471		0	0				-653	29887.14
05/16/11 07:58:36	60.02133	471		0	0				-653	29887.14
05/16/11 07:58:38	60.02069	471		0	0				-653	29887.14
05/16/11 07:58:40	60.01907	471		0	0				-653	29887.14
05/16/11 07:58:42	60.01746	471		0	0				-653	29887.14
05/16/11 07:58:44	60.01614	471		0	0				-653	29873.08
05/16/11 07:58:46	60.0152	471		0	0				-653	29873.08
05/16/11 07:58:48	60.01453	471		0	0				-653	29873.08
05/16/11 07:58:50	60.01389	471		0	0				-653	29873.08
05/16/11 07:58:52	60.01358	471		0	0				-653	29873.08
05/16/11 07:58:54	60.01099	471		0	0				-653	29862.1
05/16/11 07:58:56	60.00549	471		0	0				-653	29862.1
05/16/11 07:58:58	59.99966	471		0	0				-653	29862.1
05/16/11 07:59:00	59.99451	471		0	0				-653	29862.1
05/16/11 07:59:02	59.99127	471		0	0				-653	29862.1
05/16/11 07:59:04	59.98965	471		0	0				-653	29861.95
05/16/11 07:59:06	59.98868	471		0	0				-653	29861.95

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004553 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.005	0.005	
0	0	0	-0.006	0.006	
0	0	0	-0.005	0.005	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:59:08	59.98676	471		0	0				-653	29861.95
05/16/11 07:59:10	59.9848	471		0	0				-653	29861.95
05/16/11 07:59:12	59.98288	471		0	0				-653	29861.95
05/16/11 07:59:14	59.98062	471		0	0				-653	29906.21
05/16/11 07:59:16	59.97803	471		0	0				-653	29906.21
05/16/11 07:59:18	59.9761	471		0	0				-653	29906.21
05/16/11 07:59:20	59.97577	471		0	0				-653	29906.21
05/16/11 07:59:22	59.9761	471		0	0				-653	29906.21
05/16/11 07:59:24	59.9761	471		0	0				-653	29878.69
05/16/11 07:59:26	59.97641	471		0	0				-653	29878.69
05/16/11 07:59:28	59.97543	471		0	0				-653	29878.69
05/16/11 07:59:30	59.97479	471		0	0				-653	29878.69
05/16/11 07:59:32	59.97382	471		0	0				-653	29878.69
05/16/11 07:59:34	59.97253	471		0	0				-653	29900.56
05/16/11 07:59:36	59.97223	471		0	0				-653	29900.56
05/16/11 07:59:38	59.97253	471		0	0				-653	29900.56
05/16/11 07:59:40	59.97351	471		0	0				-653	29900.56
05/16/11 07:59:42	59.97351	471		0	0				-653	29900.56
05/16/11 07:59:44	59.97318	471		0	0				-653	29896.99
05/16/11 07:59:46	59.97189	471		0	0				-653	29896.99
05/16/11 07:59:48	59.97092	471		0	0				-653	29896.99
05/16/11 07:59:50	59.97028	471		0	0				-653	29896.99
05/16/11 07:59:52	59.97028	471		0	0				-653	29896.99
05/16/11 07:59:54	59.97028	471		0	0				-653	29905.8
05/16/11 07:59:56	59.97028	471		0	0				-653	29905.8
05/16/11 07:59:58	59.97061	471		0	0				-653	29905.8
05/16/11 08:00:00	59.97287	471		0	0				-653	29905.8
05/16/11 08:00:02	59.97287	471		0	0				-653	29905.8
05/16/11 08:00:04	59.97479	471		0	0				-653	29905.77
05/16/11 08:00:06	59.97479	471		0	0				-653	29905.77
05/16/11 08:00:08	59.97382	471		0	0				-653	29905.77
05/16/11 08:00:10	59.96832	471		0	0				-653	29905.77
05/16/11 08:00:12	59.96802	471		0	0				-653	29905.77
05/16/11 08:00:14	59.96899	471		0	0				-653	29914.9
05/16/11 08:00:16	59.96994	471		0	0				-653	29914.9
05/16/11 08:00:18	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:20	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:22	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:24	59.97769	471		0	0				-653	29925.58
05/16/11 08:00:26	59.97739	471		0	0				-653	29925.58
05/16/11 08:00:28	59.9761	471		0	0				-653	29925.58

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0)
805	8:06:38	t(0)		004554	1
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:00:30	59.9761	471		0	0				-653	29925.58
05/16/11 08:00:32	59.97705	471		0	0				-653	29925.58
05/16/11 08:00:34	59.97769	471		0	0				-653	29938.87
05/16/11 08:00:36	59.97803	471		0	0				-653	29938.87
05/16/11 08:00:38	59.97803	471		0	0				-653	29938.87
05/16/11 08:00:40	59.97739	471		0	0				-653	29938.87
05/16/11 08:00:42	59.97675	471		0	0				-653	29938.87
05/16/11 08:00:44	59.97641	471		0	0				-653	29952.51
05/16/11 08:00:46	59.97479	471		0	0				-653	29952.51
05/16/11 08:00:48	59.97449	471		0	0				-653	29952.51
05/16/11 08:00:50	59.97543	471		0	0				-653	29952.51
05/16/11 08:00:52	59.97705	471		0	0				-653	29952.51
05/16/11 08:00:54	59.97931	471		0	0				-653	29952.51
05/16/11 08:00:56	59.97964	471		0	0				-653	29948.95
05/16/11 08:00:58	59.979	471		0	0				-653	29948.95
05/16/11 08:01:00	59.97803	471		0	0				-653	29948.95
05/16/11 08:01:02	59.97803	471		0	0				-653	29948.95
05/16/11 08:01:04	59.979	471		0	0				-653	29948.95
05/16/11 08:01:06	59.98029	471		0	0				-653	29948.95
05/16/11 08:01:08	59.9819	471		0	0				-653	29948.95
05/16/11 08:01:10	59.98318	471		0	0				-653	29948.95
05/16/11 08:01:12	59.9845	471		0	0				-653	29948.95
05/16/11 08:01:14	59.98578	471		0	0				-653	29951.05
05/16/11 08:01:16	59.98642	471		0	0				-653	29951.05
05/16/11 08:01:18	59.98642	471		0	0				-653	29951.05
05/16/11 08:01:20	59.98709	471		0	0				-653	29951.05
05/16/11 08:01:22	59.98773	471		0	0				-653	29951.05
05/16/11 08:01:24	59.98965	471		0	0				-653	29955.09
05/16/11 08:01:26	59.99161	471		0	0				-653	29955.09
05/16/11 08:01:28	59.99255	471		0	0				-653	29955.09
05/16/11 08:01:30	59.99323	471		0	0				-653	29955.09
05/16/11 08:01:32	59.99289	471		0	0				-653	29955.09
05/16/11 08:01:34	59.99097	471		0	0				-653	29967.69
05/16/11 08:01:36	59.98804	471		0	0				-653	29967.69
05/16/11 08:01:38	59.98578	471		0	0				-653	29967.69
05/16/11 08:01:40	59.98386	471		0	0				-653	29967.69
05/16/11 08:01:42	59.98318	471		0	0				-653	29967.69
05/16/11 08:01:44	59.98318	471		0	0				-653	29983.13
05/16/11 08:01:46	59.98288	471		0	0				-653	29983.13
05/16/11 08:01:48	59.98126	471		0	0				-653	29983.13
05/16/11 08:01:50	59.97998	471		0	0				-653	29983.13

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004555 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:01:52	59.97964	471		0	0				-653	29983.13
05/16/11 08:01:54	59.98029	471		0	0				-653	29976.75
05/16/11 08:01:56	59.98126	471		0	0				-653	29976.75
05/16/11 08:01:58	59.98352	471		0	0				-653	29976.75
05/16/11 08:02:00	59.98386	471		0	0				-653	29976.75
05/16/11 08:02:02	59.98126	471		0	0				-653	29976.75
05/16/11 08:02:04	59.97543	471		0	0				-653	29976.78
05/16/11 08:02:06	59.96832	471		0	0				-653	29976.78
05/16/11 08:02:08	59.9635	471		0	0				-653	29976.78
05/16/11 08:02:10	59.96155	471		0	0				-653	29976.78
05/16/11 08:02:12	59.96091	471		0	0				-653	29976.78
05/16/11 08:02:14	59.96155	471		0	0				-653	30008.51
05/16/11 08:02:16	59.96057	471		0	0				-653	30008.51
05/16/11 08:02:18	59.95801	471		0	0				-653	30008.51
05/16/11 08:02:20	59.95575	471		0	0				-653	30008.51
05/16/11 08:02:22	59.95575	471		0	0				-653	30008.51
05/16/11 08:02:24	59.95703	471		0	0				-653	30037.25
05/16/11 08:02:26	59.95895	471		0	0				-653	30037.25
05/16/11 08:02:28	59.96057	471		0	0				-653	30037.25
05/16/11 08:02:30	59.96155	471		0	0				-653	30037.25
05/16/11 08:02:32	59.96252	471		0	0				-653	30037.25
05/16/11 08:02:34	59.96414	471		0	0				-653	30055.73
05/16/11 08:02:36	59.96512	471		0	0				-653	30055.73
05/16/11 08:02:38	59.96512	471		0	0				-653	30055.73
05/16/11 08:02:40	59.96576	471		0	0				-653	30055.73
05/16/11 08:02:42	59.96704	471		0	0				-653	30055.73
05/16/11 08:02:44	59.96994	471		0	0				-653	30068.76
05/16/11 08:02:46	59.97253	471		0	0				-653	30068.76
05/16/11 08:02:48	59.97415	471		0	0				-653	30068.76
05/16/11 08:02:50	59.9761	471		0	0				-653	30068.76
05/16/11 08:02:52	59.97739	471		0	0				-653	30068.76
05/16/11 08:02:54	59.97931	471		0	0				-653	30068.21
05/16/11 08:02:56	59.98029	471		0	0				-653	30068.21
05/16/11 08:02:58	59.98062	471		0	0				-653	30068.21
05/16/11 08:03:00	59.98029	471		0	0				-653	30068.21
05/16/11 08:03:02	59.98029	471		0	0				-653	30068.21
05/16/11 08:03:04	59.97836	471		0	0				-653	30068.24
05/16/11 08:03:06	59.97836	471		0	0				-653	30068.24
05/16/11 08:03:08	59.979	471		0	0				-653	30068.24
05/16/11 08:03:10	59.97998	471		0	0				-653	30068.24
05/16/11 08:03:12	59.98029	471		0	0				-653	30068.24

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004556 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.006	0.006	
0	0	0	-0.007	0.007	
0	0	0	-0.005	0.005	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:03:14	59.98093	471		0	0				-653	30076.2
05/16/11 08:03:16	59.98093	471		0	0				-653	30076.2
05/16/11 08:03:18	59.97998	471		0	0				-653	30076.2
05/16/11 08:03:20	59.98062	471		0	0				-653	30076.2
05/16/11 08:03:22	59.98029	471		0	0				-653	30076.2
05/16/11 08:03:24	59.97998	471		0	0				-653	30093.95
05/16/11 08:03:26	59.979	471		0	0				-653	30093.95
05/16/11 08:03:28	59.97931	471		0	0				-653	30093.95
05/16/11 08:03:30	59.97998	471		0	0				-653	30093.95
05/16/11 08:03:32	59.98029	471		0	0				-653	30093.95
05/16/11 08:03:34	59.98029	471		0	0				-653	30100.97
05/16/11 08:03:36	59.98029	471		0	0				-653	30100.97
05/16/11 08:03:38	59.97964	471		0	0				-653	30100.97
05/16/11 08:03:40	59.979	471		0	0				-653	30100.97
05/16/11 08:03:42	59.97803	471		0	0				-653	30100.97
05/16/11 08:03:44	59.97803	471		0	0				-653	30118.87
05/16/11 08:03:46	59.97867	471		0	0				-653	30118.87
05/16/11 08:03:48	59.97964	471		0	0				-653	30118.87
05/16/11 08:03:50	59.98224	471		0	0				-653	30118.87
05/16/11 08:03:52	59.9848	471		0	0				-653	30118.87
05/16/11 08:03:54	59.98514	471		0	0				-653	30118.77
05/16/11 08:03:56	59.98416	471		0	0				-653	30118.77
05/16/11 08:03:58	59.98224	471		0	0				-653	30118.77
05/16/11 08:04:00	59.98029	471		0	0				-653	30118.77
05/16/11 08:04:02	59.979	471		0	0				-653	30118.77
05/16/11 08:04:04	59.97867	471		0	0				-653	30118.74
05/16/11 08:04:06	59.97931	471		0	0				-653	30118.74
05/16/11 08:04:08	59.97998	471		0	0				-653	30118.74
05/16/11 08:04:10	59.97931	471		0	0				-653	30118.74
05/16/11 08:04:12	59.979	471		0	0				-653	30118.74
05/16/11 08:04:14	59.97803	471		0	0				-653	30106.93
05/16/11 08:04:16	59.97675	471		0	0				-653	30106.93
05/16/11 08:04:18	59.97739	471		0	0				-653	30106.93
05/16/11 08:04:20	59.979	471		0	0				-653	30106.93
05/16/11 08:04:22	59.97964	471		0	0				-653	30106.93
05/16/11 08:04:24	59.98093	471		0	0				-653	30106.61
05/16/11 08:04:26	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:28	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:30	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:32	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:34	59.9819	471		0	0				-653	30116.02

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004557 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:04:36	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:38	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:40	59.9816	471		0	0				-653	30116.02
05/16/11 08:04:42	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:44	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:46	59.98126	471		0	0				-653	30141.59
05/16/11 08:04:48	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:50	59.98254	471		0	0				-653	30141.59
05/16/11 08:04:52	59.98352	471		0	0				-653	30141.59
05/16/11 08:04:54	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:56	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:58	59.98416	471		0	0				-653	30144.23
05/16/11 08:05:00	59.98514	471		0	0				-653	30144.23
05/16/11 08:05:02	59.9874	471		0	0				-653	30144.23
05/16/11 08:05:04	59.98901	471		0	0				-653	30144.23
05/16/11 08:05:06	59.98804	471		0	0				-653	30144.23
05/16/11 08:05:08	59.98642	471		0	0				-653	30144.23
05/16/11 08:05:10	59.98288	471		0	0				-653	30144.23
05/16/11 08:05:12	59.98254	471		0	0				-653	30144.23
05/16/11 08:05:14	59.98318	471		0	0				-653	30148.67
05/16/11 08:05:16	59.9819	471		0	0				-653	30148.67
05/16/11 08:05:18	59.98062	471		0	0				-653	30148.67
05/16/11 08:05:20	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:22	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:24	59.97964	471		0	0				-653	30155.67
05/16/11 08:05:26	59.98029	471		0	0				-653	30155.67
05/16/11 08:05:28	59.98224	471		0	0				-653	30155.67
05/16/11 08:05:30	59.98352	471		0	0				-653	30155.67
05/16/11 08:05:32	59.98578	471		0	0				-653	30155.67
05/16/11 08:05:34	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:36	59.98804	471		0	0				-653	30142.79
05/16/11 08:05:38	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:40	59.98611	471		0	0				-653	30142.79
05/16/11 08:05:42	59.9848	471		0	0				-653	30142.79
05/16/11 08:05:44	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:46	59.98318	471		0	0				-653	30154.67
05/16/11 08:05:48	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:50	59.98416	471.3000183		0	0				-653	30150.35
05/16/11 08:05:52	59.98514	471.3000183		0	0				-653	30150.35
05/16/11 08:05:54	59.98547	471.3000183		0	0				-653	30159.63
05/16/11 08:05:56	59.98642	471.3000183		0	0				-653	30159.63

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004558 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:05:58	59.98676	471.8999939		0	0				-653	30159.63
05/16/11 08:06:00	59.9874	471.8999939		0	0				-653	30159.63
05/16/11 08:06:02	59.98773	471.8999939		0	0				-653	30151.42
05/16/11 08:06:04	59.98901	471.8999939		0	0				-653	30151.42
05/16/11 08:06:06	59.98901	471.8999939		0	0				-653	30156.16
05/16/11 08:06:08	59.98804	471.3999939		0	0				-653	30156.16
05/16/11 08:06:10	59.98642	471.3999939		0	0				-653	30156.16
05/16/11 08:06:12	59.98547	471.3999939		0	0				-653	30156.16
05/16/11 08:06:14	59.98642	471.3999939		0	0				-653	30164.15
05/16/11 08:06:16	59.98935	471.3999939		0	0				-653	30164.15
05/16/11 08:06:18	59.99225	471.3999939		0	0				-653	30164.15
05/16/11 08:06:20	59.99515	471.3999939		0	0				-653	30164.15
05/16/11 08:06:22	59.99579	471.3999939		0	0				-653	30203.91
05/16/11 08:06:24	59.99515	471.3999939		0	0				-653	30203.91
05/16/11 08:06:26	59.99548	471.3999939		0	0				-653	30203.73
05/16/11 08:06:28	59.99741	470.8999939		0	0				-653	30203.73
05/16/11 08:06:30	60	470.8999939		0	0				-653	30203.73
05/16/11 08:06:32	60.00162	470.8999939		0	0				-653	30203.73
05/16/11 08:06:34	60.00162	470.8999939		0	0				-653	30199.61
05/16/11 08:06:36	60.00195	470.8999939		0	0				-653	30199.61
05/16/11 08:06:38	59.95963	0		0	0				-653	30199.61
05/16/11 08:06:40	59.88144	0		0	0				-653	30199.61
05/16/11 08:06:42	59.87237	0		0	0				-653	30086.11
05/16/11 08:06:44	59.87011	0		0	0				-653	30086.11
05/16/11 08:06:46	59.87432	0		0	0				-653	30086.14
05/16/11 08:06:48	59.88076	0		0	0				-653	30086.14
05/16/11 08:06:50	59.88531	0		0	0				-653	30086.14
05/16/11 08:06:52	59.88787	0		0	0				-653	30086.14
05/16/11 08:06:54	59.88949	0		0	0				-653	30094.43
05/16/11 08:06:56	59.8908	0		0	0				-653	30094.43
05/16/11 08:06:58	59.89175	0		0	0				-653	30094.43
05/16/11 08:07:00	59.89242	0		0	0				-653	30094.43
05/16/11 08:07:02	59.89306	0		0	0				-653	30139.49
05/16/11 08:07:04	59.89306	0		0	0				-653	30139.49
05/16/11 08:07:06	59.89306	0		0	0				-653	30133.38
05/16/11 08:07:08	59.89532	0		0	0				-653	30133.38
05/16/11 08:07:10	59.89788	0		0	0				-653	30133.38
05/16/11 08:07:12	59.8995	0		0	0				-653	30133.38
05/16/11 08:07:14	59.90081	0		0	0				-653	30137.26
05/16/11 08:07:16	59.9021	0		0	0				-653	30137.26
05/16/11 08:07:18	59.90179	0		0	0				-653	30137.26

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004559 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	1	-0.042	0.042	
1	0	1	-0.078	0.078	
1	0	1	-0.009	0.009	
1	0	1	-0.002	0.002	
1	0	1	0.004	0.004	
1	0	1	0.006	0.006	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:07:20	59.90081	0		0	0				-653	30137.26
05/16/11 08:07:22	59.90081	0		0	0				-653	30171.38
05/16/11 08:07:24	59.90048	0		0	0				-653	30171.38
05/16/11 08:07:26	59.8992	0		0	0				-653	30168.76
05/16/11 08:07:28	59.89886	0		0	0				-653	30168.76
05/16/11 08:07:30	59.89856	0		0	0				-653	30168.76
05/16/11 08:07:32	59.90017	0		0	0				-653	30168.76
05/16/11 08:07:34	59.90243	0		0	0				-653	30208.99
05/16/11 08:07:36	59.90469	0		0	0				-653	30208.99
05/16/11 08:07:38	59.90695	0		0	0				-653	30208.99
05/16/11 08:07:40	59.90887	0		0	0				-653	30208.99
05/16/11 08:07:42	59.90921	0		0	0				-653	30205.66
05/16/11 08:07:44	59.90857	0		0	0				-653	30205.66
05/16/11 08:07:46	59.90887	0		0	0				-653	30205.66
05/16/11 08:07:48	59.91018	0		0	0				-653	30205.66
05/16/11 08:07:50	59.91244	0		0	0				-653	30205.66
05/16/11 08:07:52	59.9147	0		0	0				-653	30205.66
05/16/11 08:07:54	59.9176	0		0	0				-653	30211.75
05/16/11 08:07:56	59.91922	0		0	0				-653	30211.75
05/16/11 08:07:58	59.92083	0		0	0				-653	30211.75
05/16/11 08:08:00	59.92215	0		0	0				-653	30211.75
05/16/11 08:08:02	59.92309	0		0	0				-653	30217.55
05/16/11 08:08:04	59.92505	0		0	0				-653	30217.55
05/16/11 08:08:06	59.92505	0		0	0				-653	30217.57
05/16/11 08:08:08	59.9273	0		0	0				-653	30217.57
05/16/11 08:08:10	59.93246	0		0	0				-653	30217.57
05/16/11 08:08:12	59.93505	0		0	0				-653	30217.57
05/16/11 08:08:14	59.93701	0		0	0				-653	30217.59
05/16/11 08:08:16	59.93765	0		0	0				-653	30217.59
05/16/11 08:08:18	59.93927	0		0	0				-653	30217.59
05/16/11 08:08:20	59.94183	0		0	0				-653	30217.59
05/16/11 08:08:22	59.94409	0		0	0				-653	30210.49
05/16/11 08:08:24	59.94571	0		0	0				-653	30210.49
05/16/11 08:08:26	59.94797	0		0	0				-653	30210.26
05/16/11 08:08:28	59.94766	0		0	0				-653	30210.26
05/16/11 08:08:30	59.9454	0		0	0				-653	30210.26
05/16/11 08:08:32	59.94443	0		0	0				-653	30210.26
05/16/11 08:08:34	59.94409	0		0	0				-653	30234.59
05/16/11 08:08:36	59.94507	0		0	0				-653	30234.59
05/16/11 08:08:38	59.94604	0		0	0				-653	30234.59
05/16/11 08:08:40	59.94638	0		0	0				-653	30234.59

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004560 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1	
805	8:06:38	t(0)				
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz		
806	03:52	Event Length mm:ss				
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.000	0.000		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.000	0.000		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.001	0.001		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.003	0.003		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.002	0.002		
1	0	1	0.000	0.000		
1	0	1	0.002	0.002		
1	0	1	0.005	0.005		
1	0	1	0.003	0.003		
1	0	1	0.002	0.002		
1	0	1	0.001	0.001		
1	0	1	0.002	0.002		
1	0	1	0.003	0.003		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.002	0.002		
1	0	1	0.000	0.000		
1	0	1	-0.002	0.002		
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.001	0.001		
1	0	1	0.001	0.001		
1	0	1	0.000	0.000		

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:08:42	59.94733	0		0	0				-653	30223.6
05/16/11 08:08:44	59.9483	0		0	0				-653	30223.6
05/16/11 08:08:46	59.94894	0		0	0				-653	30223.73
05/16/11 08:08:48	59.94992	0		0	0				-653	30223.73
05/16/11 08:08:50	59.9509	0		0	0				-653	30223.73
05/16/11 08:08:52	59.95154	0		0	0				-653	30223.73
05/16/11 08:08:54	59.95187	0		0	0				-653	30224.39
05/16/11 08:08:56	59.95346	0		0	0				-653	30224.39
05/16/11 08:08:58	59.95508	0		0	0				-653	30224.39
05/16/11 08:09:00	59.95575	0		0	0				-653	30224.39
05/16/11 08:09:02	59.95639	0		0	0				-653	30255.53
05/16/11 08:09:04	59.95801	0		0	0				-653	30255.53
05/16/11 08:09:06	59.96124	0		0	0				-653	30252.87
05/16/11 08:09:08	59.96252	0		0	0				-653	30252.87
05/16/11 08:09:10	59.96188	0		0	0				-653	30252.87
05/16/11 08:09:12	59.96124	0		0	0				-653	30252.87
05/16/11 08:09:14	59.96027	0		0	0				-653	30232.45
05/16/11 08:09:16	59.96057	0		0	0				-653	30232.45
05/16/11 08:09:18	59.96219	0		0	0				-653	30232.45
05/16/11 08:09:20	59.96512	0		0	0				-653	30232.45
05/16/11 08:09:22	59.96738	0		0	0				-653	30263.99
05/16/11 08:09:24	59.96899	0		0	0				-653	30263.99
05/16/11 08:09:26	59.97061	0		0	0				-653	30263.68
05/16/11 08:09:28	59.97318	0		0	0				-653	30263.68
05/16/11 08:09:30	59.97351	0		0	0				-653	30263.68
05/16/11 08:09:32	59.97287	0		0	0				-653	30263.68
05/16/11 08:09:34	59.97253	0		0	0				-653	30264.96
05/16/11 08:09:36	59.97318	0		0	0				-653	30264.96
05/16/11 08:09:38	59.97415	0		0	0				-653	30264.96
05/16/11 08:09:40	59.97543	0		0	0				-653	30264.96
05/16/11 08:09:42	59.97577	0		0	0				-653	30263.63
05/16/11 08:09:44	59.9761	0		0	0				-653	30263.63
05/16/11 08:09:46	59.97675	0		0	0				-653	30279.39
05/16/11 08:09:48	59.97803	0		0	0				-653	30279.39
05/16/11 08:09:50	59.97931	0		0	0				-653	30279.39
05/16/11 08:09:52	59.97998	0		0	0				-653	30279.39
05/16/11 08:09:54	59.97964	0		0	0				-653	30255.32
05/16/11 08:09:56	59.979	0		0	0				-653	30255.32
05/16/11 08:09:58	59.97964	0		0	0				-653	30255.32
05/16/11 08:10:00	59.98093	0		0	0				-653	30255.32
05/16/11 08:10:02	59.98224	0		0	0				-653	30260.67

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004561 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:10:04	59.98386	0		0	0				-653	30260.67
05/16/11 08:10:06	59.98514	0		0	0				-653	30259.99
05/16/11 08:10:08	59.98773	0		0	0				-653	30259.99
05/16/11 08:10:10	59.9903	0		0	0				-653	30259.99
05/16/11 08:10:12	59.99289	0		0	0				-653	30259.99
05/16/11 08:10:14	59.99579	0		0	0				-653	30274.08
05/16/11 08:10:16	59.99646	0		0	0				-653	30274.08
05/16/11 08:10:18	59.99579	0		0	0				-653	30274.08
05/16/11 08:10:20	59.99612	0		0	0				-653	30274.08
05/16/11 08:10:22	59.99579	0		0	0				-653	30297.68
05/16/11 08:10:24	59.99484	0		0	0				-653	30297.68
05/16/11 08:10:26	59.99484	0		0	0				-653	30297.65
05/16/11 08:10:28	59.99805	0		0	0				-653	30297.65
05/16/11 08:10:30	59.99872	0		0	0				-653	30297.65
05/16/11 08:10:32	60.00034	0		0	0				-653	30297.65
05/16/11 08:10:34	60.00195	0		0	0				-653	30300.1
05/16/11 08:10:36	60.00259	0		0	0				-653	30300.1
05/16/11 08:10:38	60.00226	0		0	0				-653	30300.1
05/16/11 08:10:40	60.00195	0		0	0				-653	30300.1
05/16/11 08:10:42	60.00064	0		0	0				-653	30314.84
05/16/11 08:10:44	59.99646	0		0	0				-653	30314.84
05/16/11 08:10:46	59.99191	0		0	0				-653	30309.71
05/16/11 08:10:48	59.98901	0		0	0				-653	30309.71
05/16/11 08:10:50	59.98773	0		0	0				-653	30309.71
05/16/11 08:10:52	59.98901	0		0	0				-653	30309.71
05/16/11 08:10:54	59.99255	0		0	0				-653	30319.5
05/16/11 08:10:56	59.99579	0		0	0				-653	30319.5
05/16/11 08:10:58	59.99902	0		0	0				-653	30319.5
05/16/11 08:11:00	60.00195	0		0	0				-653	30319.5
05/16/11 08:11:02	60.00485	0		0	0				-653	30357.21
05/16/11 08:11:04	60.00809	0		0	0				-653	30357.21
05/16/11 08:11:06	60.01163	0		0	0				-653	30357.18
05/16/11 08:11:08	60.01422	0		0	0				-653	30357.18
05/16/11 08:11:10	60.0152	0		0	0				-653	30357.18
05/16/11 08:11:12	60.0155	0		0	0				-653	30357.18
05/16/11 08:11:14	60.0155	0		0	0				-653	30354.26
05/16/11 08:11:16	60.01682	0		0	0				-653	30354.26
05/16/11 08:11:18	60.01907	0		0	0				-653	30354.26
05/16/11 08:11:20	60.02295	0		0	0				-653	30354.26
05/16/11 08:11:22	60.02618	0		0	0				-653	30354.48
05/16/11 08:11:24	60.02972	0		0	0				-653	30354.48

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004562 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	0	1	-0.004	0.004	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:11:26	60.03262	0		0	0				-653	30353.83
05/16/11 08:11:28	60.03458	0		0	0				-653	30353.83
05/16/11 08:11:30	60.03522	0		0	0				-653	30353.83
05/16/11 08:11:32	60.03424	0		0	0				-653	30353.83
05/16/11 08:11:34	60.0336	0		0	0				-653	30370.41
05/16/11 08:11:36	60.03522	0		0	0				-653	30370.41
05/16/11 08:11:38	60.03812	0		0	0				-653	30370.41
05/16/11 08:11:40	60.04037	0		0	0				-653	30370.41
05/16/11 08:11:42	60.04105	0		0	0				-653	30374.79
05/16/11 08:11:44	60.04199	0		0	0				-653	30374.79
05/16/11 08:11:46	60.04233	0		0	0				-653	30366.14
05/16/11 08:11:48	60.0433	0		0	0				-653	30366.14
05/16/11 08:11:50	60.04425	0		0	0				-653	30366.14
05/16/11 08:11:52	60.04492	0		0	0				-653	30366.14
05/16/11 08:11:54	60.04556	0		0	0				-653	30373.53
05/16/11 08:11:56	60.04587	0		0	0				-653	30373.53
05/16/11 08:11:58	60.04654	0		0	0				-653	30373.53
05/16/11 08:12:00	60.0488	0		0	0				-653	30373.53
05/16/11 08:12:02	60.04974	0		0	0				-653	30343.46
05/16/11 08:12:04	60.0491	0		0	0				-653	30343.46
05/16/11 08:12:06	60.0491	0		0	0				-653	30335.12
05/16/11 08:12:08	60.05042	0		0	0				-653	30335.12
05/16/11 08:12:10	60.04974	0		0	0				-653	30335.12
05/16/11 08:12:12	60.04846	0		0	0				-653	30335.12
05/16/11 08:12:14	60.04718	0		0	0				-653	30337.29
05/16/11 08:12:16	60.04587	0		0	0				-653	30337.29
05/16/11 08:12:18	60.04587	0		0	0				-653	30337.29
05/16/11 08:12:20	60.04556	0		0	0				-653	30337.29
05/16/11 08:12:22	60.04425	0		0	0				-653	30350.2
05/16/11 08:12:24	60.04297	0		0	0				-653	30350.2
05/16/11 08:12:26	60.04169	0		0	0				-653	30350.07
05/16/11 08:12:28	60.04233	0		0	0				-653	30350.07
05/16/11 08:12:30	60.04459	0		0	0				-653	30350.07
05/16/11 08:12:32	60.04654	0		0	0				-653	30350.07
05/16/11 08:12:34	60.04718	0		0	0				-653	30354.77
05/16/11 08:12:36	60.0462	0		0	0				-653	30354.77
05/16/11 08:12:38	60.04425	0		0	0				-653	30354.77
05/16/11 08:12:40	60.04492	0		0	0				-653	30354.77
05/16/11 08:12:42	60.04523	0		0	0				-653	30372.38
05/16/11 08:12:44	60.04523	0		0	0				-653	30372.38
05/16/11 08:12:46	60.04556	0		0	0				-653	30372.38

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004563 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:12:48	60.0462	0		0	0				-653	30372.38
05/16/11 08:12:50	60.04654	0		0	0				-653	30372.38
05/16/11 08:12:52	60.04654	0		0	0				-653	30372.38
05/16/11 08:12:54	60.04523	0		0	0				-653	30349.1
05/16/11 08:12:56	60.04361	0		0	0				-653	30349.1
05/16/11 08:12:58	60.04199	0		0	0				-653	30349.1
05/16/11 08:13:00	60.04071	0		0	0				-653	30349.1
05/16/11 08:13:02	60.03876	0		0	0				-653	30363.65
05/16/11 08:13:04	60.03586	0		0	0				-653	30363.65
05/16/11 08:13:06	60.03394	0		0	0				-653	30363.88
05/16/11 08:13:08	60.0336	0		0	0				-653	30363.88
05/16/11 08:13:10	60.03262	0		0	0				-653	30363.88
05/16/11 08:13:12	60.03006	0		0	0				-653	30363.88
05/16/11 08:13:14	60.02747	0		0	0				-653	30364.77
05/16/11 08:13:16	60.02682	0		0	0				-653	30364.77
05/16/11 08:13:18	60.02585	0		0	0				-653	30364.77
05/16/11 08:13:20	60.02359	0		0	0				-653	30364.77
05/16/11 08:13:22	60.02197	0		0	0				-653	30374.33
05/16/11 08:13:24	60.02164	0		0	0				-653	30374.33
05/16/11 08:13:26	60.02231	0		0	0				-653	30364.67
05/16/11 08:13:28	60.02133	0		0	0				-653	30364.67
05/16/11 08:13:30	60.02133	0		0	0				-653	30364.67
05/16/11 08:13:32	60.02002	0		0	0				-653	30364.67
05/16/11 08:13:34	60.01776	0		0	0				-653	30361.56
05/16/11 08:13:36	60.01584	0		0	0				-653	30361.56
05/16/11 08:13:38	60.01291	0		0	0				-653	30361.56
05/16/11 08:13:40	60.01132	0		0	0				-653	30361.56
05/16/11 08:13:42	60.01001	0		0	0				-653	30350.69
05/16/11 08:13:44	60.00937	0		0	0				-653	30350.69
05/16/11 08:13:46	60.00775	0		0	0				-653	30344.52
05/16/11 08:13:48	60.00516	0		0	0				-653	30344.52
05/16/11 08:13:50	60.00452	0		0	0				-653	30344.52
05/16/11 08:13:52	60.00613	0		0	0				-653	30344.52
05/16/11 08:13:54	60.00613	0		0	0				-653	30354.37
05/16/11 08:13:56	60.00549	0		0	0				-653	30354.37
05/16/11 08:13:58	60.00516	0		0	0				-653	30354.37
05/16/11 08:14:00	60.00388	0		0	0				-653	30354.37
05/16/11 08:14:02	60.00259	0		0	0				-653	30373.31
05/16/11 08:14:04	60.00128	0		0	0				-653	30373.31
05/16/11 08:14:06	60.00128	0		0	0				-653	30373.78
05/16/11 08:14:08	60.00064	0		0	0				-653	30373.78

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004564 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:14:10	60.00034	0		0	0				-653	30373.78
05/16/11 08:14:12	60.00226	0		0	0				-653	30373.78
05/16/11 08:14:14	60.00421	0		0	0				-653	30366.33
05/16/11 08:14:16	60.00677	0		0	0				-653	30366.33
05/16/11 08:14:18	60.00903	0		0	0				-653	30366.33
05/16/11 08:14:20	60.01291	0		0	0				-653	30366.33
05/16/11 08:14:22	60.01486	0		0	0				-653	30373.85
05/16/11 08:14:24	60.01453	0		0	0				-653	30373.85
05/16/11 08:14:26	60.01422	0		0	0				-653	30373.05
05/16/11 08:14:28	60.0152	0		0	0				-653	30373.05
05/16/11 08:14:30	60.01614	0		0	0				-653	30373.05
05/16/11 08:14:32	60.01682	0		0	0				-653	30373.05
05/16/11 08:14:34	60.01746	0		0	0				-653	30369.77
05/16/11 08:14:36	60.01712	0		0	0				-653	30369.77
05/16/11 08:14:38	60.01682	0		0	0				-653	30369.77
05/16/11 08:14:40	60.01648	0		0	0				-653	30369.77
05/16/11 08:14:42	60.01614	0		0	0				-653	30388.99
05/16/11 08:14:44	60.01746	0		0	0				-653	30388.99
05/16/11 08:14:46	60.01776	0		0	0				-653	30388.16
05/16/11 08:14:48	60.01776	0		0	0				-653	30388.16
05/16/11 08:14:50	60.01648	0		0	0				-653	30388.16
05/16/11 08:14:52	60.01584	0		0	0				-653	30388.16
05/16/11 08:14:54	60.01648	0		0	0				-653	30376.94
05/16/11 08:14:56	60.01584	0		0	0				-653	30376.94
05/16/11 08:14:58	60.01358	0		0	0				-653	30376.94
05/16/11 08:15:00	60.01163	0		0	0				-653	30376.94
05/16/11 08:15:02	60.01132	0		0	0				-653	30371.85
05/16/11 08:15:04	60.01132	0		0	0				-653	30371.85
05/16/11 08:15:06	60.01099	0		0	0				-653	30362.65
05/16/11 08:15:08	60.01099	0		0	0				-653	30362.65
05/16/11 08:15:10	60.01291	0		0	0				-653	30362.65
05/16/11 08:15:12	60.01486	0		0	0				-653	30362.65
05/16/11 08:15:14	60.01776	0		0	0				-653	30395.46
05/16/11 08:15:16	60.01776	0		0	0				-653	30395.46
05/16/11 08:15:18	60.0184	0		0	0				-653	30395.46
05/16/11 08:15:20	60.0181	0		0	0				-653	30395.46
05/16/11 08:15:22	60.01746	0		0	0				-653	30397.03
05/16/11 08:15:24	60.0152	0		0	0				-653	30397.03
05/16/11 08:15:26	60.0152	0		0	0				-653	30396.67
05/16/11 08:15:28	60.01389	0		0	0				-653	30396.67
05/16/11 08:15:30	60.01746	0		0	0				-653	30396.67

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004565 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.004	0.004	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:15:32	60.01907	0		0	0				-653	30396.67
05/16/11 08:15:34	60.01907	0		0	0				-653	30388.62
05/16/11 08:15:36	60.02036	0		0	0				-653	30388.62
05/16/11 08:15:38	60.01874	0		0	0				-653	30388.62
05/16/11 08:15:40	60.01874	0		0	0				-653	30388.62
05/16/11 08:15:42	60.01971	0		0	0				-653	30381.78
05/16/11 08:15:44	60.01971	0		0	0				-653	30381.78
05/16/11 08:15:46	60.01971	0		0	0				-653	30382.96
05/16/11 08:15:48	60.0184	0		0	0				-653	30382.96
05/16/11 08:15:50	60.01486	0		0	0				-653	30382.96
05/16/11 08:15:52	60.01358	0		0	0				-653	30382.96
05/16/11 08:15:54	60.01389	0		0	0				-653	30381.48
05/16/11 08:15:56	60.01227	0		0	0				-653	30381.48
05/16/11 08:15:58	60.01001	0		0	0				-653	30381.48
05/16/11 08:16:00	60.00583	0		0	0				-653	30381.48
05/16/11 08:16:02	60.00162	0		0	0				-653	30394.03
05/16/11 08:16:04	60.00162	0		0	0				-653	30394.03
05/16/11 08:16:06	59.99805	0		0	0				-653	30394.07
05/16/11 08:16:08	59.99353	0		0	0				-653	30394.07
05/16/11 08:16:10	59.99255	0		0	0				-653	30394.07
05/16/11 08:16:12	59.99225	0		0	0				-653	30394.07
05/16/11 08:16:14	59.98999	0		0	0				-653	30376.91
05/16/11 08:16:16	59.98837	0		0	0				-653	30376.91
05/16/11 08:16:18	59.98416	0		0	0				-653	30376.91
05/16/11 08:16:20	59.9816	0		0	0				-653	30376.91
05/16/11 08:16:22	59.98093	0		0	0				-653	30367.96
05/16/11 08:16:24	59.98029	0		0	0				-653	30367.96
05/16/11 08:16:26	59.97998	0		0	0				-653	30367.46
05/16/11 08:16:28	59.97836	0		0	0				-653	30367.46
05/16/11 08:16:30	59.97513	0		0	0				-653	30367.46
05/16/11 08:16:32	59.97287	0		0	0				-653	30367.46
05/16/11 08:16:34	59.97189	0		0	0				-653	30361.18
05/16/11 08:16:36	59.97156	0		0	0				-653	30361.18
05/16/11 08:16:38	59.97382	0		0	0				-653	30361.18
05/16/11 08:16:40	59.97641	0		0	0				-653	30361.18
05/16/11 08:16:42	59.97836	0		0	0				-653	30365.59
05/16/11 08:16:44	59.97705	0		0	0				-653	30365.59
05/16/11 08:16:46	59.97449	0		0	0				-653	30365.19
05/16/11 08:16:48	59.97125	0		0	0				-653	30365.19
05/16/11 08:16:50	59.97092	0		0	0				-653	30365.19
05/16/11 08:16:52	59.97287	0		0	0				-653	30365.19

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 004566 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.004	0.004	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.004	0.004	
1	1	1	-0.004	0.004	
1	1	1	0.000	0.000	
1	0	1	-0.004	0.004	
1	0	1	-0.005	0.005	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:16:54	59.97449	0		0	0				-653	30375.91
05/16/11 08:16:56	59.97382	0		0	0				-653	30375.91
05/16/11 08:16:58	59.97318	0		0	0				-653	30375.91
05/16/11 08:17:00	59.97449	0		0	0				-653	30375.91
05/16/11 08:17:02	59.9761	0		0	0				-653	30367.4
05/16/11 08:17:04	59.97739	0		0	0				-653	30367.4
05/16/11 08:17:06	59.97836	0		0	0				-653	30367.72
05/16/11 08:17:08	59.97769	0		0	0				-653	30367.72
05/16/11 08:17:10	59.97705	0		0	0				-653	30367.72
05/16/11 08:17:12	59.97641	0		0	0				-653	30367.72
05/16/11 08:17:14	59.97543	0		0	0				-653	30416.87
05/16/11 08:17:16	59.97382	0		0	0				-653	30416.87
05/16/11 08:17:18	59.97318	0		0	0				-653	30416.87
05/16/11 08:17:20	59.97223	0		0	0				-653	30416.87
05/16/11 08:17:22	59.97189	0		0	0				-653	30413.65
05/16/11 08:17:24	59.97092	0		0	0				-653	30413.65
05/16/11 08:17:26	59.96994	0		0	0				-653	30406.3
05/16/11 08:17:28	59.96832	0		0	0				-653	30406.3
05/16/11 08:17:30	59.96606	0		0	0				-653	30406.3
05/16/11 08:17:32	59.96542	0		0	0				-653	30406.3
05/16/11 08:17:34	59.96606	0		0	0				-653	30418.59
05/16/11 08:17:36	59.9693	0		0	0				-653	30418.59
05/16/11 08:17:38	59.97253	0		0	0				-653	30418.59
05/16/11 08:17:40	59.97351	0		0	0				-653	30418.59
05/16/11 08:17:42	59.97382	0		0	0				-653	30433.31
05/16/11 08:17:44	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:46	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:48	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:50	59.96768	0		0	0				-653	30433.31
05/16/11 08:17:52	59.97125	0		0	0				-653	30433.31
05/16/11 08:17:54	59.97577	0		0	0				-653	30451.3
05/16/11 08:17:56	59.97577	0		0	0				-653	30451.3
05/16/11 08:17:58	59.97577	0		0	0				-653	30451.3
05/16/11 08:18:00	59.98416	0		0	0				-653	30451.3
05/16/11 08:18:02	59.9819	0		0	0				-653	30425.74
05/16/11 08:18:04	59.979	0		0	0				-653	30425.74
05/16/11 08:18:06	59.97769	0		0	0				-653	30419.18
05/16/11 08:18:08	59.97769	0		0	0				-653	30419.18
05/16/11 08:18:10	59.98126	0		0	0				-653	30419.18
05/16/11 08:18:12	59.9848	0		0	0				-653	30419.18
05/16/11 08:18:14	59.98868	0		0	0				-653	30424.29

Event Detection Row	Recovery Target Freq:	Max Absolute Delta Hz	Lowest Delta Hz	Highest Delta Hz	004567	Rows of data to shift to align T(0)
805	59.999	0.078	-0.078	0.009		1
921	8:06:38	t(0)				
806	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz		
1	03:52	Event Length mm:ss	1	0.002	0.002	
1	0		1	-0.001	0.001	
1	0		1	-0.001	0.001	
1	0		1	0.001	0.001	
1	0		1	0.002	0.002	
1	0		1	0.001	0.001	
1	0		1	0.001	0.001	
1	0		1	-0.001	0.001	
1	0		1	-0.001	0.001	
1	0		1	-0.001	0.001	
1	0		1	-0.001	0.001	
1	0		1	-0.002	0.002	
1	0		1	-0.001	0.001	
1	0		1	-0.001	0.001	
1	0		1	0.000	0.000	
1	0		1	-0.001	0.001	
1	0		1	-0.001	0.001	
1	0		1	-0.002	0.002	
1	0		1	-0.002	0.002	
1	0		1	-0.001	0.001	
1	0		1	0.001	0.001	
1	0		1	0.003	0.003	
1	0		1	0.003	0.003	
1	0		1	0.001	0.001	
1	0		1	0.000	0.000	
1	0		1	-0.001	0.001	
1	0		1	0.000	0.000	
1	0		1	0.000	0.000	
1	0		1	-0.005	0.005	
1	0		1	0.004	0.004	
1	0		1	0.005	0.005	
1	0		1	0.000	0.000	
1	0		1	0.000	0.000	
1	0		1	0.008	0.008	
1	0		1	-0.002	0.002	
1	0		1	-0.003	0.003	
1	0		1	-0.001	0.001	
1	0		1	0.000	0.000	
1	0		1	0.004	0.004	
1	0		1	0.004	0.004	
1	0		1	0.004	0.004	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:18:16	59.99161	0		0	0				-653	30424.29
05/16/11 08:18:18	59.99353	0		0	0				-653	30424.29
05/16/11 08:18:20	59.99579	0		0	0				-653	30424.29
05/16/11 08:18:22	59.99677	0		0	0				-653	30440.82
05/16/11 08:18:24	59.99774	0		0	0				-653	30440.82
05/16/11 08:18:26	59.99838	0		0	0				-653	30431.58
05/16/11 08:18:28	59.99774	0		0	0				-653	30431.58
05/16/11 08:18:30	59.9971	0		0	0				-653	30431.58
05/16/11 08:18:32	59.99741	0		0	0				-653	30431.58
05/16/11 08:18:34	59.99741	0		0	0				-653	30444.25
05/16/11 08:18:36	59.99741	0		0	0				-653	30444.25
05/16/11 08:18:38	60.00064	0		0	0				-653	30444.25
05/16/11 08:18:40	60.00323	0		0	0				-653	30444.25
05/16/11 08:18:42	60.00354	0		0	0				-653	30465.11
05/16/11 08:18:44	60.00259	0		0	0				-653	30465.11
05/16/11 08:18:46	60.00098	0		0	0				-653	30465.3
05/16/11 08:18:48	59.99936	0		0	0				-653	30465.3
05/16/11 08:18:50	59.99741	0		0	0				-653	30465.3
05/16/11 08:18:52	59.99677	0		0	0				-653	30465.3
05/16/11 08:18:54	59.99677	0		0	0				-653	30478.25
05/16/11 08:18:56	59.9971	0		0	0				-653	30478.25
05/16/11 08:18:58	59.99774	0		0	0				-653	30478.25
05/16/11 08:19:00	59.99872	0		0	0				-653	30478.25
05/16/11 08:19:02	59.99966	0		0	0				-653	30473.86
05/16/11 08:19:04	60	0		0	0				-653	30473.86
05/16/11 08:19:06	60.00034	0		0	0				-653	30468.84
05/16/11 08:19:08	60.00098	0		0	0				-653	30468.84
05/16/11 08:19:10	60.00226	0		0	0				-653	30468.84
05/16/11 08:19:12	60.0029	0		0	0				-653	30468.84
05/16/11 08:19:14	60.00259	0		0	0				-653	30469.63
05/16/11 08:19:16	60.00226	0		0	0				-653	30469.63
05/16/11 08:19:18	60.00226	0		0	0				-653	30469.63
05/16/11 08:19:20	60.00323	0		0	0				-653	30469.63
05/16/11 08:19:22	60.00421	0		0	0				-653	30488.41
05/16/11 08:19:24	60.00485	0		0	0				-653	30488.41
05/16/11 08:19:26	60.00452	0		0	0				-653	30480.29
05/16/11 08:19:28	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:30	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:32	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:34	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:36	60.00354	0		0	0				-653	30477.13

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004568 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:19:38	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:40	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:42	60.00613	0		0	0				-653	30487.82
05/16/11 08:19:44	60.00485	0		0	0				-653	30487.82
05/16/11 08:19:46	60.00452	0		0	0				-653	30489.73
05/16/11 08:19:48	60.00452	0		0	0				-653	30489.73
05/16/11 08:19:50	60.00354	0		0	0				-653	30489.73
05/16/11 08:19:52	60.0029	0		0	0				-653	30489.73
05/16/11 08:19:54	60.00162	0		0	0				-653	30480.09
05/16/11 08:19:56	60.00162	0		0	0				-653	30480.09
05/16/11 08:19:58	60.00421	0		0	0				-653	30480.09
05/16/11 08:20:00	60.00421	0		0	0				-653	30480.09
05/16/11 08:20:02	60.0029	0		0	0				-653	30480.91
05/16/11 08:20:04	60.00034	0		0	0				-653	30480.91
05/16/11 08:20:06	59.99805	0		0	0				-653	30480.84
05/16/11 08:20:08	59.99646	0		0	0				-653	30480.84
05/16/11 08:20:10	59.99515	0		0	0				-653	30480.84
05/16/11 08:20:12	59.99387	0		0	0				-653	30480.84
05/16/11 08:20:14	59.99289	0		0	0				-653	30476.09
05/16/11 08:20:16	59.99255	0		0	0				-653	30476.09
05/16/11 08:20:18	59.99225	0		0	0				-653	30476.09
05/16/11 08:20:20	59.98965	0		0	0				-653	30476.09
05/16/11 08:20:22	59.98514	0		0	0				-653	30456.76
05/16/11 08:20:24	59.98254	0		0	0				-653	30456.76
05/16/11 08:20:26	59.97836	0		0	0				-653	30457.12
05/16/11 08:20:28	59.97641	0		0	0				-653	30457.12
05/16/11 08:20:30	59.97705	0		0	0				-653	30457.12
05/16/11 08:20:32	59.97705	0		0	0				-653	30457.12
05/16/11 08:20:34	59.97705	0		0	0				-653	30446.98
05/16/11 08:20:36	59.97803	0		0	0				-653	30446.98
05/16/11 08:20:38	59.97964	0		0	0				-653	30446.98
05/16/11 08:20:40	59.9816	0		0	0				-653	30446.98
05/16/11 08:20:42	59.98126	0		0	0				-653	30461.02
05/16/11 08:20:44	59.97931	0		0	0				-653	30461.02
05/16/11 08:20:46	59.9761	0		0	0				-653	30460.94
05/16/11 08:20:48	59.97543	0		0	0				-653	30460.94
05/16/11 08:20:50	59.97577	0		0	0				-653	30460.94
05/16/11 08:20:52	59.97675	0		0	0				-653	30460.94
05/16/11 08:20:54	59.97803	0		0	0				-653	30469.23
05/16/11 08:20:56	59.979	0		0	0				-653	30469.23
05/16/11 08:20:58	59.97964	0		0	0				-653	30469.23

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004569 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:21:00	59.98062	0		0	0				-653	30469.23
05/16/11 08:21:02	59.9819	0		0	0				-653	30481.49
05/16/11 08:21:04	59.98224	0		0	0				-653	30481.49
05/16/11 08:21:06	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:08	59.98288	0		0	0				-653	30480.29
05/16/11 08:21:10	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:12	59.98254	0		0	0				-653	30480.29
05/16/11 08:21:14	59.98288	0		0	0				-653	30473.15
05/16/11 08:21:16	59.98611	0		0	0				-653	30473.15
05/16/11 08:21:18	59.99387	0		0	0				-653	30473.15
05/16/11 08:21:20	60.00226	0		0	0				-653	30473.15
05/16/11 08:21:22	60.01099	0		0	0				-653	30470.66
05/16/11 08:21:24	60.01712	0		0	0				-653	30470.66
05/16/11 08:21:26	60.02069	0		0	0				-653	30470.6
05/16/11 08:21:28	60.02133	0		0	0				-653	30470.6
05/16/11 08:21:30	60.02133	0		0	0				-653	30470.6
05/16/11 08:21:32	60.02133	0		0	0				-653	30470.6
05/16/11 08:21:34	60.02325	0		0	0				-653	30461.28
05/16/11 08:21:36	60.02551	0		0	0				-653	30461.28
05/16/11 08:21:38	60.02682	0		0	0				-653	30461.28
05/16/11 08:21:40	60.02844	0		0	0				-653	30461.28
05/16/11 08:21:42	60.02972	0		0	0				-653	30450.44
05/16/11 08:21:44	60.03101	0		0	0				-653	30450.44
05/16/11 08:21:46	60.03198	0		0	0				-653	30451.91
05/16/11 08:21:48	60.03296	0		0	0				-653	30451.91
05/16/11 08:21:50	60.03458	0		0	0				-653	30451.91
05/16/11 08:21:52	60.03488	0		0	0				-653	30451.91
05/16/11 08:21:54	60.03488	0		0	0				-653	30446.52
05/16/11 08:21:56	60.03424	0		0	0				-653	30446.52
05/16/11 08:21:58	60.03458	0		0	0				-653	30446.52
05/16/11 08:22:00	60.03458	0		0	0				-653	30446.52
05/16/11 08:22:02	60.03555	0		0	0				-653	30452.43
05/16/11 08:22:04	60.03586	0		0	0				-653	30452.43
05/16/11 08:22:06	60.03683	0		0	0				-653	30452.43
05/16/11 08:22:08	60.03748	0		0	0				-653	30452.43
05/16/11 08:22:10	60.03748	0		0	0				-653	30452.43
05/16/11 08:22:12	60.03717	0		0	0				-653	30452.43
05/16/11 08:22:14	60.03781	0		0	0				-653	30473.21
05/16/11 08:22:16	60.03781	0		0	0				-653	30473.21
05/16/11 08:22:18	60.03748	0		0	0				-653	30473.21
05/16/11 08:22:20	60.0365	0		0	0				-653	30473.21

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004570 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta Hz	Absolute Delta Hz	
806	03:52 Event Length mm:ss				
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.003	0.003	
1	0	1	0.008	0.008	
1	1	1	0.008	0.008	
1	1	1	0.009	0.009	
1	1	1	0.006	0.006	
1	1	1	0.004	0.004	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:22:22	60.03683	0		0	0				-653	30476.61
05/16/11 08:22:24	60.03748	0		0	0				-653	30476.61
05/16/11 08:22:26	60.03748	0		0	0				-653	30476.55
05/16/11 08:22:28	60.03812	0		0	0				-653	30476.55
05/16/11 08:22:30	60.03876	0		0	0				-653	30476.55
05/16/11 08:22:32	60.04007	0		0	0				-653	30476.55
05/16/11 08:22:34	60.04169	0		0	0				-653	30473.8
05/16/11 08:22:36	60.04361	0		0	0				-653	30473.8
05/16/11 08:22:38	60.04523	0		0	0				-653	30473.8
05/16/11 08:22:40	60.04492	0		0	0				-653	30473.8
05/16/11 08:22:42	60.04459	0		0	0				-653	30471
05/16/11 08:22:44	60.04395	0		0	0				-653	30471
05/16/11 08:22:46	60.04199	0		0	0				-653	30471.97
05/16/11 08:22:48	60.03717	0		0	0				-653	30471.97
05/16/11 08:22:50	60.03296	0		0	0				-653	30471.97
05/16/11 08:22:52	60.03101	0		0	0				-653	30471.97
05/16/11 08:22:54	60.03134	0		0	0				-653	30485.47
05/16/11 08:22:56	60.03168	0		0	0				-653	30485.47
05/16/11 08:22:58	60.03101	0		0	0				-653	30485.47
05/16/11 08:23:00	60.03101	0		0	0				-653	30485.47
05/16/11 08:23:02	60.03232	0		0	0				-653	30505.49
05/16/11 08:23:04	60.03326	0		0	0				-653	30505.49
05/16/11 08:23:06	60.03326	0		0	0				-653	30505.26
05/16/11 08:23:08	60.03394	0		0	0				-653	30505.26
05/16/11 08:23:10	60.03296	0		0	0				-653	30505.26
05/16/11 08:23:12	60.03232	0		0	0				-653	30505.26
05/16/11 08:23:14	60.03168	0		0	0				-653	30515.6
05/16/11 08:23:16	60.03168	0		0	0				-653	30515.6
05/16/11 08:23:18	60.03232	0		0	0				-653	30515.6
05/16/11 08:23:20	60.03232	0		0	0				-653	30515.6
05/16/11 08:23:22	60.03168	0		0	0				-653	30505.28
05/16/11 08:23:24	60.03168	0		0	0				-653	30505.28
05/16/11 08:23:26	60.03134	0		0	0				-653	30506.12
05/16/11 08:23:28	60.03101	0		0	0				-653	30506.12
05/16/11 08:23:30	60.03036	0		0	0				-653	30506.12
05/16/11 08:23:32	60.03036	0		0	0				-653	30506.12
05/16/11 08:23:34	60.02972	0		0	0				-653	30493.68
05/16/11 08:23:36	60.02875	0		0	0				-653	30493.68
05/16/11 08:23:38	60.03006	0		0	0				-653	30493.68
05/16/11 08:23:40	60.03198	0		0	0				-653	30493.68
05/16/11 08:23:42	60.03326	0		0	0				-653	30529.28

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004571 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.005	0.005	
1	1	1	-0.004	0.004	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:23:44	60.03458	0		0	0				-653	30529.28
05/16/11 08:23:46	60.03488	0		0	0				-653	30529.08
05/16/11 08:23:48	60.0336	0		0	0				-653	30529.08
05/16/11 08:23:50	60.03326	0		0	0				-653	30529.08
05/16/11 08:23:52	60.03232	0		0	0				-653	30529.08
05/16/11 08:23:54	60.03134	0		0	0				-653	30529.52
05/16/11 08:23:56	60.03168	0		0	0				-653	30529.52
05/16/11 08:23:58	60.03326	0		0	0				-653	30529.52
05/16/11 08:24:00	60.03458	0		0	0				-653	30529.52
05/16/11 08:24:02	60.03586	0		0	0				-653	30535.57
05/16/11 08:24:04	60.0365	0		0	0				-653	30535.57
05/16/11 08:24:06	60.03748	0		0	0				-653	30533.89
05/16/11 08:24:08	60.03683	0		0	0				-653	30533.89
05/16/11 08:24:10	60.03619	0		0	0				-653	30533.89
05/16/11 08:24:12	60.03522	0		0	0				-653	30533.89
05/16/11 08:24:14	60.03424	0		0	0				-653	30521.82
05/16/11 08:24:16	60.03296	0		0	0				-653	30521.82
05/16/11 08:24:18	60.03198	0		0	0				-653	30521.82
05/16/11 08:24:20	60.03134	0		0	0				-653	30521.82
05/16/11 08:24:22	60.03168	0		0	0				-653	30533.64
05/16/11 08:24:24	60.03134	0		0	0				-653	30533.64
05/16/11 08:24:26	60.03101	0		0	0				-653	30532.32
05/16/11 08:24:28	60.03036	0		0	0				-653	30532.32
05/16/11 08:24:30	60.02972	0		0	0				-653	30532.32
05/16/11 08:24:32	60.03006	0		0	0				-653	30532.32
05/16/11 08:24:34	60.0307	0		0	0				-653	30551.2
05/16/11 08:24:36	60.03168	0		0	0				-653	30551.2
05/16/11 08:24:38	60.0336	0		0	0				-653	30551.2
05/16/11 08:24:40	60.03488	0		0	0				-653	30551.2
05/16/11 08:24:42	60.03522	0		0	0				-653	30548.06
05/16/11 08:24:44	60.03586	0		0	0				-653	30548.06
05/16/11 08:24:46	60.03717	0		0	0				-653	30543.69
05/16/11 08:24:48	60.03812	0		0	0				-653	30543.69
05/16/11 08:24:50	60.03717	0		0	0				-653	30543.69
05/16/11 08:24:52	60.03748	0		0	0				-653	30543.69
05/16/11 08:24:54	60.03845	0		0	0				-653	30546.32
05/16/11 08:24:56	60.03876	0		0	0				-653	30546.32
05/16/11 08:24:58	60.03781	0		0	0				-653	30546.32
05/16/11 08:25:00	60.03619	0		0	0				-653	30546.32
05/16/11 08:25:02	60.03488	0		0	0				-653	30546.28
05/16/11 08:25:04	60.03394	0		0	0				-653	30546.28

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004572 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:25:06	60.0336	0		0	0				-653	30546.38
05/16/11 08:25:08	60.0336	0		0	0				-653	30546.38
05/16/11 08:25:10	60.03458	0		0	0				-653	30546.38
05/16/11 08:25:12	60.0365	0		0	0				-653	30546.38
05/16/11 08:25:14	60.03748	0		0	0				-653	30556.84
05/16/11 08:25:16	60.03781	0		0	0				-653	30556.84
05/16/11 08:25:18	60.03748	0		0	0				-653	30556.84
05/16/11 08:25:20	60.0365	0		0	0				-653	30556.84
05/16/11 08:25:22	60.03488	0		0	0				-653	30557.42
05/16/11 08:25:24	60.0336	0		0	0				-653	30557.42
05/16/11 08:25:26	60.03232	0		0	0				-653	30557.43
05/16/11 08:25:28	60.03134	0		0	0				-653	30557.43
05/16/11 08:25:30	60.03101	0		0	0				-653	30557.43
05/16/11 08:25:32	60.03101	0		0	0				-653	30557.43
05/16/11 08:25:34	60.0307	0		0	0				-653	30566.39
05/16/11 08:25:36	60.02972	0		0	0				-653	30566.39
05/16/11 08:25:38	60.02908	0		0	0				-653	30566.39
05/16/11 08:25:40	60.02811	0		0	0				-653	30566.39
05/16/11 08:25:42	60.02649	0		0	0				-653	30567.26
05/16/11 08:25:44	60.02521	0		0	0				-653	30567.26
05/16/11 08:25:46	60.02359	0		0	0				-653	30562.43
05/16/11 08:25:48	60.02133	0		0	0				-653	30562.43
05/16/11 08:25:50	60.02002	0		0	0				-653	30562.43
05/16/11 08:25:52	60.02002	0		0	0				-653	30562.43
05/16/11 08:25:54	60.02069	0		0	0				-653	30573.32
05/16/11 08:25:56	60.02133	0		0	0				-653	30573.32
05/16/11 08:25:58	60.021	0		0	0				-653	30573.32
05/16/11 08:26:00	60.02036	0		0	0				-653	30573.32
05/16/11 08:26:02	60.01938	0		0	0				-653	30567
05/16/11 08:26:04	60.01938	0		0	0				-653	30567
05/16/11 08:26:06	60.01938	0		0	0				-653	30567.04
05/16/11 08:26:08	60.01971	0		0	0				-653	30567.04
05/16/11 08:26:10	60.01971	0		0	0				-653	30567.04
05/16/11 08:26:12	60.01907	0		0	0				-653	30567.04
05/16/11 08:26:14	60.01938	0		0	0				-653	30556.49
05/16/11 08:26:16	60.02036	0		0	0				-653	30556.49
05/16/11 08:26:18	60.02036	0		0	0				-653	30556.49
05/16/11 08:26:20	60.01907	0		0	0				-653	30556.49
05/16/11 08:26:22	60.01712	0		0	0				-653	30530.19
05/16/11 08:26:24	60.01584	0		0	0				-653	30530.19
05/16/11 08:26:26	60.0152	0		0	0				-653	30530.04

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004573 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:26:28	60.0155	0		0	0				-653	30530.04
05/16/11 08:26:30	60.01614	0		0	0				-653	30530.04
05/16/11 08:26:32	60.01746	0		0	0				-653	30530.04
05/16/11 08:26:34	60.0181	0		0	0				-653	30542.27
05/16/11 08:26:36	60.01746	0		0	0				-653	30542.27
05/16/11 08:26:38	60.01712	0		0	0				-653	30542.27
05/16/11 08:26:40	60.01648	0		0	0				-653	30542.27
05/16/11 08:26:42	60.01486	0		0	0				-653	30559.64
05/16/11 08:26:44	60.01227	0		0	0				-653	30559.64
05/16/11 08:26:46	60.01035	0		0	0				-653	30559.67
05/16/11 08:26:48	60.00937	0		0	0				-653	30559.67
05/16/11 08:26:50	60.00903	0		0	0				-653	30559.67
05/16/11 08:26:52	60.00937	0		0	0				-653	30559.67
05/16/11 08:26:54	60.01065	0		0	0				-653	30552.02
05/16/11 08:26:56	60.01163	0		0	0				-653	30552.02
05/16/11 08:26:58	60.01227	0		0	0				-653	30552.02
05/16/11 08:27:00	60.01163	0		0	0				-653	30552.02
05/16/11 08:27:02	60.00873	0		0	0				-653	30556.78
05/16/11 08:27:04	60.00647	0		0	0				-653	30556.78
05/16/11 08:27:06	60.00583	0		0	0				-653	30550.7
05/16/11 08:27:08	60.00613	0		0	0				-653	30550.7
05/16/11 08:27:10	60.00613	0		0	0				-653	30550.7
05/16/11 08:27:12	60.00711	0		0	0				-653	30550.7
05/16/11 08:27:14	60.00903	0		0	0				-653	30559.76
05/16/11 08:27:16	60.01099	0		0	0				-653	30559.76
05/16/11 08:27:18	60.01099	0		0	0				-653	30559.76
05/16/11 08:27:20	60.01035	0		0	0				-653	30559.76
05/16/11 08:27:22	60.0097	0		0	0				-653	30563.61
05/16/11 08:27:24	60.00873	0		0	0				-653	30563.61
05/16/11 08:27:26	60.00711	0		0	0				-653	30556.57
05/16/11 08:27:28	60.00613	0		0	0				-653	30556.57
05/16/11 08:27:30	60.00583	0		0	0				-653	30556.57
05/16/11 08:27:32	60.00711	0		0	0				-653	30556.57
05/16/11 08:27:34	60.00809	0		0	0				-653	30556.7
05/16/11 08:27:36	60.00839	0		0	0				-653	30556.7
05/16/11 08:27:38	60.00809	0		0	0				-653	30556.7
05/16/11 08:27:40	60.00711	0		0	0				-653	30556.7
05/16/11 08:27:42	60.00677	0		0	0				-653	30544.52
05/16/11 08:27:44	60.00775	0		0	0				-653	30544.52
05/16/11 08:27:46	60.00711	0		0	0				-653	30543.34
05/16/11 08:27:48	60.00647	0		0	0				-653	30543.34

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004574 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:27:50	60.00388	0		0	0				-653	30543.34
05/16/11 08:27:52	60.00128	0		0	0				-653	30543.34
05/16/11 08:27:54	59.99936	0		0	0				-653	30554.42
05/16/11 08:27:56	59.99805	0		0	0				-653	30554.42
05/16/11 08:27:58	59.99741	0		0	0				-653	30554.42
05/16/11 08:28:00	59.9971	0		0	0				-653	30554.42
05/16/11 08:28:02	59.99677	0		0	0				-653	30534.33
05/16/11 08:28:04	59.9971	0		0	0				-653	30534.33
05/16/11 08:28:06	59.99646	0		0	0				-653	30533.84
05/16/11 08:28:08	59.99579	0		0	0				-653	30533.84
05/16/11 08:28:10	59.99451	0		0	0				-653	30533.84
05/16/11 08:28:12	59.99353	0		0	0				-653	30533.84
05/16/11 08:28:14	59.99289	0		0	0				-653	30557.2
05/16/11 08:28:16	59.99191	0		0	0				-653	30557.2
05/16/11 08:28:18	59.98901	0		0	0				-653	30557.2
05/16/11 08:28:20	59.98611	0		0	0				-653	30557.2
05/16/11 08:28:22	59.9845	0		0	0				-653	30560.91
05/16/11 08:28:24	59.98318	0		0	0				-653	30560.91
05/16/11 08:28:26	59.9819	0		0	0				-653	30560.56
05/16/11 08:28:28	59.98093	0		0	0				-653	30560.56
05/16/11 08:28:30	59.97964	0		0	0				-653	30560.56
05/16/11 08:28:32	59.97867	0		0	0				-653	30560.56
05/16/11 08:28:34	59.97964	0		0	0				-653	30560.08
05/16/11 08:28:36	59.97998	0		0	0				-653	30560.08
05/16/11 08:28:38	59.98062	0		0	0				-653	30560.08
05/16/11 08:28:40	59.98029	0		0	0				-653	30560.08
05/16/11 08:28:42	59.979	0		0	0				-653	30558.72
05/16/11 08:28:44	59.97739	0		0	0				-653	30558.72
05/16/11 08:28:46	59.97513	0		0	0				-653	30553.46
05/16/11 08:28:48	59.97351	0		0	0				-653	30553.46
05/16/11 08:28:50	59.97253	0		0	0				-653	30553.46
05/16/11 08:28:52	59.97189	0		0	0				-653	30553.46
05/16/11 08:28:54	59.97318	0		0	0				-653	30562.63
05/16/11 08:28:56	59.97415	0		0	0				-653	30562.63
05/16/11 08:28:58	59.97449	0		0	0				-653	30562.63
05/16/11 08:29:00	59.97513	0		0	0				-653	30562.63
05/16/11 08:29:02	59.97577	0		0	0				-653	30578.05
05/16/11 08:29:04	59.97641	0		0	0				-653	30578.05
05/16/11 08:29:06	59.97705	0		0	0				-653	30570.97
05/16/11 08:29:08	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:10	59.97675	0		0	0				-653	30570.97

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004575 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.003	0.003	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:29:12	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:14	59.9761	0		0	0				-653	30593.17
05/16/11 08:29:16	59.9761	0		0	0				-653	30593.17
05/16/11 08:29:18	59.97641	0		0	0				-653	30593.17
05/16/11 08:29:20	59.97705	0		0	0				-653	30593.17
05/16/11 08:29:22	59.97803	0		0	0				-653	30575.07
05/16/11 08:29:24	59.98029	0		0	0				-653	30575.07
05/16/11 08:29:26	59.98318	0		0	0				-653	30575.07
05/16/11 08:29:28	59.98547	0		0	0				-653	30575.07
05/16/11 08:29:30	59.98709	0		0	0				-653	30575.07
05/16/11 08:29:32	59.98965	0		0	0				-653	30575.07
05/16/11 08:29:34	59.99225	0		0	0				-653	30575.72
05/16/11 08:29:36	59.99484	0		0	0				-653	30575.72
05/16/11 08:29:38	59.99646	0		0	0				-653	30575.72
05/16/11 08:29:40	59.99774	0		0	0				-653	30575.72
05/16/11 08:29:42	59.99966	0		0	0				-653	30583.84
05/16/11 08:29:44	60.00034	0		0	0				-653	30583.84
05/16/11 08:29:46	60.00128	0		0	0				-653	30586.4
05/16/11 08:29:48	60.00195	0		0	0				-653	30586.4
05/16/11 08:29:50	60.00226	0		0	0				-653	30586.4
05/16/11 08:29:52	60.0029	0		0	0				-653	30586.4
05/16/11 08:29:54	60.00354	0		0	0				-653	30589.72
05/16/11 08:29:56	60.00421	0		0	0				-653	30589.72
05/16/11 08:29:58	60.00452	0		0	0				-653	30589.72
05/16/11 08:30:00	60.00388	0		0	0				-653	30589.72
05/16/11 08:30:02	60.00388	0		0	0				-653	30590.3
05/16/11 08:30:04	60.00421	0		0	0				-653	30590.3
05/16/11 08:30:06	60.00421	0		0	0				-653	30590.22
05/16/11 08:30:08	60.00388	0		0	0				-653	30590.22
05/16/11 08:30:10	60.00195	0		0	0				-653	30590.22
05/16/11 08:30:12	59.99966	0		0	0				-653	30590.22
05/16/11 08:30:14	59.99387	0		0	0				-653	30600.12
05/16/11 08:30:16	59.99387	0		0	0				-653	30600.12
05/16/11 08:30:18	59.98999	0		0	0				-653	30600.12
05/16/11 08:30:20	59.98868	0		0	0				-653	30600.12
05/16/11 08:30:22	59.98709	0		0	0				-653	30603.38
05/16/11 08:30:24	59.98578	0		0	0				-653	30603.38
05/16/11 08:30:26	59.98578	0		0	0				-653	30597.09
05/16/11 08:30:28	59.98288	0		0	0				-653	30597.09
05/16/11 08:30:30	59.97964	0		0	0				-653	30597.09
05/16/11 08:30:32	59.97675	0		0	0				-653	30597.09

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 004576 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	0	1	-0.006	0.006	
1	0	1	0.000	0.000	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:30:34	59.97479	0		0	0				-653	30603.96
05/16/11 08:30:36	59.97479	0		0	0				-653	30603.96
05/16/11 08:30:38	59.97641	0		0	0				-653	30603.96
05/16/11 08:30:40	59.97641	0		0	0				-653	30603.96
05/16/11 08:30:42	59.97543	0		0	0				-653	30607.96
05/16/11 08:30:44	59.97351	0		0	0				-653	30607.96
05/16/11 08:30:46	59.97318	0		0	0				-653	30601.98
05/16/11 08:30:48	59.97513	0		0	0				-653	30601.98
05/16/11 08:30:50	59.97641	0		0	0				-653	30597.09
05/16/11 08:30:52	59.97705	0		0	0				-653	30597.09
05/16/11 08:30:54	59.97867	0		0	0				-653	30607.96
05/16/11 08:30:56	59.97836	0		0	0				-653	30607.96
05/16/11 08:30:58	59.97803	0		0	0				-653	30607.96
05/16/11 08:31:00	59.97543	0		0	0				-653	30607.96
05/16/11 08:31:02	59.97415	0		0	0				-653	30607.96
05/16/11 08:31:04	59.97415	0		0	0				-653	30601.98
05/16/11 08:31:06	59.97479	0		0	0				-653	30601.98
05/16/11 08:31:08	59.97415	0		0	0				-653	30601.98
05/16/11 08:31:10	59.97351	0		0	0				-653	30601.98
05/16/11 08:31:12	59.97351	0		0	0				-653	30601.98
05/16/11 08:31:14	59.97543	0		0	0				-653	30632.79
05/16/11 08:31:16	59.97769	0		0	0				-653	30632.79
05/16/11 08:31:18	59.98062	0		0	0				-653	30632.79
05/16/11 08:31:20	59.98514	0		0	0				-653	30632.79
05/16/11 08:31:22	59.98773	0		0	0				-653	30632.79
05/16/11 08:31:24	59.98965	0		0	0				-653	30633.18
05/16/11 08:31:26	59.99097	0		0	0				-653	30633.18
05/16/11 08:31:28	59.99225	0		0	0				-653	30633.18
05/16/11 08:31:30	59.99323	0		0	0				-653	30633.18
05/16/11 08:31:32	59.99612	0		0	0				-653	30633.18
05/16/11 08:31:34	60.00034	0		0	0				-653	30620.6
05/16/11 08:31:36	60.00452	0		0	0				-653	30620.6
05/16/11 08:31:38	60.00809	0		0	0				-653	30620.6
05/16/11 08:31:40	60.01099	0		0	0				-653	30620.6
05/16/11 08:31:42	60.01389	0		0	0				-653	30620.6
05/16/11 08:31:44	60.01776	0		0	0				-653	30620.91
05/16/11 08:31:46	60.02069	0		0	0				-653	30620.91
05/16/11 08:31:48	60.02164	0		0	0				-653	30620.91
05/16/11 08:31:50	60.021	0		0	0				-653	30620.91
05/16/11 08:31:52	60.01907	0		0	0				-653	30620.91
05/16/11 08:31:54	60.0181	0		0	0				-653	30661.87

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004577 Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta Hz	Absolute Delta Hz	
806	03:52 Event Length mm:ss				
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.004	0.004	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:31:56	60.0184	0		0	0				-653	30661.87
05/16/11 08:31:58	60.02069	0		0	0				-653	30661.87
05/16/11 08:32:00	60.0239	0		0	0				-653	30661.87
05/16/11 08:32:02	60.02618	0		0	0				-653	30661.87
05/16/11 08:32:04	60.02682	0		0	0				-653	30663.73
05/16/11 08:32:06	60.02649	0		0	0				-653	30663.73
05/16/11 08:32:08	60.02585	0		0	0				-653	30663.73
05/16/11 08:32:10	60.02359	0		0	0				-653	30663.73
05/16/11 08:32:12	60.02359	0		0	0				-653	30663.73
05/16/11 08:32:14	60.02164	0		0	0				-653	30659.84
05/16/11 08:32:16	60.02231	0		0	0				-653	30659.84
05/16/11 08:32:18	60.02325	0		0	0				-653	30659.84
05/16/11 08:32:20	60.02359	0		0	0				-653	30659.84
05/16/11 08:32:22	60.02295	0		0	0				-653	30659.84
05/16/11 08:32:24	60.02133	0		0	0				-653	30653.46
05/16/11 08:32:26	60.021	0		0	0				-653	30653.46
05/16/11 08:32:28	60.021	0		0	0				-653	30653.46
05/16/11 08:32:30	60.02133	0		0	0				-653	30653.46
05/16/11 08:32:32	60.021	0		0	0				-653	30653.46
05/16/11 08:32:34	60.02036	0		0	0				-653	30661.6
05/16/11 08:32:36	60.02002	0		0	0				-653	30661.6
05/16/11 08:32:38	60.01938	0		0	0				-653	30661.6
05/16/11 08:32:40	60.0184	0		0	0				-653	30661.6
05/16/11 08:32:42	60.01712	0		0	0				-653	30661.6
05/16/11 08:32:44	60.01584	0		0	0				-653	30655.51
05/16/11 08:32:46	60.01486	0		0	0				-653	30655.51
05/16/11 08:32:48	60.01453	0		0	0				-653	30655.51
05/16/11 08:32:50	60.01486	0		0	0				-653	30655.51
05/16/11 08:32:52	60.01453	0		0	0				-653	30655.51
05/16/11 08:32:54	60.01486	0		0	0				-653	30648.14
05/16/11 08:32:56	60.0152	0		0	0				-653	30648.14
05/16/11 08:32:58	60.01486	0		0	0				-653	30648.14
05/16/11 08:33:00	60.0152	0		0	0				-653	30648.14
05/16/11 08:33:02	60.0152	0		0	0				-653	30648.14
05/16/11 08:33:04	60.01648	0		0	0				-653	30648.29
05/16/11 08:33:06	60.01614	0		0	0				-653	30648.29
05/16/11 08:33:08	60.0152	0		0	0				-653	30648.29
05/16/11 08:33:10	60.01486	0		0	0				-653	30648.29
05/16/11 08:33:12	60.01453	0		0	0				-653	30648.29
05/16/11 08:33:14	60.01291	0		0	0				-653	30652.04
05/16/11 08:33:16	60.01099	0		0	0				-653	30652.04

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	004578 Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:33:18	60.00775	0		0	0				-653	30652.04
05/16/11 08:33:20	60.00421	0		0	0				-653	30652.04
05/16/11 08:33:22	60.00162	0		0	0				-653	30652.04
05/16/11 08:33:24	60	0		0	0				-653	30651.84
05/16/11 08:33:26	59.99774	0		0	0				-653	30651.84
05/16/11 08:33:28	59.99515	0		0	0				-653	30651.84
05/16/11 08:33:30	59.99255	0		0	0				-653	30651.84
05/16/11 08:33:32	59.9903	0		0	0				-653	30651.84
05/16/11 08:33:34	59.98676	0		0	0				-653	30633.8
05/16/11 08:33:36	59.98352	0		0	0				-653	30633.8
05/16/11 08:33:38	59.98062	0		0	0				-653	30633.8
05/16/11 08:33:40	59.97964	0		0	0				-653	30633.8
05/16/11 08:33:42	59.97867	0		0	0				-653	30633.8
05/16/11 08:33:44	59.97705	0		0	0				-653	30627.71
05/16/11 08:33:46	59.97641	0		0	0				-653	30627.71
05/16/11 08:33:48	59.97675	0		0	0				-653	30627.71
05/16/11 08:33:50	59.97641	0		0	0				-653	30627.71
05/16/11 08:33:52	59.97577	0		0	0				-653	30627.71
05/16/11 08:33:54	59.97479	0		0	0				-653	30634.13
05/16/11 08:33:56	59.97415	0		0	0				-653	30634.13
05/16/11 08:33:58	59.97287	0		0	0				-653	30634.13
05/16/11 08:34:00	59.97125	0		0	0				-653	30634.13
05/16/11 08:34:02	59.97092	0		0	0				-653	30634.13
05/16/11 08:34:04	59.97125	0		0	0				-653	30627.05
05/16/11 08:34:06	59.97061	0		0	0				-653	30627.05
05/16/11 08:34:08	59.97092	0		0	0				-653	30627.05
05/16/11 08:34:10	59.97125	0		0	0				-653	30627.05
05/16/11 08:34:12	59.97156	0		0	0				-653	30627.05
05/16/11 08:34:14	59.97253	0		0	0				-653	30662.72
05/16/11 08:34:16	59.97449	0		0	0				-653	30662.72
05/16/11 08:34:18	59.97577	0		0	0				-653	30662.72
05/16/11 08:34:20	59.97641	0		0	0				-653	30662.72
05/16/11 08:34:22	59.97641	0		0	0				-653	30662.72
05/16/11 08:34:24	59.97513	0		0	0				-653	30656.52
05/16/11 08:34:26	59.9761	0		0	0				-653	30656.52
05/16/11 08:34:28	59.979	0		0	0				-653	30656.52
05/16/11 08:34:30	59.98126	0		0	0				-653	30656.52
05/16/11 08:34:32	59.98224	0		0	0				-653	30656.52
05/16/11 08:34:34	59.98254	0		0	0				-653	30642.25
05/16/11 08:34:36	59.98254	0		0	0				-653	30642.25
05/16/11 08:34:38	59.9816	0		0	0				-653	30642.25

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004579 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.003	0.003	
1	1	1	-0.004	0.004	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.004	0.004	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:34:40	59.98029	0		0	0				-653	30642.25
05/16/11 08:34:42	59.97964	0		0	0				-653	30642.25
05/16/11 08:34:44	59.98062	0		0	0				-653	30642.49
05/16/11 08:34:46	59.98093	0		0	0				-653	30642.49
05/16/11 08:34:48	59.98029	0		0	0				-653	30642.49
05/16/11 08:34:50	59.97931	0		0	0				-653	30642.49
05/16/11 08:34:52	59.97836	0		0	0				-653	30642.49
05/16/11 08:34:54	59.97803	0		0	0				-653	30645.72
05/16/11 08:34:56	59.97803	0		0	0				-653	30645.72
05/16/11 08:34:58	59.97867	0		0	0				-653	30645.72
05/16/11 08:35:00	59.97964	0		0	0				-653	30645.72
05/16/11 08:35:02	59.98062	0		0	0				-653	30645.72
05/16/11 08:35:04	59.98126	0		0	0				-653	30648.55
05/16/11 08:35:06	59.98224	0		0	0				-653	30648.55
05/16/11 08:35:08	59.98416	0		0	0				-653	30648.55
05/16/11 08:35:10	59.98547	0		0	0				-653	30648.55
05/16/11 08:35:12	59.98578	0		0	0				-653	30648.55
05/16/11 08:35:14	59.98578	0		0	0				-653	30661.06
05/16/11 08:35:16	59.98676	0		0	0				-653	30661.06
05/16/11 08:35:18	59.99063	0		0	0				-653	30661.06
05/16/11 08:35:20	59.99417	0		0	0				-653	30661.06
05/16/11 08:35:22	59.99805	0		0	0				-653	30661.06
05/16/11 08:35:24	59.99966	0		0	0				-653	30661.06
05/16/11 08:35:26	60.00226	0		0	0				-653	30661.06
05/16/11 08:35:28	60.00195	0		0	0				-653	30661.06
05/16/11 08:35:30	60.00098	0		0	0				-653	30661.06
05/16/11 08:35:32	59.99936	0		0	0				-653	30661.06
05/16/11 08:35:34	59.99872	0		0	0				-653	30684.31
05/16/11 08:35:36	59.99774	0		0	0				-653	30684.31
05/16/11 08:35:38	59.99741	0		0	0				-653	30684.31
05/16/11 08:35:40	59.99741	0		0	0				-653	30684.31
05/16/11 08:35:42	59.99838	0		0	0				-653	30684.31
05/16/11 08:35:44	59.99966	0		0	0				-653	30686.83
05/16/11 08:35:46	60.00064	0		0	0				-653	30686.83
05/16/11 08:35:48	60.00098	0		0	0				-653	30686.83
05/16/11 08:35:50	60.00064	0		0	0				-653	30686.83
05/16/11 08:35:52	60	0		0	0				-653	30686.83
05/16/11 08:35:54	59.99936	0		0	0				-653	30678.05
05/16/11 08:35:56	59.99741	0		0	0				-653	30678.05
05/16/11 08:35:58	59.99484	0		0	0					30678.05
05/16/11 08:36:00	59.99289	0		0	0					30678.05

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004580 Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:36:02	59.99097	0		0	0					30678.05
05/16/11 08:36:04	59.98965	0		0	0					30679.19
05/16/11 08:36:06	59.98804	0		0	0					30679.19
05/16/11 08:36:08	59.98773	0		0	0					30679.19
05/16/11 08:36:10	59.98804	0		0	0					30679.19
05/16/11 08:36:12	59.98901	0		0	0					30679.19
05/16/11 08:36:14	59.99063	0		0	0					30684.85
05/16/11 08:36:16	59.99255	0		0	0					30684.85
05/16/11 08:36:18	59.99484	0		0	0					30684.85
05/16/11 08:36:20	59.99677	0		0	0					30684.85
05/16/11 08:36:22	59.99838	0		0	0					30684.85
05/16/11 08:36:24	59.99872	0		0	0					30684.99
05/16/11 08:36:26	59.99872	0		0	0					30684.99
05/16/11 08:36:28	59.99936	0		0	0					30684.99
05/16/11 08:36:30	60.00195	0		0	0					30684.99
05/16/11 08:36:32	60.00485	0		0	0					30684.99
05/16/11 08:36:34	60.00809	0		0	0					30687.29
05/16/11 08:36:36	60.01099	0		0	0					30687.29
05/16/11 08:36:38	60.01324	0		0	0					30687.29
05/16/11 08:36:40	60.01422	0		0	0					30687.29
05/16/11 08:36:42	60.01486	0		0	0					30687.29
05/16/11 08:36:44	60.01453	0		0	0					30687.59
05/16/11 08:36:46	60.01227	0		0	0					30687.59
05/16/11 08:36:48	60.01099	0		0	0					30687.59
05/16/11 08:36:50	60.01099	0		0	0					30687.59
05/16/11 08:36:52	60.01227	0		0	0					30687.59
05/16/11 08:36:54	60.01227	0		0	0					30726.76
05/16/11 08:36:56	60.01163	0		0	0					30726.76
05/16/11 08:36:58	60.01132	0		0	0					30726.76
05/16/11 08:37:00	60.01132	0		0	0					30726.76
05/16/11 08:37:02	60.01065	0		0	0					30726.76
05/16/11 08:37:04	60.00903	0		0	0					30726.82
05/16/11 08:37:06	60.00839	0		0	0					30726.82
05/16/11 08:37:08	60.00809	0		0	0					30726.82
05/16/11 08:37:10	60.00809	0		0	0					30726.82
05/16/11 08:37:12	60.00937	0		0	0					30726.82
05/16/11 08:37:14	60.01099	0		0	0					30720.93
05/16/11 08:37:16	60.01227	0		0	0					30720.93
05/16/11 08:37:18	60.01291	0		0	0					30720.93
05/16/11 08:37:20	60.0126	0		0	0					30720.93
05/16/11 08:37:22	60.01132	0		0	0					30720.93

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	004581 Rows of data to shift to align T(0) 1
805	8:06:38 t(0)				
921	8:10:30 t(Recovery)		Delta Hz	Absolute Delta Hz	
806	03:52 Event Length mm:ss				
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:37:24	60.0097	0		0	0					30720.53
05/16/11 08:37:26	60.00613	0		0	0					30720.53
05/16/11 08:37:28	60.00259	0		0	0					30720.53
05/16/11 08:37:30	59.99936	0		0	0					30720.53
05/16/11 08:37:32	59.99902	0		0	0					30720.53
05/16/11 08:37:34	60.00034	0		0	0					30720.62
05/16/11 08:37:36	60.00064	0		0	0					30720.62
05/16/11 08:37:38	59.99936	0		0	0					30720.62
05/16/11 08:37:40	59.99741	0		0	0					30720.62
05/16/11 08:37:42	59.99579	0		0	0					30720.62
05/16/11 08:37:44	59.99387	0		0	0					30721.15
05/16/11 08:37:46	59.99255	0		0	0					30721.15
05/16/11 08:37:48	59.99191	0		0	0					30721.15
05/16/11 08:37:50	59.99255	0		0	0					30721.15
05/16/11 08:37:52	59.99548	0		0	0					30721.15
05/16/11 08:37:54	60	0		0	0					30726.87
05/16/11 08:37:56	60.00323	0		0	0					30726.87
05/16/11 08:37:58	60.00516	0		0	0					30726.87
05/16/11 08:38:00	60.00485	0		0	0					30726.87
05/16/11 08:38:02	60.00354	0		0	0					30726.87
05/16/11 08:38:04	60.00226	0		0	0					30734.84
05/16/11 08:38:06	60.00098	0		0	0					30734.84
05/16/11 08:38:08	60	0		0	0					30734.84
05/16/11 08:38:10	59.99966	0		0	0					30734.84
05/16/11 08:38:12	59.99966	0		0	0					30734.84
05/16/11 08:38:14	59.99774	0		0	0					30757.45
05/16/11 08:38:16	59.9971	0		0	0					30757.45
05/16/11 08:38:18	59.99741	0		0	0					30757.45
05/16/11 08:38:20	59.99805	0		0	0					30757.45
05/16/11 08:38:22	59.99872	0		0	0					30757.45
05/16/11 08:38:24	59.99936	0		0	0					30757.92
05/16/11 08:38:26	60	0		0	0					30757.92
05/16/11 08:38:28	60.00162	0		0	0					30757.92
05/16/11 08:38:30	60.00323	0		0	0					30757.92
05/16/11 08:38:32	60.00388	0		0	0					30757.92
05/16/11 08:38:34	60.00485	0		0	0					30752.27
05/16/11 08:38:36	60.00549	0		0	0					30752.27
05/16/11 08:38:38	60.00613	0		0	0					30752.27
05/16/11 08:38:40	60.00647	0		0	0					30752.27
05/16/11 08:38:42	60.00677	0		0	0					30752.27
05/16/11 08:38:44	60.00677	0		0	0					30752.33

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)		004582	
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.002	0.002	
1	1	1	-0.004	0.004	
1	1	1	-0.004	0.004	
1	1	1	-0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	1	1	0.005	0.005	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:38:46	60.00613	0		0	0					30752.33
05/16/11 08:38:48	60.00549	0		0	0					30752.33
05/16/11 08:38:50	60.00485	0		0	0					30752.33
05/16/11 08:38:52	60.00485	0		0	0					30752.33
05/16/11 08:38:54	60.00613	0		0	0					30755.63
05/16/11 08:38:56	60.01001	0		0	0					30755.63
05/16/11 08:38:58	60.01324	0		0	0					30755.63
05/16/11 08:39:00	60.01614	0		0	0					30755.63
05/16/11 08:39:02	60.0184	0		0	0					30755.63
05/16/11 08:39:04	60.01971	0		0	0					30755.66
05/16/11 08:39:06	60.021	0		0	0					30755.66
05/16/11 08:39:08	60.02133	0		0	0					30755.66
05/16/11 08:39:10	60.02197	0		0	0					30755.66
05/16/11 08:39:12	60.02359	0		0	0					30755.66
05/16/11 08:39:14	60.02682	0		0	0					30784.89
05/16/11 08:39:16	60.0307	0		0	0					30784.89
05/16/11 08:39:18	60.0336	0		0	0					30784.89
05/16/11 08:39:20	60.03424	0		0	0					30784.89
05/16/11 08:39:22	60.03326	0		0	0					30784.89
05/16/11 08:39:24	60.0307	0		0	0					30786.98
05/16/11 08:39:26	60.02875	0		0	0					30786.98
05/16/11 08:39:28	60.02875	0		0	0					30786.98
05/16/11 08:39:30	60.02939	0		0	0					30786.98
05/16/11 08:39:32	60.02908	0		0	0					30786.98
05/16/11 08:39:34	60.02844	0		0	0					30796.28
05/16/11 08:39:36	60.02777	0		0	0					30796.28
05/16/11 08:39:38	60.02811	0		0	0					30796.28
05/16/11 08:39:40	60.02777	0		0	0					30796.28
05/16/11 08:39:42	60.02777	0		0	0					30796.28
05/16/11 08:39:44	60.02777	0		0	0					30792.94
05/16/11 08:39:46	60.02747	0		0	0					30792.94
05/16/11 08:39:48	60.02713	0		0	0					30792.94
05/16/11 08:39:50	60.02618	0		0	0					30792.94
05/16/11 08:39:52	60.02521	0		0	0					30792.94
05/16/11 08:39:54	60.02457	0		0	0					30803.58
05/16/11 08:39:56	60.02487	0		0	0					30803.58
05/16/11 08:39:58	60.02551	0		0	0					30803.58
05/16/11 08:40:00	60.02618	0		0	0					30803.58

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)		004583	
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	

Balancing Authority Name: MyBA

MyBA_110516_0806_FRS_Form2.9.xlsm

Interconnection Prevailing UFLS First Step Relay trip point 59.300 Hz

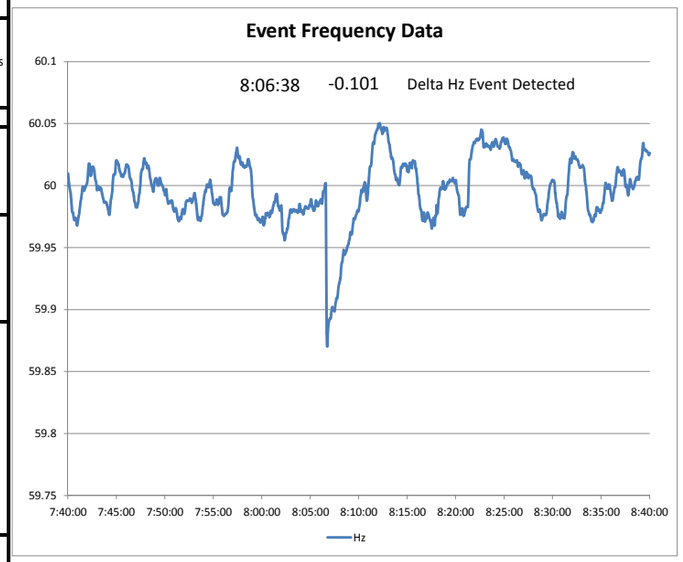
Interconnection High Relay trip point 60.700 Hz

004584

Note: See "Instruction" tab for more detailed instructions.

	Auto	**Event Detection**	Auto
8:06:38	1245	Manually selected row number of the Event Starting Time.	Manual
8:10:30	1442	Manually selected row number of the Event Ending Time.	

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



11/05/16 Date yymmdd

8:06 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_110516_0806_FRS_Form2.9.xlsm

Date:	Monday, May 16, 2011
Time of T(0)	8:06:38
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999 Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897 Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101 Hz
Value A Pre-Perturbation Average Contingent MW [T(-2) to T(-16)]	471.09 MW
Value B Post-Perturbation Average Contingent MW [T(+20 to T(+52)]	0.00 MW
Pre to Post Perturbation Contingent Delta MW Actual	-471.09 MW
Initial Performance Ramp Magnitude Adjustment	-0.06 MW
EPFR Pre-Perturbation Average	8.97 MW
EPFR Post-Perturbation Average	671.54 MW
EPFR Delta	662.57 MW

Balancing Authority	MyBA
Grid Nominal Frequency	60.000 Hz
Droop Setting	5.00% 3.00000 Hz
Deadband Setting	0.000 Hz
Hz Span	3.00000 Hz
TC (frequency response filter constant)	0.350 Time Constant for delayed delivery of PFR during Sustained Measure

A Point	8:06:36	
FPointA	60.00195313	8:06:36
A Value	59.99862671	
C Value	59.87011337	
Delta FC		

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-"

EPFR = Expected Primary Frequency Response EPFR(Final) 662.51 MW

MW Response in right direction for frequency delta Yes

Low Hz Delta Hz Event

0.00 Actual Interchange MW Average during frequency recovery period
617.52 Target Interchange MW Average during frequency recovery period
226.52 Interchange Average Ramp MW during frequency recovery period
470.90 Actual MW @ T(-4)
-494.59 Starting and Ending Difference in Interchange MW during frequency recovery period (indicates ramp direction during recovery period)
0:03:52 Event Duration (h:mm:ss)
No Target MW Average minus MW @ T(-4) less than zero
641.21 Interchange Target Relative Average Change - MW (Low Frequency Event)
23.69 Interchange Actual Relative Average Change - MW (Low Frequency Event)
Yes Interchange Actual Average minus MW @ T(-4) less than zero
No Interchange Average MW minus MW @ T(-4) greater than zero
Yes Interchange Target MW Average minus MW @ T(-4) greater than zero
146.62 Interchange Target Relative Average Change - MW (High Frequency Event)
-470.90 Interchange Actual Relative Average Change - MW (High Frequency Event)
Down Ramp Direction during frequency recovery period

Initial Response P.U. Performance 0.711 P.U.

0.738 P.U. Sustained Response P.U. Performance

T	Frequency Hz	Contingent Resource Lost MW	Value B 20 to 52 sec Average Frequency	Average MW	Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

T	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW

Date:	Monday, May 16, 2011
Time of T(0)	8:06:38
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999 Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897 Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101 Hz
Value A Pre-Perturbation Contingency MW [T(-2) to T(-16)]	471.09 MW
Value B Post-Perturbation Average Contingency MW [T(+20 to T(+52)]	0.00 MW
Pre to Post Perturbation Contingency Delta MW Actual	471.09 MW
EPFR Pre-Perturbation Average	8.97 MW
EPFR Post-Perturbation Average	671.54 MW
EPFR Unadjusted	662.57 MW
EPFR Adjusted	662.57 MW
Pre Load Resources MW	0.00 MW
Pre Non-Conforming Load MW	0.00 MW
Spare	0.00 MW
Spare	0.00 MW
Spare	0.00 MW
Sum of Pre Perturbation Adjustments	0.00 MW
Post Load Resources MW	0.00 MW
Post Non-Conforming Load MW	0.00 MW
Spare	0.00 MW
Spare	0.00 MW
Spare	0.00 MW
Sum of Post Perturbation Adjustments	0.00 MW
Net Total Adjustments MW	0.00 MW

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-653.00 MW/0.1 Hz
Post-Perturbation Bias Setting	-653.00 MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	8.97 MW
EPFR for Bias Setting Post-Perturbation Average	671.54 MW
EPFR for Bias Setting Delta	662.57 MW
Primary Frequency Response Delivery % of Bias	71.10%
Pre-Perturbation BA Load	30202.7 MW
Post-Perturbation BA Load	30136.8 MW
Pre to Post Perturbation BA Load Change	-65.973 MW
Load Dampening Frequency Response	-65.020 MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	14.00%
Average Bias Setting when Hz is greater than +/-0.036 Hz	-653.00 MW/0.1 Hz

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

004585

		Actual Primary Freq Response MW/0.1 Hz	Un-adjusted P.U. Performance	Load Resources Tripped Adjustment	Non-Conforming Load Adjustment	Spare Adjustment	Spare Adjustment	Spare Adjustment	Adjusted P.U. Performance
Frequency @ T(+46)	59.901 Hz								
Frequency @ T(+76)	59.915 Hz								
Frequency @ T(+106)	59.944 Hz								
Frequency @ T(+136)	59.952 Hz								
Frequency @ T(+166)	59.967 Hz								
EPFR @ T(+46)	-653.00 MW/0.1 Hz	-481.62	0.738	0.00	0.00	0.00	0.00	0.00	0.738
EPFR @ T(+76)	-653.00 MW/0.1 Hz	-561.31	0.860	0.00	0.00	0.00	0.00	0.00	0.860
EPFR @ T(+106)	-653.00 MW/0.1 Hz	-863.83	1.323	0.00	0.00	0.00	0.00	0.00	1.323
EPFR @ T(+136)	-653.00 MW/0.1 Hz	-1000.43	1.532	0.00	0.00	0.00	0.00	0.00	1.532
EPFR @ T(+166)	-653.00 MW/0.1 Hz	-1507.48	2.309	0.00	0.00	0.00	0.00	0.00	2.309

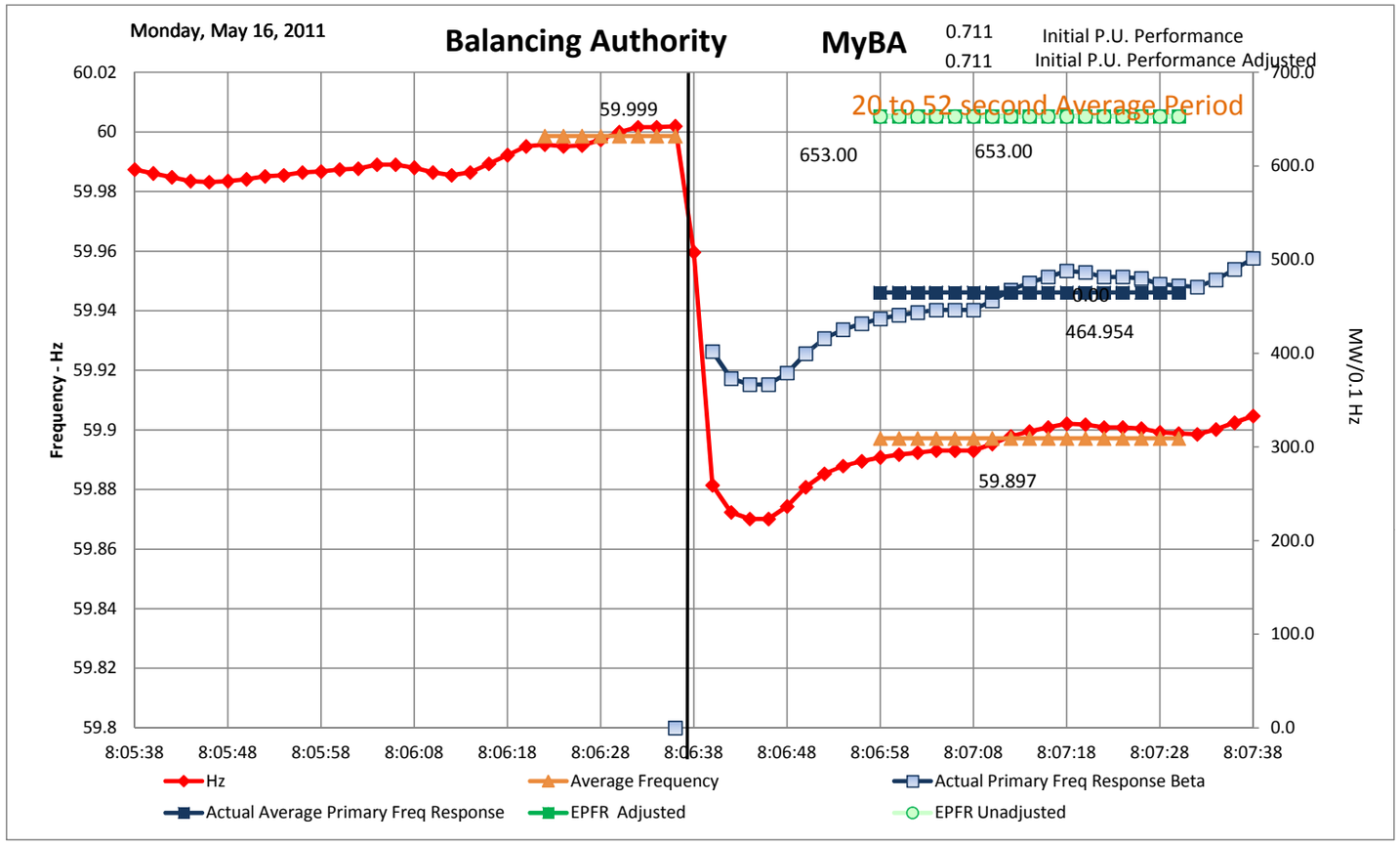
20 to 52 second Average Period Evaluation

Initial P.U. Performance for FRO	0.711 P.U.
Initial P.U. Performance Adjusted for FRO	0.711 P.U.

T	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected MW/0.1 Hz Response MW/0.1 Hz	Actual Average Primary Freq Response MW/0.1 Hz	Actual Primary Freq Response Beta MW/0.1 Hz

004588

8:20:30	59.97641	0.000	19590	154.043	121.340	0.000	100.707	0.000	125.818	-18.645	49.717	8:20:30	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	154.043	2120.41	0.0236
8:20:32	59.97705	0.000	19590	149.858	131.321	0.000	110.689	0.000	125.782	-18.645	49.553	8:20:32	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858	2183.39	0.0229
8:20:34	59.97705	0.000	19590	149.858	137.809	0.000	117.177	0.000	125.762	-18.645	49.390	8:20:34	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858	2183.39	0.0229
8:20:36	59.97705	0.000	19590	149.858	142.026	0.000	121.394	0.000	125.751	-18.645	49.228	8:20:36	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	149.858	2183.39	0.0229
8:20:38	59.97803	0.000	19590	143.481	142.536	0.000	121.903	0.000	125.742	-18.645	49.066	8:20:38	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	143.481	2286.90	0.0220
8:20:40	59.97964	0.000	19590	132.920	139.170	0.000	118.538	0.000	125.725	-18.645	48.906	8:20:40	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	132.920	2481.77	0.0204
8:20:42	59.9816	0.000	19590	120.166	132.519	0.000	111.886	0.000	125.692	-18.645	48.745	8:20:42	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	120.166	2766.41	0.0184
8:20:44	59.98126	0.000	19590	122.358	128.962	0.000	108.330	0.000	125.651	-18.645	48.586	8:20:44	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	122.358	2712.93	0.0187
8:20:46	59.97931	0.000	19590	135.112	131.115	0.000	110.482	0.000	125.616	-18.645	48.428	8:20:46	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	135.112	2438.64	0.0207
8:20:48	59.9761	0.000	19590	156.036	139.837	0.000	119.205	0.000	125.600	-18.645	48.270	8:20:48	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	156.036	2091.68	0.0239
8:20:50	59.97543	0.000	19590	160.420	147.041	0.000	126.409	0.000	125.602	-18.645	48.113	8:20:50	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	160.420	2031.13	0.0246
8:20:52	59.97577	0.000	19590	158.228	150.957	0.000	130.324	0.000	125.613	-18.645	47.956	8:20:52	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	158.228	2060.96	0.0242
8:20:54	59.97675	0.000	19590	151.851	151.270	0.000	130.637	0.000	125.625	-18.645	47.801	8:20:54	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	151.851	2152.94	0.0233
8:20:56	59.97803	0.000	19590	143.481	148.544	0.000	127.911	0.000	125.630	-18.645	47.646	8:20:56	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	143.481	2286.90	0.0220
8:20:58	59.979	0.000	19590	137.104	144.540	0.000	123.908	0.000	125.626	-18.645	47.492	8:20:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	137.104	2400.71	0.0210
8:21:00	59.97964	0.000	19590	132.920	140.473	0.000	119.840	0.000	125.613	-18.645	47.338	8:21:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	132.920	2481.77	0.0204
8:21:02	59.98062	0.000	19590	126.543	135.597	0.000	114.965	0.000	125.588	-18.645	47.185	8:21:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	126.543	2616.37	0.0194
8:21:04	59.9819	0.000	19590	118.173	129.499	0.000	108.866	0.000	125.550	-18.645	47.033	8:21:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	118.173	2816.90	0.0181
8:21:06	59.98224	0.000	19590	115.981	124.767	0.000	104.135	0.000	125.501	-18.645	46.882	8:21:06	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	115.981	2874.60	0.0178
8:21:08	59.98254	0.000	19590	113.988	120.995	0.000	100.362	0.000	125.443	-18.645	46.731	8:21:08	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:10	59.98288	0.000	19590	111.796	117.775	0.000	97.143	0.000	125.378	-18.645	46.582	8:21:10	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	111.796	2991.59	0.0171
8:21:12	59.98254	0.000	19590	113.988	116.450	0.000	95.817	0.000	125.311	-18.645	46.432	8:21:12	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:14	59.98254	0.000	19590	113.988	115.588	0.000	94.956	0.000	125.242	-18.645	46.284	8:21:14	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:16	59.98288	0.000	19590	111.796	114.261	0.000	93.628	0.000	125.170	-18.645	46.136	8:21:16	59.983	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	111.796	2991.59	0.0171
8:21:18	59.98611	0.000	19590	90.672	106.005	0.000	85.372	0.000	125.080	-18.645	45.989	8:21:18	59.986	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	90.672	3765.02	0.0139
8:21:20	59.99387	0.000	19590	40.055	82.922	0.000	62.290	0.000	124.937	-18.645	45.842	8:21:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	40.055	9895.25	0.0061
8:21:22	60.00226	0.000	19590	-14.747	48.738	0.000	28.106	0.000	124.719	-18.645	45.696	8:21:22	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	-14.747		0.0023
8:21:24	60.01099	0.000	19590	-71.741	6.571	0.000	-14.062	0.000	124.406	-18.645	45.551	8:21:24	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-71.741		0.0110
8:21:26	60.01712	0.000	19590	-111.796	-34.858	0.000	-55.490	0.000	124.002	-18.645	45.406	8:21:26	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-111.796		0.0171
8:21:28	60.02069	0.000	19590	-135.112	-69.947	0.000	-90.579	0.000	123.521	-18.645	45.262	8:21:28	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-135.112		0.0207
8:21:30	60.02133	0.000	19590	-139.297	-94.219	0.000	-114.852	0.000	122.988	-18.645	45.119	8:21:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:32	60.02133	0.000	19590	-139.297	-109.996	0.000	-130.629	0.000	122.422	-18.645	44.976	8:21:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:34	60.02133	0.000	19590	-139.297	-120.251	0.000	-140.884	0.000	121.835	-18.645	44.834	8:21:34	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:36	60.02325	0.000	19590	-151.851	-131.311	0.000	-151.944	0.000	121.227	-18.645	44.693	8:21:36	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-151.851		0.0233
8:21:38	60.02551	0.000	19590	-166.598	-143.662	0.000	-164.294	0.000	120.594	-18.645	44.552	8:21:38	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-166.598		0.0255



T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

"Auto" Event Detection adjustment of T(0). 004589
# of rows to shift T(0)
1
A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

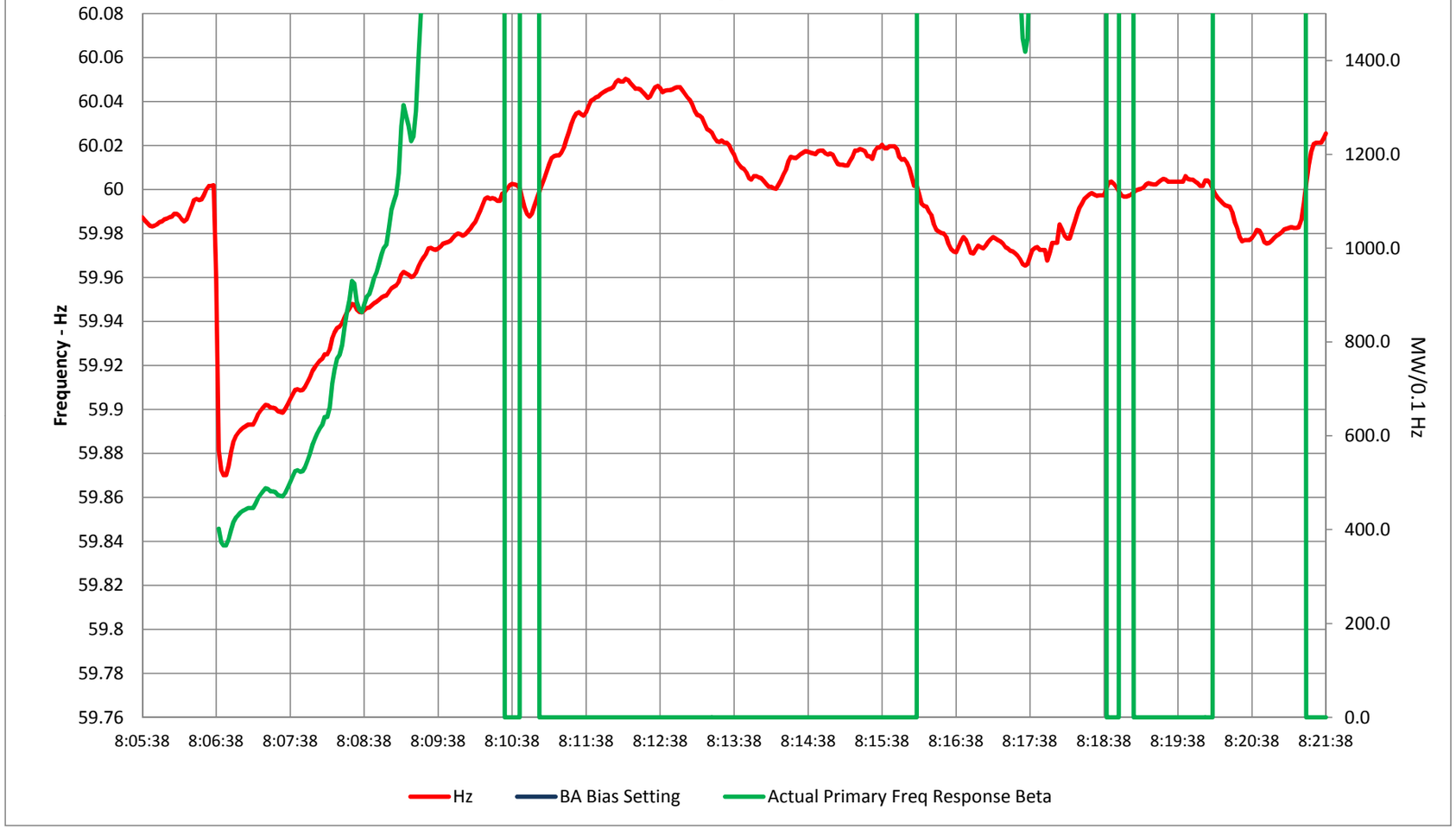
Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.

Monday, May 16, 2011

MyBA

-653.00 Avg Bias While Hz >+/-0.036 Hz

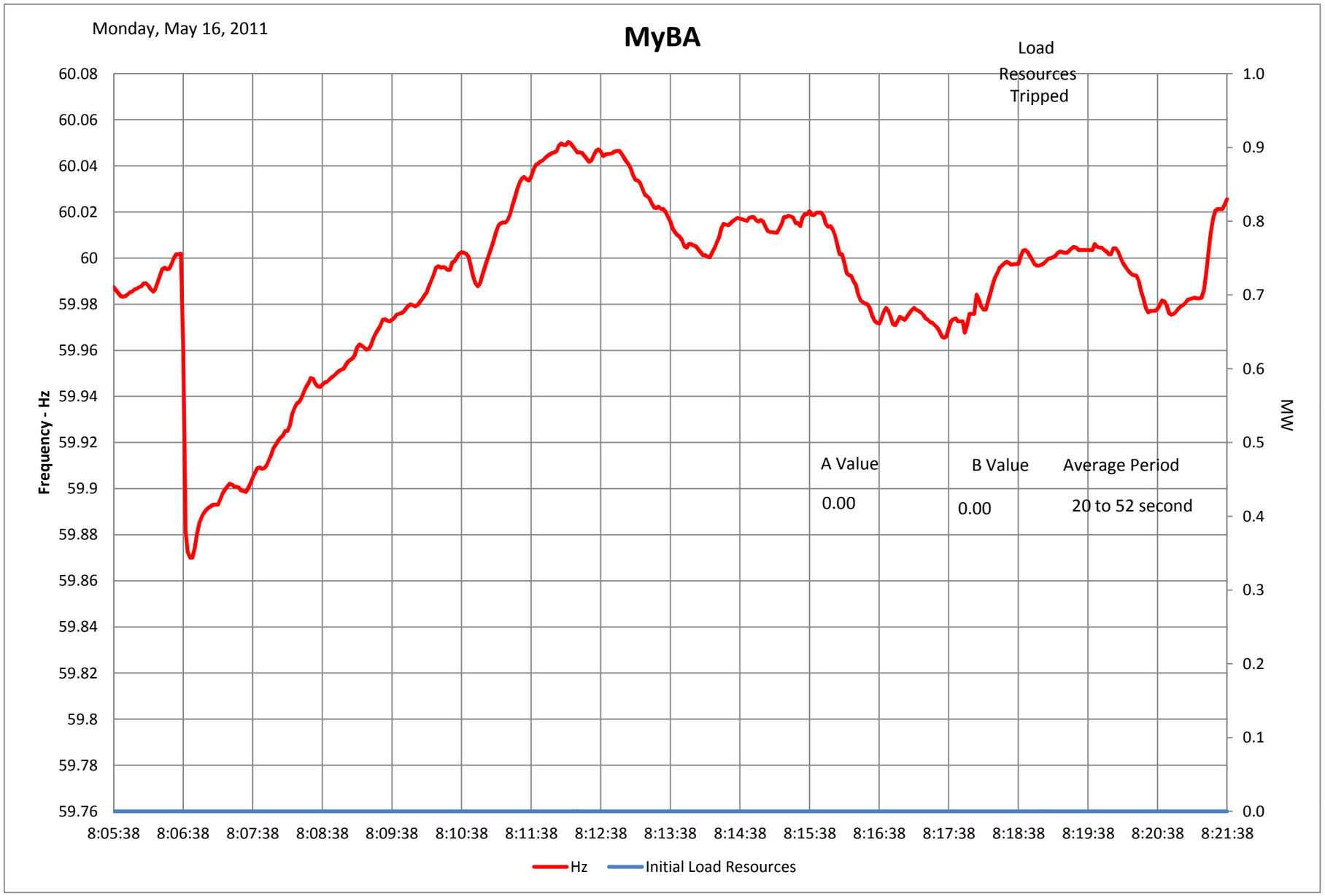


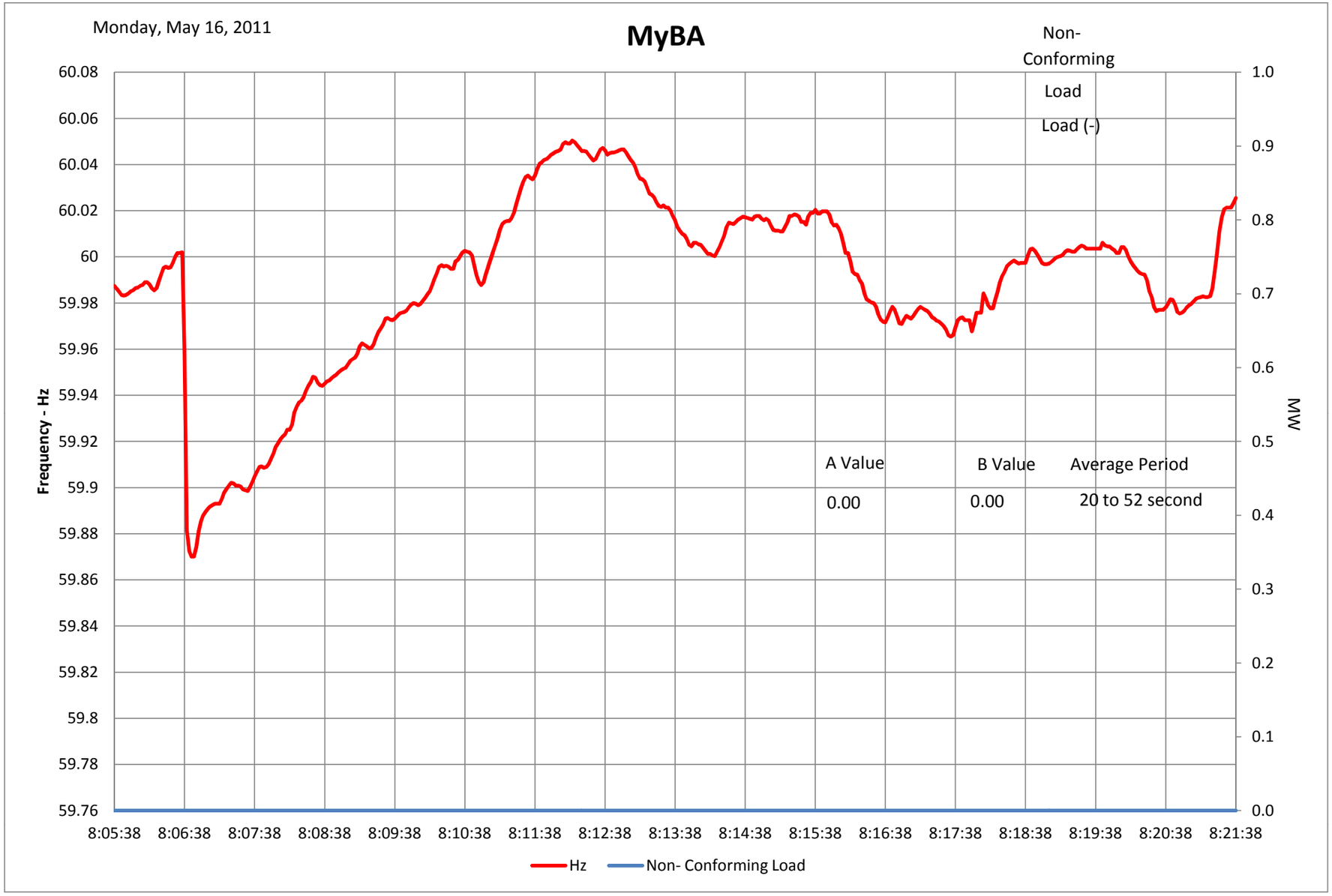
						Value A Data	BA Performance										Value B	20 to 52 second Average Period Evaluation				
Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW
Monday, May 16, 2011	8:06:38	60.002	59.999	8:06:38	59.870	59.999	471.09	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30202.74	8.97	59.897	0.00	0.00	0.00	0.00	0.00

									Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	~~004592~~ Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
0.00	0.00	0.711	0.711	0.738	-653.00	30136.77	671.54	-653.00	0.738	0.860	1.323	1.532	2.309	0.738	0.860	1.323	1.532	2.309	-653.00	-653.00

Steps	To be completed for each event evaluated.
1	Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order Column A: Date and Time in this format, mm/dd/yy HH:MM:SS Column B: Frequency Hz Column C: Contingent Resouce Lost MW or Lost Load Column D: Load Resources tripped during the event. Column E: Non Conforming Load Column F: Spare Column G: Not Used Column H: Spare Column I: Spare Column J: BA Bias Setting Column K: BA Load
2	Note: Columns D & E are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1
3	Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation
4	Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data
5	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" workshee If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
6	Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0)
7	If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph
8	The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz event This value controls the end of the "Sustained Frequency Response" evaluation period Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal
9	Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarize in the correct order on worksheet "Form 1 Summary Data"
10	Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9
11	Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC

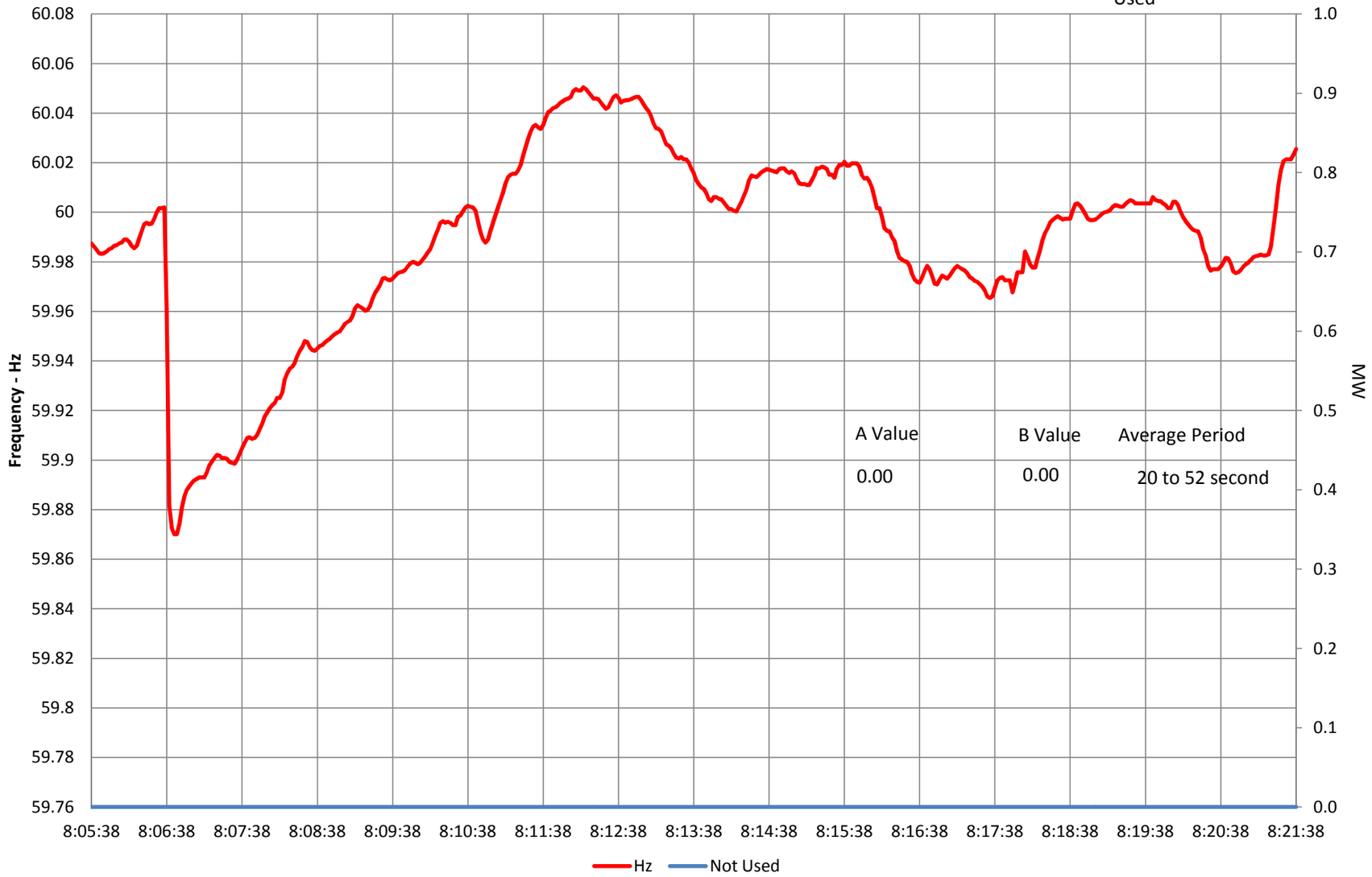
Steps	To be completed the first time you use Form 2 for your BA.
A	Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "ERCOT"


Monday, May 16, 2011
MyBA
Load Resources Tripped
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Hz
Initial Load Resources


Monday, May 16, 2011
MyBA
Non-Conforming Load
Load (-)
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Non- Conforming Load

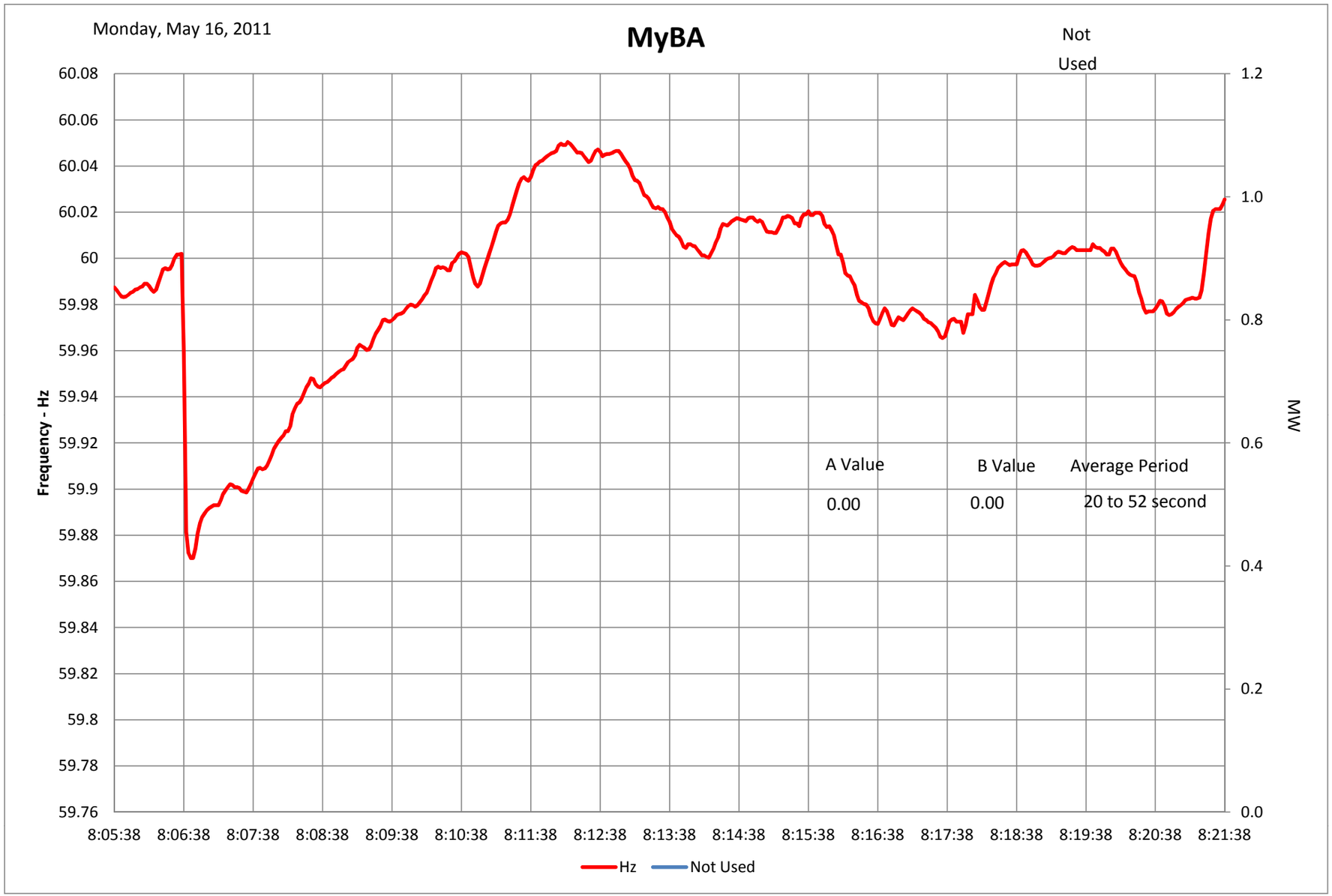
Monday, May 16, 2011

MyBA



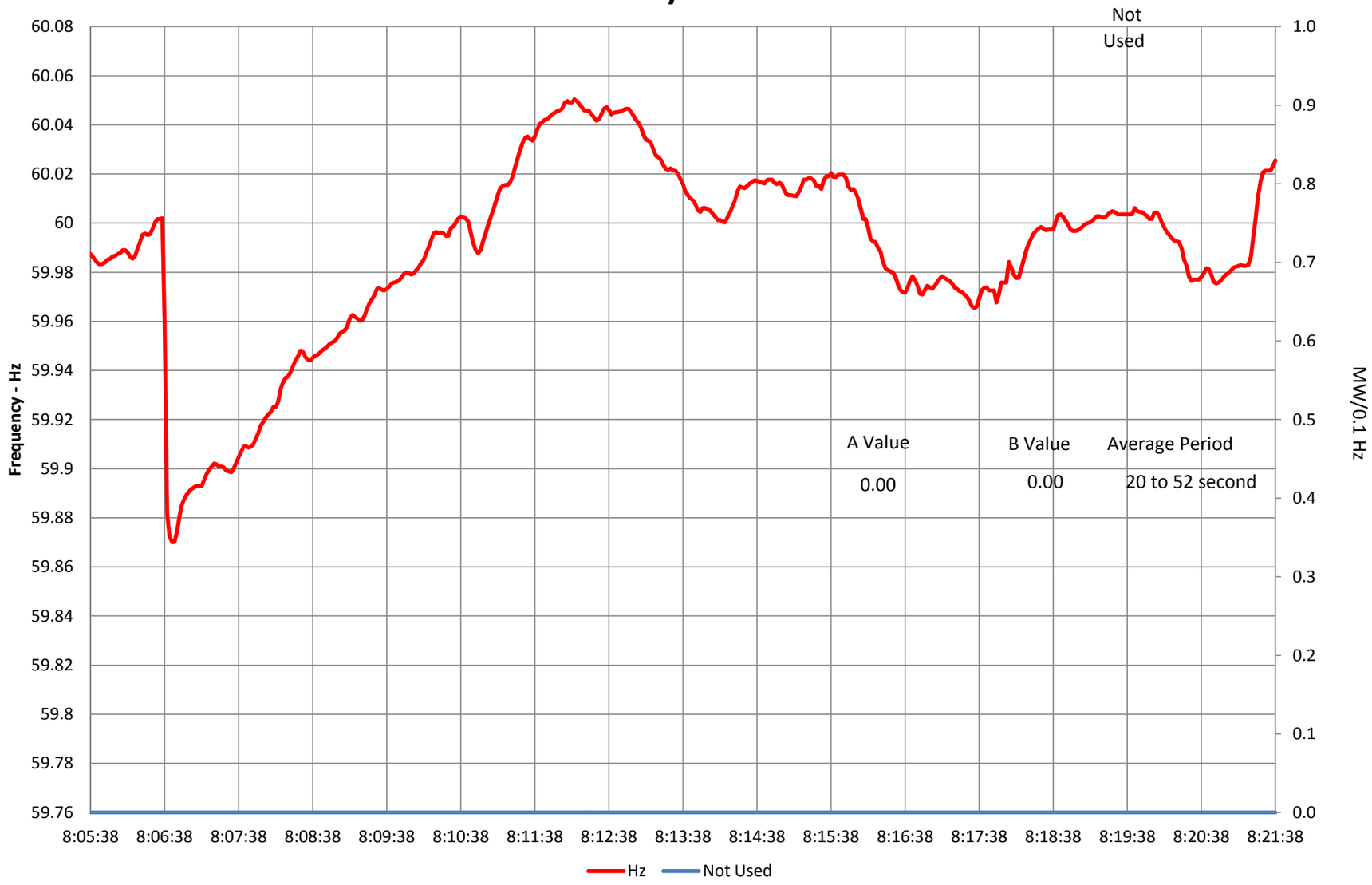
Monday, May 16, 2011

MyBA



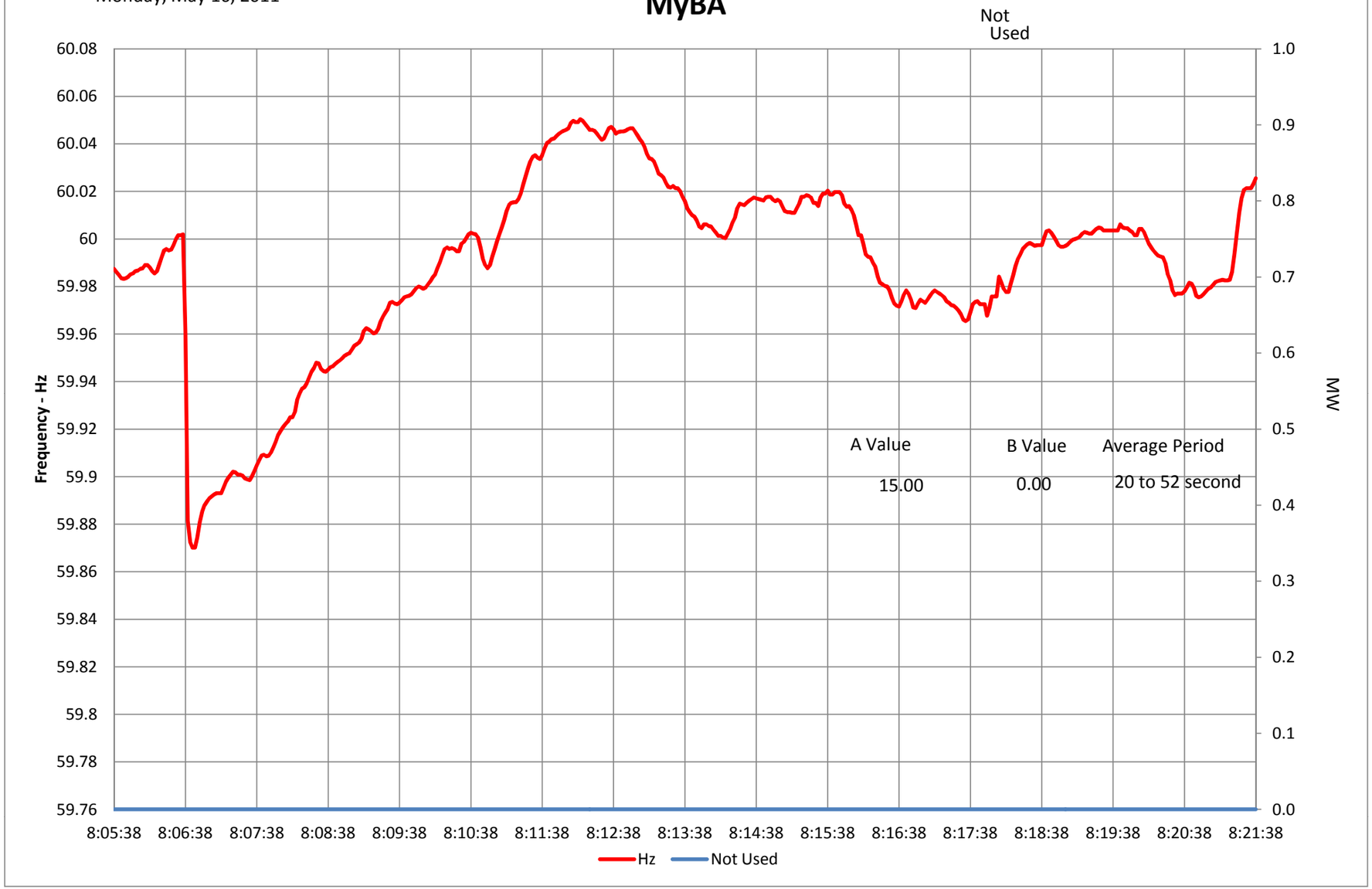
Monday, May 16, 2011

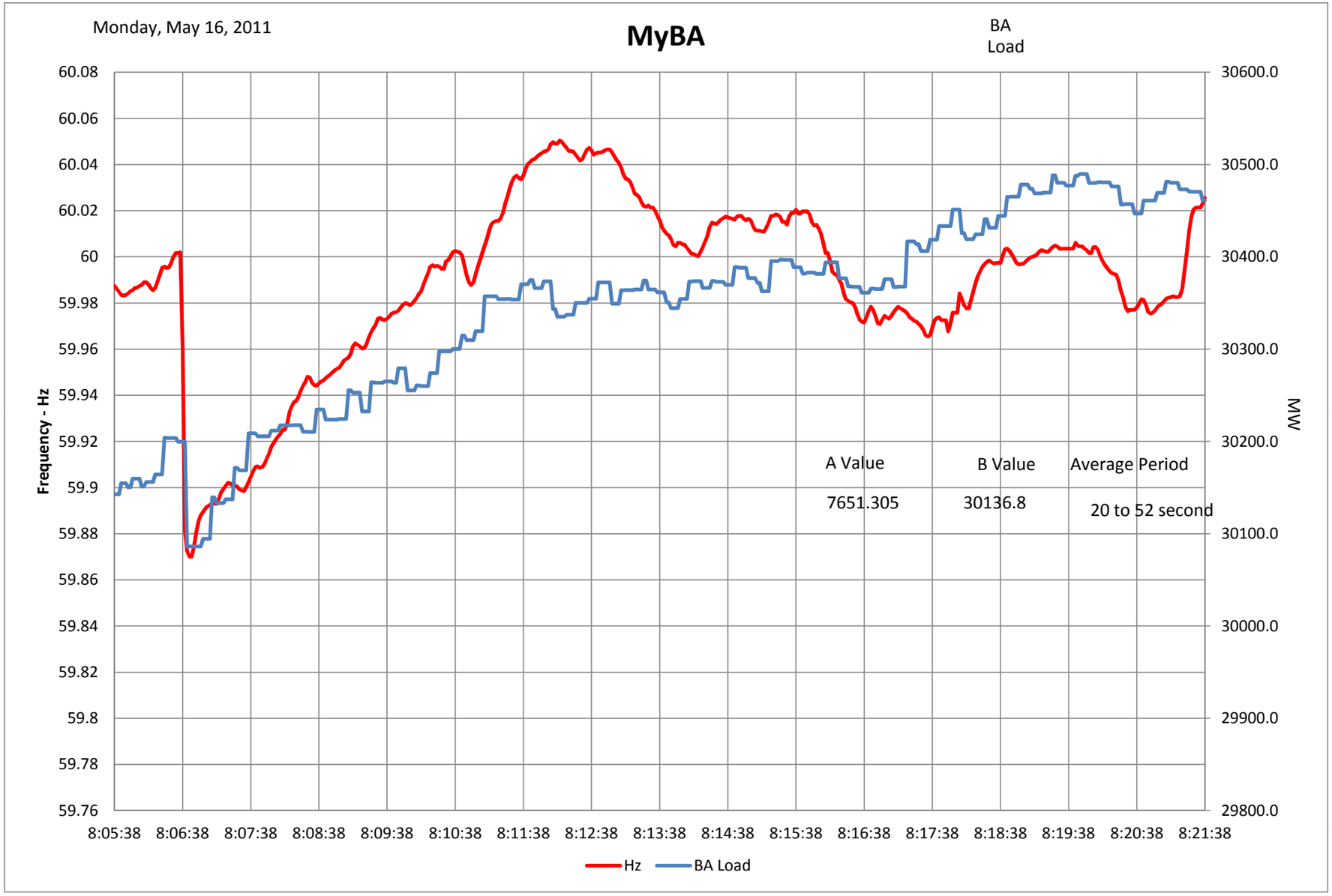
MyBA



Monday, May 16, 2011

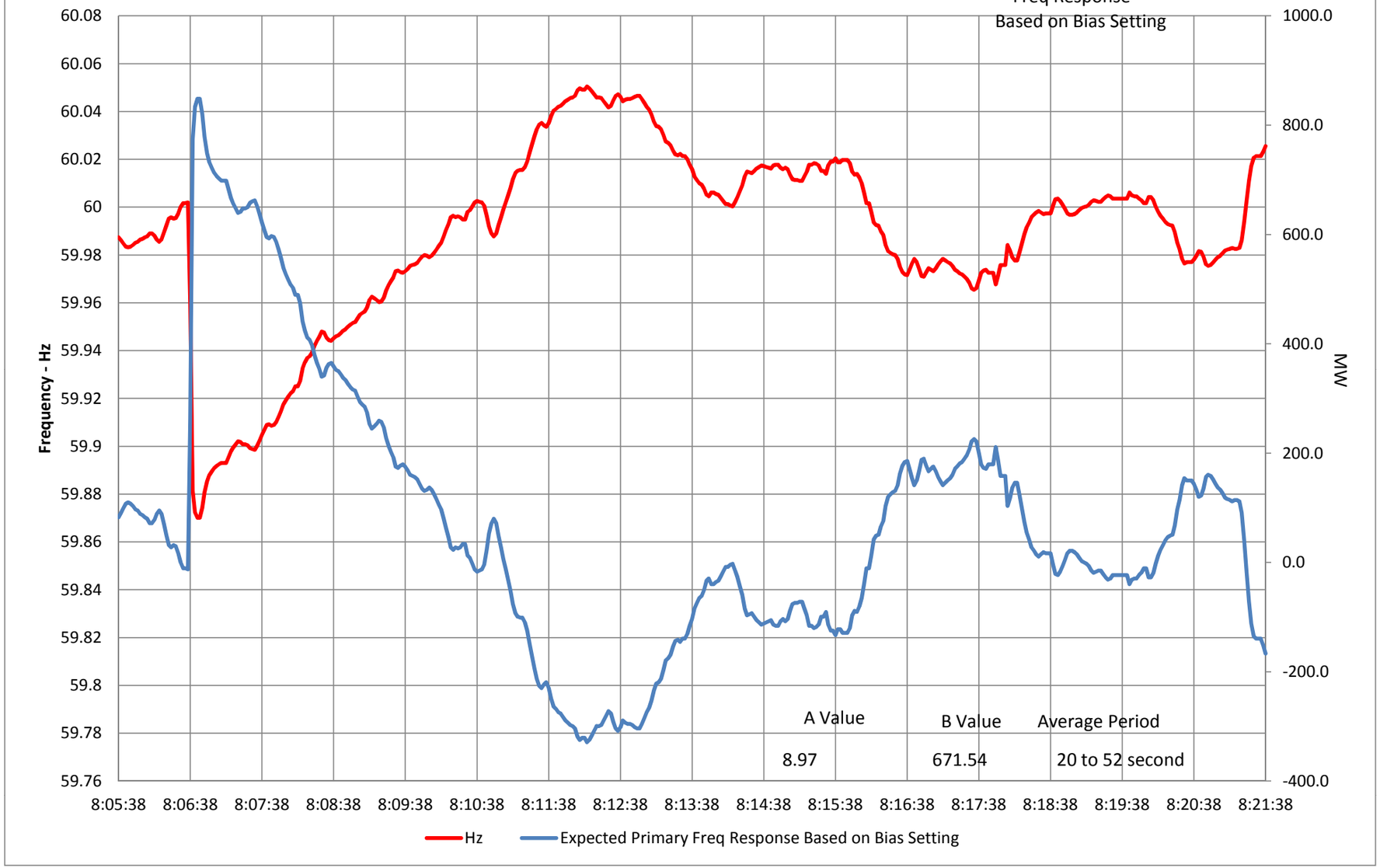
MyBA




Monday, May 16, 2011
MyBA
BA Load
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
30600.0
30500.0
30400.0
30300.0
30200.0
30100.0
30000.0
29900.0
29800.0
MW
A Value
7651.305
B Value
30136.8
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Load

Monday, May 16, 2011

MyBA



Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
											805	8:06:38	t(0)			
											921	8:10:30	t(Recovery)			
											806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
05/16/11 07:40:00	60.0097	471		0	0				-653	29756.85		0				
05/16/11 07:40:02	60.00745	471		0	0				-653	29756.85	0	0	0	-0.002	0.002	
05/16/11 07:40:04	60.00452	471		0	0				-653	29756.82	0	0	0	-0.003	0.003	
05/16/11 07:40:06	60.00259	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:08	60.00034	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:10	59.99872	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:12	59.9971	471		0	0				-653	29756.82	0	0	0	-0.002	0.002	
05/16/11 07:40:14	59.99548	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:16	59.99353	471		0	0				-653	29766.46	0	0	0	-0.002	0.002	
05/16/11 07:40:18	59.99063	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:20	59.9874	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:22	59.98416	471		0	0				-653	29766.46	0	0	0	-0.003	0.003	
05/16/11 07:40:24	59.98093	471		0	0				-653	29766.37	0	0	0	-0.003	0.003	
05/16/11 07:40:26	59.97867	471		0	0				-653	29766.37	0	0	0	-0.002	0.002	
05/16/11 07:40:28	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:30	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:32	59.97836	471		0	0				-653	29766.37	0	0	0	0.000	0.000	
05/16/11 07:40:34	59.97577	471		0	0				-653	29780.98	0	0	0	-0.003	0.003	
05/16/11 07:40:36	59.97382	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:38	59.97223	471		0	0				-653	29780.98	0	0	0	-0.002	0.002	
05/16/11 07:40:40	59.97223	471		0	0				-653	29780.98	0	0	0	0.000	0.000	
05/16/11 07:40:42	59.97318	471		0	0				-653	29780.98	0	0	0	0.001	0.001	
05/16/11 07:40:44	59.97351	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:46	59.97415	471		0	0				-653	29780.95	0	0	0	0.001	0.001	
05/16/11 07:40:48	59.97287	471		0	0				-653	29780.95	0	0	0	-0.001	0.001	
05/16/11 07:40:50	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:52	59.97287	471		0	0				-653	29780.95	0	0	0	0.000	0.000	
05/16/11 07:40:54	59.96832	471		0	0				-653	29770.34	0	0	0	-0.005	0.005	
05/16/11 07:40:56	59.96768	471		0	0				-653	29770.34	0	0	0	-0.001	0.001	
05/16/11 07:40:58	59.96899	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:00	59.97028	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:02	59.97223	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:04	59.97382	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:06	59.97479	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:08	59.9761	471		0	0				-653	29770.34	0	0	0	0.001	0.001	
05/16/11 07:41:10	59.97769	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:12	59.97998	471		0	0				-653	29770.34	0	0	0	0.002	0.002	
05/16/11 07:41:14	59.98318	471		0	0				-653	29782.73	0	0	0	0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:41:16	59.98578	471		0	0				-653	29782.73
05/16/11 07:41:18	59.9874	471		0	0				-653	29782.73
05/16/11 07:41:20	59.98868	471		0	0				-653	29782.73
05/16/11 07:41:22	59.98999	471		0	0				-653	29782.73
05/16/11 07:41:24	59.99191	471		0	0				-653	29782.82
05/16/11 07:41:26	59.99353	471		0	0				-653	29782.82
05/16/11 07:41:28	59.99612	471		0	0				-653	29782.82
05/16/11 07:41:30	59.99805	471		0	0				-653	29782.82
05/16/11 07:41:32	59.99902	471		0	0				-653	29782.82
05/16/11 07:41:34	59.99902	471		0	0				-653	29786.15
05/16/11 07:41:36	59.99774	471		0	0				-653	29786.15
05/16/11 07:41:38	59.99646	471		0	0				-653	29786.15
05/16/11 07:41:40	59.99579	471		0	0				-653	29786.15
05/16/11 07:41:42	59.99612	471		0	0				-653	29786.15
05/16/11 07:41:44	59.9971	471		0	0				-653	29786.21
05/16/11 07:41:46	59.99774	471		0	0				-653	29786.21
05/16/11 07:41:48	59.99838	471		0	0				-653	29786.21
05/16/11 07:41:50	59.99936	471		0	0				-653	29786.21
05/16/11 07:41:52	60	471		0	0				-653	29786.21
05/16/11 07:41:54	60.00064	471		0	0				-653	29778.98
05/16/11 07:41:56	60.00128	471		0	0				-653	29778.98
05/16/11 07:41:58	60.00226	471		0	0				-653	29778.98
05/16/11 07:42:00	60.00388	471		0	0				-653	29778.98
05/16/11 07:42:02	60.00647	471		0	0				-653	29778.98
05/16/11 07:42:04	60.0097	471		0	0				-653	29778.92
05/16/11 07:42:06	60.01358	471		0	0				-653	29778.92
05/16/11 07:42:08	60.01614	471		0	0				-653	29778.92
05/16/11 07:42:10	60.01776	471		0	0				-653	29778.92
05/16/11 07:42:12	60.01776	471		0	0				-653	29778.92
05/16/11 07:42:14	60.01486	471		0	0				-653	29787.9
05/16/11 07:42:16	60.01163	471		0	0				-653	29787.9
05/16/11 07:42:18	60.00903	471		0	0				-653	29787.9
05/16/11 07:42:20	60.00775	471		0	0				-653	29787.9
05/16/11 07:42:22	60.00775	471		0	0				-653	29787.9
05/16/11 07:42:24	60.00903	471		0	0				-653	29787.84
05/16/11 07:42:26	60.00903	471		0	0				-653	29787.84
05/16/11 07:42:28	60.01324	471		0	0				-653	29787.84
05/16/11 07:42:30	60.01486	471		0	0				-653	29787.84

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.004	0.004	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:42:32	60.0152	471		0	0				-653	29787.84
05/16/11 07:42:34	60.0152	471		0	0				-653	29813.39
05/16/11 07:42:36	60.01486	471		0	0				-653	29813.39
05/16/11 07:42:38	60.01422	471		0	0				-653	29813.39
05/16/11 07:42:40	60.01358	471		0	0				-653	29813.39
05/16/11 07:42:42	60.01227	471		0	0				-653	29813.39
05/16/11 07:42:44	60.01099	471		0	0				-653	29813.33
05/16/11 07:42:46	60.00873	471		0	0				-653	29813.33
05/16/11 07:42:48	60.00647	471		0	0				-653	29813.33
05/16/11 07:42:50	60.00485	471		0	0				-653	29813.33
05/16/11 07:42:52	60.00354	471		0	0				-653	29813.33
05/16/11 07:42:54	60.00195	471		0	0				-653	29797.46
05/16/11 07:42:56	60	471		0	0				-653	29797.46
05/16/11 07:42:58	59.99774	471		0	0				-653	29797.46
05/16/11 07:43:00	59.99612	471		0	0				-653	29797.46
05/16/11 07:43:02	59.99646	471		0	0				-653	29797.46
05/16/11 07:43:04	59.99741	471		0	0				-653	29797.52
05/16/11 07:43:06	59.99838	471		0	0				-653	29797.52
05/16/11 07:43:08	59.99936	471		0	0				-653	29797.52
05/16/11 07:43:10	59.99902	471		0	0				-653	29797.52
05/16/11 07:43:12	59.99872	471		0	0				-653	29797.52
05/16/11 07:43:14	59.99774	471		0	0				-653	29780.33
05/16/11 07:43:16	59.99646	471		0	0				-653	29780.33
05/16/11 07:43:18	59.99677	471		0	0				-653	29780.33
05/16/11 07:43:20	59.99677	471		0	0				-653	29780.33
05/16/11 07:43:22	59.99774	471		0	0				-653	29780.33
05/16/11 07:43:24	59.99805	471		0	0				-653	29780.27
05/16/11 07:43:26	59.99774	471		0	0				-653	29780.27
05/16/11 07:43:28	59.99579	471		0	0				-653	29780.27
05/16/11 07:43:30	59.99387	471		0	0				-653	29780.27
05/16/11 07:43:32	59.99255	471		0	0				-653	29780.27
05/16/11 07:43:34	59.99127	471		0	0				-653	29785.63
05/16/11 07:43:36	59.98999	471		0	0				-653	29785.63
05/16/11 07:43:38	59.98965	471		0	0				-653	29785.63
05/16/11 07:43:40	59.98837	471		0	0				-653	29785.63
05/16/11 07:43:42	59.98709	471		0	0				-653	29785.63
05/16/11 07:43:44	59.98642	471		0	0				-653	29785.63
05/16/11 07:43:46	59.98642	471		0	0				-653	29785.63

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 07:43:48	59.98642	471		0	0				-653	29785.63	0	0	0	0.000	0.000	
05/16/11 07:43:50	59.98676	471		0	0				-653	29785.63	0	0	0	0.000	0.000	
05/16/11 07:43:52	59.98676	471		0	0				-653	29785.63	0	0	0	0.000	0.000	
05/16/11 07:43:54	59.98642	471		0	0				-653	29787.12	0	0	0	0.000	0.000	
05/16/11 07:43:56	59.98611	471		0	0				-653	29787.12	0	0	0	0.000	0.000	
05/16/11 07:43:58	59.98611	471		0	0				-653	29787.12	0	0	0	0.000	0.000	
05/16/11 07:44:00	59.98514	471		0	0				-653	29787.12	0	0	0	-0.001	0.001	
05/16/11 07:44:02	59.98416	471		0	0				-653	29787.12	0	0	0	-0.001	0.001	
05/16/11 07:44:04	59.98352	471		0	0				-653	29787.12	0	0	0	-0.001	0.001	
05/16/11 07:44:06	59.98224	471		0	0				-653	29787.12	0	0	0	-0.001	0.001	
05/16/11 07:44:08	59.98029	471		0	0				-653	29787.12	0	0	0	-0.002	0.002	
05/16/11 07:44:10	59.979	471		0	0				-653	29787.12	0	0	0	-0.001	0.001	
05/16/11 07:44:12	59.97769	471		0	0				-653	29787.12	0	0	0	-0.001	0.001	
05/16/11 07:44:14	59.97675	471		0	0				-653	29780.67	0	0	0	-0.001	0.001	
05/16/11 07:44:16	59.97641	471		0	0				-653	29780.67	0	0	0	0.000	0.000	
05/16/11 07:44:18	59.97739	471		0	0				-653	29780.67	0	0	0	0.001	0.001	
05/16/11 07:44:20	59.97998	471		0	0				-653	29780.67	0	0	0	0.003	0.003	
05/16/11 07:44:22	59.98318	471		0	0				-653	29780.67	0	0	0	0.003	0.003	
05/16/11 07:44:24	59.98611	471		0	0				-653	29780.76	0	0	0	0.003	0.003	
05/16/11 07:44:26	59.98837	471		0	0				-653	29780.76	0	0	0	0.002	0.002	
05/16/11 07:44:28	59.9903	471		0	0				-653	29780.76	0	0	0	0.002	0.002	
05/16/11 07:44:30	59.99191	471		0	0				-653	29780.76	0	0	0	0.002	0.002	
05/16/11 07:44:32	59.99353	471		0	0				-653	29780.76	0	0	0	0.002	0.002	
05/16/11 07:44:34	59.99579	471		0	0				-653	29777.7	0	0	0	0.002	0.002	
05/16/11 07:44:36	60	471		0	0				-653	29777.7	0	0	0	0.004	0.004	
05/16/11 07:44:38	60.00354	471		0	0				-653	29777.7	0	0	0	0.004	0.004	
05/16/11 07:44:40	60.00647	471		0	0				-653	29777.7	0	0	0	0.003	0.003	
05/16/11 07:44:42	60.00839	471		0	0				-653	29777.7	0	0	0	0.002	0.002	
05/16/11 07:44:44	60.00903	471		0	0				-653	29777.7	0	0	0	0.001	0.001	
05/16/11 07:44:46	60.00873	471		0	0				-653	29777.7	0	0	0	0.000	0.000	
05/16/11 07:44:48	60.00873	471		0	0				-653	29777.7	0	0	0	0.000	0.000	
05/16/11 07:44:50	60.00937	471		0	0				-653	29777.7	0	0	0	0.001	0.001	
05/16/11 07:44:52	60.01099	471		0	0				-653	29777.7	0	0	0	0.002	0.002	
05/16/11 07:44:54	60.01453	471		0	0				-653	29788.63	0	0	0	0.004	0.004	
05/16/11 07:44:56	60.0181	471		0	0				-653	29788.63	0	0	0	0.004	0.004	
05/16/11 07:44:58	60.02002	471		0	0				-653	29788.63	0	0	0	0.002	0.002	
05/16/11 07:45:00	60.02036	471		0	0				-653	29788.63	0	0	0	0.000	0.000	
05/16/11 07:45:02	60.02002	471		0	0				-653	29788.63	0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
											805	8:06:38	t(0)			
											921	8:10:30	t(Recovery)			
											806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
05/16/11 07:45:04	60.02002	471		0	0				-653	29788.63	0	0	0	0.000	0.000	
05/16/11 07:45:06	60.01907	471		0	0				-653	29788.63	0	0	0	-0.001	0.001	
05/16/11 07:45:08	60.0181	471		0	0				-653	29788.63	0	0	0	-0.001	0.001	
05/16/11 07:45:10	60.01712	471		0	0				-653	29788.63	0	0	0	-0.001	0.001	
05/16/11 07:45:12	60.01712	471		0	0				-653	29788.63	0	0	0	0.000	0.000	
05/16/11 07:45:14	60.01712	471		0	0				-653	29788.51	0	0	0	0.000	0.000	
05/16/11 07:45:16	60.01453	471		0	0				-653	29788.51	0	0	0	-0.003	0.003	
05/16/11 07:45:18	60.01358	471		0	0				-653	29788.51	0	0	0	-0.001	0.001	
05/16/11 07:45:20	60.01227	471		0	0				-653	29788.51	0	0	0	-0.001	0.001	
05/16/11 07:45:22	60.01163	471		0	0				-653	29788.51	0	0	0	-0.001	0.001	
05/16/11 07:45:24	60.01065	471		0	0				-653	29788.51	0	0	0	-0.001	0.001	
05/16/11 07:45:26	60.0097	471		0	0				-653	29788.51	0	0	0	-0.001	0.001	
05/16/11 07:45:28	60.00839	471		0	0				-653	29788.51	0	0	0	-0.001	0.001	
05/16/11 07:45:30	60.00745	471		0	0				-653	29788.51	0	0	0	-0.001	0.001	
05/16/11 07:45:32	60.00775	471		0	0				-653	29788.51	0	0	0	0.000	0.000	
05/16/11 07:45:34	60.00839	471		0	0				-653	29780.62	0	0	0	0.001	0.001	
05/16/11 07:45:36	60.00839	471		0	0				-653	29780.62	0	0	0	0.000	0.000	
05/16/11 07:45:38	60.00809	471		0	0				-653	29780.62	0	0	0	0.000	0.000	
05/16/11 07:45:40	60.00745	471		0	0				-653	29780.62	0	0	0	-0.001	0.001	
05/16/11 07:45:42	60.00711	471		0	0				-653	29780.62	0	0	0	0.000	0.000	
05/16/11 07:45:44	60.00839	471		0	0				-653	29780.56	0	0	0	0.001	0.001	
05/16/11 07:45:46	60.00937	471		0	0				-653	29780.56	0	0	0	0.001	0.001	
05/16/11 07:45:48	60.0097	471		0	0				-653	29780.56	0	0	0	0.000	0.000	
05/16/11 07:45:50	60.01001	471		0	0				-653	29780.56	0	0	0	0.000	0.000	
05/16/11 07:45:52	60.01065	471		0	0				-653	29780.56	0	0	0	0.001	0.001	
05/16/11 07:45:54	60.01196	471		0	0				-653	29784.96	0	0	0	0.001	0.001	
05/16/11 07:45:56	60.01324	471		0	0				-653	29784.96	0	0	0	0.001	0.001	
05/16/11 07:45:58	60.01453	471		0	0				-653	29784.96	0	0	0	0.001	0.001	
05/16/11 07:46:00	60.01614	471		0	0				-653	29784.96	0	0	0	0.002	0.002	
05/16/11 07:46:02	60.01712	471		0	0				-653	29784.96	0	0	0	0.001	0.001	
05/16/11 07:46:04	60.01712	471		0	0				-653	29784.93	0	0	0	0.000	0.000	
05/16/11 07:46:06	60.01614	471		0	0				-653	29784.93	0	0	0	-0.001	0.001	
05/16/11 07:46:08	60.01584	471		0	0				-653	29784.93	0	0	0	0.000	0.000	
05/16/11 07:46:10	60.01614	471		0	0				-653	29784.93	0	0	0	0.000	0.000	
05/16/11 07:46:12	60.01584	471		0	0				-653	29784.93	0	0	0	0.000	0.000	
05/16/11 07:46:14	60.01486	471		0	0				-653	29760.42	0	0	0	-0.001	0.001	
05/16/11 07:46:16	60.01422	471		0	0				-653	29760.42	0	0	0	-0.001	0.001	
05/16/11 07:46:18	60.01227	471		0	0				-653	29760.42	0	0	0	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:46:20	60.0097	471		0	0				-653	29760.42
05/16/11 07:46:22	60.00711	471		0	0				-653	29760.42
05/16/11 07:46:24	60.00583	471		0	0				-653	29760.42
05/16/11 07:46:26	60.00516	471		0	0				-653	29760.42
05/16/11 07:46:28	60.00516	471		0	0				-653	29760.42
05/16/11 07:46:30	60.00485	471		0	0				-653	29760.42
05/16/11 07:46:32	60.00388	471		0	0				-653	29760.42
05/16/11 07:46:34	60.00259	471		0	0				-653	29782.35
05/16/11 07:46:36	59.99902	471		0	0				-653	29782.35
05/16/11 07:46:38	59.9971	471		0	0				-653	29782.35
05/16/11 07:46:40	59.99646	471		0	0				-653	29782.35
05/16/11 07:46:42	59.99579	471		0	0				-653	29782.35
05/16/11 07:46:44	59.99417	471		0	0				-653	29782.44
05/16/11 07:46:46	59.99225	471		0	0				-653	29782.44
05/16/11 07:46:48	59.9903	471		0	0				-653	29782.44
05/16/11 07:46:50	59.98804	471		0	0				-653	29782.44
05/16/11 07:46:52	59.98709	471		0	0				-653	29782.44
05/16/11 07:46:54	59.98676	471		0	0				-653	29785.52
05/16/11 07:46:56	59.98578	471		0	0				-653	29785.52
05/16/11 07:46:58	59.9845	471		0	0				-653	29785.52
05/16/11 07:47:00	59.98288	471		0	0				-653	29785.52
05/16/11 07:47:02	59.98224	471		0	0				-653	29785.52
05/16/11 07:47:04	59.98224	471		0	0				-653	29785.55
05/16/11 07:47:06	59.98224	471		0	0				-653	29785.55
05/16/11 07:47:08	59.98254	471		0	0				-653	29785.55
05/16/11 07:47:10	59.98386	471		0	0				-653	29785.55
05/16/11 07:47:12	59.9848	471		0	0				-653	29785.55
05/16/11 07:47:14	59.98578	471		0	0				-653	29788.21
05/16/11 07:47:16	59.98642	471		0	0				-653	29788.21
05/16/11 07:47:18	59.98999	471		0	0				-653	29788.21
05/16/11 07:47:20	59.99225	471		0	0				-653	29788.21
05/16/11 07:47:22	59.99323	471		0	0				-653	29788.21
05/16/11 07:47:24	59.99646	471		0	0				-653	29788.06
05/16/11 07:47:26	59.99902	471		0	0				-653	29788.06
05/16/11 07:47:28	60.00064	471		0	0				-653	29788.06
05/16/11 07:47:30	60.00647	471		0	0				-653	29788.06
05/16/11 07:47:32	60.00903	471		0	0				-653	29788.06
05/16/11 07:47:34	60.01099	471		0	0				-653	29776.11

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.006	0.006	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:47:36	60.01132	471		0	0				-653	29776.11
05/16/11 07:47:38	60.01291	471		0	0				-653	29776.11
05/16/11 07:47:40	60.01324	471		0	0				-653	29776.11
05/16/11 07:47:42	60.01324	471		0	0				-653	29776.11
05/16/11 07:47:44	60.01422	471		0	0				-653	29776.17
05/16/11 07:47:46	60.0181	471		0	0				-653	29776.17
05/16/11 07:47:48	60.01907	471		0	0				-653	29776.17
05/16/11 07:47:50	60.02133	471		0	0				-653	29776.17
05/16/11 07:47:52	60.02197	471		0	0				-653	29776.17
05/16/11 07:47:54	60.02164	471		0	0				-653	29794.69
05/16/11 07:47:56	60.01971	471		0	0				-653	29794.69
05/16/11 07:47:58	60.01907	471		0	0				-653	29794.69
05/16/11 07:48:00	60.01746	471		0	0				-653	29794.69
05/16/11 07:48:02	60.01776	471		0	0				-653	29794.69
05/16/11 07:48:04	60.0184	471		0	0				-653	29794.66
05/16/11 07:48:06	60.01776	471		0	0				-653	29794.66
05/16/11 07:48:08	60.0152	471		0	0				-653	29794.66
05/16/11 07:48:10	60.01389	471		0	0				-653	29794.66
05/16/11 07:48:12	60.01422	471		0	0				-653	29794.66
05/16/11 07:48:14	60.0152	471		0	0				-653	29804.78
05/16/11 07:48:16	60.01614	471		0	0				-653	29804.78
05/16/11 07:48:18	60.01614	471		0	0				-653	29804.78
05/16/11 07:48:20	60.01422	471		0	0				-653	29804.78
05/16/11 07:48:22	60.01196	471		0	0				-653	29804.78
05/16/11 07:48:24	60.01035	471		0	0				-653	29804.86
05/16/11 07:48:26	60.00809	471		0	0				-653	29804.86
05/16/11 07:48:28	60.00613	471		0	0				-653	29804.86
05/16/11 07:48:30	60.00516	471		0	0				-653	29804.86
05/16/11 07:48:32	60.00452	471		0	0				-653	29804.86
05/16/11 07:48:34	60.00354	471		0	0				-653	29800.12
05/16/11 07:48:36	60.00128	471		0	0				-653	29800.12
05/16/11 07:48:38	60	471		0	0				-653	29800.12
05/16/11 07:48:40	59.99936	471		0	0				-653	29800.12
05/16/11 07:48:42	59.99838	471		0	0				-653	29800.12
05/16/11 07:48:44	59.99741	471		0	0				-653	29800.18
05/16/11 07:48:46	59.99579	471		0	0				-653	29800.18
05/16/11 07:48:48	59.99515	471		0	0				-653	29800.18
05/16/11 07:48:50	59.99646	471		0	0				-653	29800.18

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
											805	8:06:38	t(0)			
											921	8:10:30	t(Recovery)			
											806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
05/16/11 07:48:52	59.99872	471		0	0				-653	29800.18	0	0	0	0.002	0.002	
05/16/11 07:48:54	60.00128	471		0	0				-653	29799.82	0	0	0	0.003	0.003	
05/16/11 07:48:56	60.00323	471		0	0				-653	29799.82	0	0	0	0.002	0.002	
05/16/11 07:48:58	60.00421	471		0	0				-653	29799.82	0	0	0	0.001	0.001	
05/16/11 07:49:00	60.00485	471		0	0				-653	29799.82	0	0	0	0.001	0.001	
05/16/11 07:49:02	60.00549	471		0	0				-653	29799.82	0	0	0	0.001	0.001	
05/16/11 07:49:04	60.00583	471		0	0				-653	29799.79	0	0	0	0.000	0.000	
05/16/11 07:49:06	60.00583	471		0	0				-653	29799.79	0	0	0	0.000	0.000	
05/16/11 07:49:08	60.00549	471		0	0				-653	29799.79	0	0	0	0.000	0.000	
05/16/11 07:49:10	60.00388	471		0	0				-653	29799.79	0	0	0	-0.002	0.002	
05/16/11 07:49:12	60.00226	471		0	0				-653	29799.79	0	0	0	-0.002	0.002	
05/16/11 07:49:14	60.00226	471		0	0				-653	29795.67	0	0	0	0.000	0.000	
05/16/11 07:49:16	60	471		0	0				-653	29795.67	0	0	0	-0.002	0.002	
05/16/11 07:49:18	60	471		0	0				-653	29795.67	0	0	0	0.000	0.000	
05/16/11 07:49:20	60	471		0	0				-653	29795.67	0	0	0	0.000	0.000	
05/16/11 07:49:22	60	471		0	0				-653	29795.67	0	0	0	0.000	0.000	
05/16/11 07:49:24	60.00452	471		0	0				-653	29795.55	0	0	0	0.005	0.005	
05/16/11 07:49:26	60.00583	471		0	0				-653	29795.55	0	0	0	0.001	0.001	
05/16/11 07:49:28	60.00613	471		0	0				-653	29795.55	0	0	0	0.000	0.000	
05/16/11 07:49:30	60.00583	471		0	0				-653	29795.55	0	0	0	0.000	0.000	
05/16/11 07:49:32	60.00516	471		0	0				-653	29795.55	0	0	0	-0.001	0.001	
05/16/11 07:49:34	60.00388	471		0	0				-653	29783.53	0	0	0	-0.001	0.001	
05/16/11 07:49:36	60.00195	471		0	0				-653	29783.53	0	0	0	-0.002	0.002	
05/16/11 07:49:38	60.00128	471		0	0				-653	29783.53	0	0	0	-0.001	0.001	
05/16/11 07:49:40	60.00098	471		0	0				-653	29783.53	0	0	0	0.000	0.000	
05/16/11 07:49:42	60.00034	471		0	0				-653	29783.53	0	0	0	-0.001	0.001	
05/16/11 07:49:44	60	471		0	0				-653	29783.47	0	0	0	0.000	0.000	
05/16/11 07:49:46	59.99902	471		0	0				-653	29783.47	0	0	0	-0.001	0.001	
05/16/11 07:49:48	59.99872	471		0	0				-653	29783.47	0	0	0	0.000	0.000	
05/16/11 07:49:50	59.99838	471		0	0				-653	29783.47	0	0	0	0.000	0.000	
05/16/11 07:49:52	59.99612	471		0	0				-653	29783.47	0	0	0	-0.002	0.002	
05/16/11 07:49:54	59.99579	471		0	0				-653	29788.38	0	0	0	0.000	0.000	
05/16/11 07:49:56	59.99515	471		0	0				-653	29788.38	0	0	0	-0.001	0.001	
05/16/11 07:49:58	59.99387	471		0	0				-653	29788.38	0	0	0	-0.001	0.001	
05/16/11 07:50:00	59.99225	471		0	0				-653	29788.38	0	0	0	-0.002	0.002	
05/16/11 07:50:02	59.99225	471		0	0				-653	29788.38	0	0	0	0.000	0.000	
05/16/11 07:50:04	59.99484	471		0	0				-653	29788.38	0	0	0	0.003	0.003	
05/16/11 07:50:06	59.99646	471		0	0				-653	29788.38	0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
											805	8:06:38	t(0)			
											921	8:10:30	t(Recovery)			
											806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
05/16/11 07:50:08	59.9971	471		0	0				-653	29788.38	0	0	0	0.001	0.001	
05/16/11 07:50:10	59.99548	471		0	0				-653	29788.38	0	0	0	-0.002	0.002	
05/16/11 07:50:12	59.99289	471		0	0				-653	29788.38	0	0	0	-0.003	0.003	
05/16/11 07:50:14	59.98999	471		0	0				-653	29790.16	0	0	0	-0.003	0.003	
05/16/11 07:50:16	59.98773	471		0	0				-653	29790.16	0	0	0	-0.002	0.002	
05/16/11 07:50:18	59.98642	471		0	0				-653	29790.16	0	0	0	-0.001	0.001	
05/16/11 07:50:20	59.98547	471		0	0				-653	29790.16	0	0	0	-0.001	0.001	
05/16/11 07:50:22	59.98547	471		0	0				-653	29790.16	0	0	0	0.000	0.000	
05/16/11 07:50:24	59.98611	471		0	0				-653	29790.07	0	0	0	0.001	0.001	
05/16/11 07:50:26	59.98611	471		0	0				-653	29790.07	0	0	0	0.000	0.000	
05/16/11 07:50:28	59.98676	471		0	0				-653	29790.07	0	0	0	0.001	0.001	
05/16/11 07:50:30	59.98709	471		0	0				-653	29790.07	0	0	0	0.000	0.000	
05/16/11 07:50:32	59.9874	471		0	0				-653	29790.07	0	0	0	0.000	0.000	
05/16/11 07:50:34	59.98676	471		0	0				-653	29777.49	0	0	0	-0.001	0.001	
05/16/11 07:50:36	59.98611	471		0	0				-653	29777.49	0	0	0	-0.001	0.001	
05/16/11 07:50:38	59.98642	471		0	0				-653	29777.49	0	0	0	0.000	0.000	
05/16/11 07:50:40	59.9874	471		0	0				-653	29777.49	0	0	0	0.001	0.001	
05/16/11 07:50:42	59.98804	471		0	0				-653	29777.49	0	0	0	0.001	0.001	
05/16/11 07:50:44	59.9874	471		0	0				-653	29777.49	0	0	0	-0.001	0.001	
05/16/11 07:50:46	59.98676	471		0	0				-653	29777.49	0	0	0	-0.001	0.001	
05/16/11 07:50:48	59.9848	471		0	0				-653	29777.49	0	0	0	-0.002	0.002	
05/16/11 07:50:50	59.98288	471		0	0				-653	29777.49	0	0	0	-0.002	0.002	
05/16/11 07:50:52	59.98062	471		0	0				-653	29777.49	0	0	0	-0.002	0.002	
05/16/11 07:50:54	59.97998	471		0	0				-653	29782.49	0	0	0	-0.001	0.001	
05/16/11 07:50:56	59.97931	471		0	0				-653	29782.49	0	0	0	-0.001	0.001	
05/16/11 07:50:58	59.979	471		0	0				-653	29782.49	0	0	0	0.000	0.000	
05/16/11 07:51:00	59.97931	471		0	0				-653	29782.49	0	0	0	0.000	0.000	
05/16/11 07:51:02	59.98093	471		0	0				-653	29782.49	0	0	0	0.002	0.002	
05/16/11 07:51:04	59.98126	471		0	0				-653	29782.46	0	0	0	0.000	0.000	
05/16/11 07:51:06	59.98126	471		0	0				-653	29782.46	0	0	0	0.000	0.000	
05/16/11 07:51:08	59.9819	471		0	0				-653	29782.46	0	0	0	0.001	0.001	
05/16/11 07:51:10	59.98126	471		0	0				-653	29782.46	0	0	0	-0.001	0.001	
05/16/11 07:51:12	59.97964	471		0	0				-653	29782.46	0	0	0	-0.002	0.002	
05/16/11 07:51:14	59.97705	471		0	0				-653	29756.13	0	0	0	-0.003	0.003	
05/16/11 07:51:16	59.97479	471		0	0				-653	29756.13	0	0	0	-0.002	0.002	
05/16/11 07:51:18	59.97351	471		0	0				-653	29756.13	0	0	0	-0.001	0.001	
05/16/11 07:51:20	59.97287	471		0	0				-653	29756.13	0	0	0	-0.001	0.001	
05/16/11 07:51:22	59.97223	471		0	0				-653	29756.13	0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:51:24	59.97189	471		0	0				-653	29756.18
05/16/11 07:51:26	59.97125	471		0	0				-653	29756.18
05/16/11 07:51:28	59.97156	471		0	0				-653	29756.18
05/16/11 07:51:30	59.97318	471		0	0				-653	29756.18
05/16/11 07:51:32	59.97415	471		0	0				-653	29756.18
05/16/11 07:51:34	59.97479	471		0	0				-653	29777.58
05/16/11 07:51:36	59.97382	471		0	0				-653	29777.58
05/16/11 07:51:38	59.97287	471		0	0				-653	29777.58
05/16/11 07:51:40	59.97318	471		0	0				-653	29777.58
05/16/11 07:51:42	59.97449	471		0	0				-653	29777.58
05/16/11 07:51:44	59.97675	471		0	0				-653	29777.4
05/16/11 07:51:46	59.97803	471		0	0				-653	29777.4
05/16/11 07:51:48	59.97998	471		0	0				-653	29777.4
05/16/11 07:51:50	59.98093	471		0	0				-653	29777.4
05/16/11 07:51:52	59.98093	471		0	0				-653	29777.4
05/16/11 07:51:54	59.97964	471		0	0				-653	29802.24
05/16/11 07:51:56	59.97803	471		0	0				-653	29802.24
05/16/11 07:51:58	59.97705	471		0	0				-653	29802.24
05/16/11 07:52:00	59.97739	471		0	0				-653	29802.24
05/16/11 07:52:02	59.97836	471		0	0				-653	29802.24
05/16/11 07:52:04	59.97931	471		0	0				-653	29802.18
05/16/11 07:52:06	59.98126	471		0	0				-653	29802.18
05/16/11 07:52:08	59.98416	471		0	0				-653	29802.18
05/16/11 07:52:10	59.98611	471		0	0				-653	29802.18
05/16/11 07:52:12	59.98709	471		0	0				-653	29802.18
05/16/11 07:52:14	59.9874	471		0	0				-653	29802.29
05/16/11 07:52:16	59.98804	471		0	0				-653	29802.29
05/16/11 07:52:18	59.98804	471		0	0				-653	29802.29
05/16/11 07:52:20	59.98773	471		0	0				-653	29802.29
05/16/11 07:52:22	59.9874	471		0	0				-653	29802.29
05/16/11 07:52:24	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:26	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:28	59.9874	471		0	0				-653	29802.32
05/16/11 07:52:30	59.98773	471		0	0				-653	29802.32
05/16/11 07:52:32	59.98901	471		0	0				-653	29802.32
05/16/11 07:52:34	59.98965	471		0	0				-653	29795.02
05/16/11 07:52:36	59.98935	471		0	0				-653	29795.02
05/16/11 07:52:38	59.98837	471		0	0				-653	29795.02

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 07:52:40	59.98868	471		0	0				-653	29795.02	0	0	0	0.000	0.000	
05/16/11 07:52:42	59.98868	471		0	0				-653	29795.02	0	0	0	0.000	0.000	
05/16/11 07:52:44	59.9874	471		0	0				-653	29795.05	0	0	0	-0.001	0.001	
05/16/11 07:52:46	59.98611	471		0	0				-653	29795.05	0	0	0	-0.001	0.001	
05/16/11 07:52:48	59.98611	471		0	0				-653	29795.05	0	0	0	0.000	0.000	
05/16/11 07:52:50	59.98709	471		0	0				-653	29795.05	0	0	0	0.001	0.001	
05/16/11 07:52:52	59.98837	471		0	0				-653	29795.05	0	0	0	0.001	0.001	
05/16/11 07:52:54	59.98935	471		0	0				-653	29781.42	0	0	0	0.001	0.001	
05/16/11 07:52:56	59.98999	471		0	0				-653	29781.42	0	0	0	0.001	0.001	
05/16/11 07:52:58	59.99127	471		0	0				-653	29781.42	0	0	0	0.001	0.001	
05/16/11 07:53:00	59.99255	471		0	0				-653	29781.42	0	0	0	0.001	0.001	
05/16/11 07:53:02	59.99387	471		0	0				-653	29781.42	0	0	0	0.001	0.001	
05/16/11 07:53:04	59.99387	471		0	0				-653	29781.45	0	0	0	0.000	0.000	
05/16/11 07:53:06	59.99289	471		0	0				-653	29781.45	0	0	0	-0.001	0.001	
05/16/11 07:53:08	59.99097	471		0	0				-653	29781.45	0	0	0	-0.002	0.002	
05/16/11 07:53:10	59.98868	471		0	0				-653	29781.45	0	0	0	-0.002	0.002	
05/16/11 07:53:12	59.98642	471		0	0				-653	29781.45	0	0	0	-0.002	0.002	
05/16/11 07:53:14	59.98386	471		0	0				-653	29802.43	0	0	0	-0.003	0.003	
05/16/11 07:53:16	59.9816	471		0	0				-653	29802.43	0	0	0	-0.002	0.002	
05/16/11 07:53:18	59.97931	471		0	0				-653	29802.43	0	0	0	-0.002	0.002	
05/16/11 07:53:20	59.97675	471		0	0				-653	29802.43	0	0	0	-0.003	0.003	
05/16/11 07:53:22	59.97415	471		0	0				-653	29802.43	0	0	0	-0.003	0.003	
05/16/11 07:53:24	59.97287	471		0	0				-653	29802.4	0	0	0	-0.001	0.001	
05/16/11 07:53:26	59.97223	471		0	0				-653	29802.4	0	0	0	-0.001	0.001	
05/16/11 07:53:28	59.97318	471		0	0				-653	29802.4	0	0	0	0.001	0.001	
05/16/11 07:53:30	59.97449	471		0	0				-653	29802.4	0	0	0	0.001	0.001	
05/16/11 07:53:32	59.97351	471		0	0				-653	29802.4	0	0	0	-0.001	0.001	
05/16/11 07:53:34	59.97253	471		0	0				-653	29804.4	0	0	0	-0.001	0.001	
05/16/11 07:53:36	59.97253	471		0	0				-653	29804.4	0	0	0	0.000	0.000	
05/16/11 07:53:38	59.97223	471		0	0				-653	29804.4	0	0	0	0.000	0.000	
05/16/11 07:53:40	59.97156	471		0	0				-653	29804.4	0	0	0	-0.001	0.001	
05/16/11 07:53:42	59.97189	471		0	0				-653	29804.4	0	0	0	0.000	0.000	
05/16/11 07:53:44	59.97318	471		0	0				-653	29804.4	0	0	0	0.001	0.001	
05/16/11 07:53:46	59.97479	471		0	0				-653	29804.4	0	0	0	0.002	0.002	
05/16/11 07:53:48	59.9761	471		0	0				-653	29804.4	0	0	0	0.001	0.001	
05/16/11 07:53:50	59.97803	471		0	0				-653	29804.4	0	0	0	0.002	0.002	
05/16/11 07:53:52	59.98062	471		0	0				-653	29804.4	0	0	0	0.003	0.003	
05/16/11 07:53:54	59.98254	471		0	0				-653	29797.32	0	0	0	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:53:56	59.98416	471		0	0				-653	29797.32
05/16/11 07:53:58	59.98611	471		0	0				-653	29797.32
05/16/11 07:54:00	59.98804	471		0	0				-653	29797.32
05/16/11 07:54:02	59.9903	471		0	0				-653	29797.32
05/16/11 07:54:04	59.99161	471		0	0				-653	29797.29
05/16/11 07:54:06	59.99323	471		0	0				-653	29797.29
05/16/11 07:54:08	59.99484	471		0	0				-653	29797.29
05/16/11 07:54:10	59.99579	471		0	0				-653	29797.29
05/16/11 07:54:12	59.99515	471		0	0				-653	29797.29
05/16/11 07:54:14	59.99612	471		0	0				-653	29823.76
05/16/11 07:54:16	59.99805	471		0	0				-653	29823.76
05/16/11 07:54:18	59.99936	471		0	0				-653	29823.76
05/16/11 07:54:20	60.00064	471		0	0				-653	29823.76
05/16/11 07:54:22	60.00098	471		0	0				-653	29823.76
05/16/11 07:54:24	60.00064	471		0	0				-653	29818.41
05/16/11 07:54:26	60	471		0	0				-653	29818.41
05/16/11 07:54:28	59.99902	471		0	0				-653	29818.41
05/16/11 07:54:30	59.99872	471		0	0				-653	29818.41
05/16/11 07:54:32	59.99936	471		0	0				-653	29818.41
05/16/11 07:54:34	60.00034	471		0	0				-653	29808.89
05/16/11 07:54:36	60.00162	471		0	0				-653	29808.89
05/16/11 07:54:38	60.00354	471		0	0				-653	29808.89
05/16/11 07:54:40	60.00485	471		0	0				-653	29808.89
05/16/11 07:54:42	60.00421	471		0	0				-653	29808.89
05/16/11 07:54:44	60.00195	471		0	0				-653	29814.89
05/16/11 07:54:46	59.99902	471		0	0				-653	29814.89
05/16/11 07:54:48	59.99646	471		0	0				-653	29814.89
05/16/11 07:54:50	59.99417	471		0	0				-653	29814.89
05/16/11 07:54:52	59.99323	471		0	0				-653	29814.89
05/16/11 07:54:54	59.99127	471		0	0				-653	29826.47
05/16/11 07:54:56	59.98935	471		0	0				-653	29826.47
05/16/11 07:54:58	59.98709	471		0	0				-653	29826.47
05/16/11 07:55:00	59.98578	471		0	0				-653	29826.47
05/16/11 07:55:02	59.98547	471		0	0				-653	29826.47
05/16/11 07:55:04	59.98547	471		0	0				-653	29826.41
05/16/11 07:55:06	59.98514	471		0	0				-653	29826.41
05/16/11 07:55:08	59.9845	471		0	0				-653	29826.41
05/16/11 07:55:10	59.9845	471		0	0				-653	29826.41

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:55:12	59.9848	471		0	0				-653	29826.41
05/16/11 07:55:14	59.9848	471		0	0				-653	29834.18
05/16/11 07:55:16	59.98611	471		0	0				-653	29834.18
05/16/11 07:55:18	59.9874	471		0	0				-653	29834.18
05/16/11 07:55:20	59.98868	471		0	0				-653	29834.18
05/16/11 07:55:22	59.98837	471		0	0				-653	29834.18
05/16/11 07:55:24	59.98837	471		0	0				-653	29836.13
05/16/11 07:55:26	59.98578	471		0	0				-653	29836.13
05/16/11 07:55:28	59.9845	471		0	0				-653	29836.13
05/16/11 07:55:30	59.9848	471		0	0				-653	29836.13
05/16/11 07:55:32	59.98547	471		0	0				-653	29836.13
05/16/11 07:55:34	59.98642	471		0	0				-653	29821.84
05/16/11 07:55:36	59.98773	471		0	0				-653	29821.84
05/16/11 07:55:38	59.98965	471		0	0				-653	29821.84
05/16/11 07:55:40	59.99063	471		0	0				-653	29821.84
05/16/11 07:55:42	59.99063	471		0	0				-653	29821.84
05/16/11 07:55:44	59.99063	471		0	0				-653	29821.87
05/16/11 07:55:46	59.99063	471		0	0				-653	29821.87
05/16/11 07:55:48	59.98642	471		0	0				-653	29821.87
05/16/11 07:55:50	59.9845	471		0	0				-653	29821.87
05/16/11 07:55:52	59.98224	471		0	0				-653	29821.87
05/16/11 07:55:54	59.98062	471		0	0				-653	29831.33
05/16/11 07:55:56	59.97739	471		0	0				-653	29831.33
05/16/11 07:55:58	59.97641	471		0	0				-653	29831.33
05/16/11 07:56:00	59.97641	471		0	0				-653	29831.33
05/16/11 07:56:02	59.9761	471		0	0				-653	29831.33
05/16/11 07:56:04	59.97543	471		0	0				-653	29831.33
05/16/11 07:56:06	59.97577	471		0	0				-653	29831.33
05/16/11 07:56:08	59.97675	471		0	0				-653	29831.33
05/16/11 07:56:10	59.97705	471		0	0				-653	29831.33
05/16/11 07:56:12	59.97705	471		0	0				-653	29831.33
05/16/11 07:56:14	59.97705	471		0	0				-653	29835.51
05/16/11 07:56:16	59.97675	471		0	0				-653	29835.51
05/16/11 07:56:18	59.97705	471		0	0				-653	29835.51
05/16/11 07:56:20	59.97739	471		0	0				-653	29835.51
05/16/11 07:56:22	59.97803	471		0	0				-653	29835.51
05/16/11 07:56:24	59.97803	471		0	0				-653	29856.55
05/16/11 07:56:26	59.97867	471		0	0				-653	29856.55

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.004	0.004	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 07:56:28	59.97964	471		0	0				-653	29856.55	0	0	0	0.001	0.001	
05/16/11 07:56:30	59.9816	471		0	0				-653	29856.55	0	0	0	0.002	0.002	
05/16/11 07:56:32	59.98352	471		0	0				-653	29856.55	0	0	0	0.002	0.002	
05/16/11 07:56:34	59.98642	471		0	0				-653	29846.76	0	0	0	0.003	0.003	
05/16/11 07:56:36	59.9903	471		0	0				-653	29846.76	0	0	0	0.004	0.004	
05/16/11 07:56:38	59.99451	471		0	0				-653	29846.76	0	0	0	0.004	0.004	
05/16/11 07:56:40	59.99741	471		0	0				-653	29846.76	0	0	0	0.003	0.003	
05/16/11 07:56:42	59.99838	471		0	0				-653	29846.76	0	0	0	0.001	0.001	
05/16/11 07:56:44	59.99805	471		0	0				-653	29860.05	0	0	0	0.000	0.000	
05/16/11 07:56:46	59.99677	471		0	0				-653	29860.05	0	0	0	-0.001	0.001	
05/16/11 07:56:48	59.99612	471		0	0				-653	29860.05	0	0	0	-0.001	0.001	
05/16/11 07:56:50	59.99548	471		0	0				-653	29860.05	0	0	0	-0.001	0.001	
05/16/11 07:56:52	59.99612	471		0	0				-653	29860.05	0	0	0	0.001	0.001	
05/16/11 07:56:54	59.99936	471		0	0				-653	29873.15	0	0	0	0.003	0.003	
05/16/11 07:56:56	60.00323	471		0	0				-653	29873.15	0	0	0	0.004	0.004	
05/16/11 07:56:58	60.00745	471		0	0				-653	29873.15	0	0	0	0.004	0.004	
05/16/11 07:57:00	60.01163	471		0	0				-653	29873.15	0	0	0	0.004	0.004	
05/16/11 07:57:02	60.01453	471		0	0				-653	29873.15	0	0	0	0.003	0.003	
05/16/11 07:57:04	60.01746	471		0	0				-653	29873.15	0	0	0	0.003	0.003	
05/16/11 07:57:06	60.01907	471		0	0				-653	29873.15	0	0	0	0.002	0.002	
05/16/11 07:57:08	60.01938	471		0	0				-653	29873.15	0	0	0	0.000	0.000	
05/16/11 07:57:10	60.01938	471		0	0				-653	29873.15	0	0	0	0.000	0.000	
05/16/11 07:57:12	60.01938	471		0	0				-653	29873.15	0	0	0	0.000	0.000	
05/16/11 07:57:14	60.02036	471		0	0				-653	29889.67	0	0	0	0.001	0.001	
05/16/11 07:57:16	60.02197	471		0	0				-653	29889.67	0	0	0	0.002	0.002	
05/16/11 07:57:18	60.02423	471		0	0				-653	29889.67	0	0	0	0.002	0.002	
05/16/11 07:57:20	60.02682	471		0	0				-653	29889.67	0	0	0	0.003	0.003	
05/16/11 07:57:22	60.02811	471		0	0				-653	29889.67	0	0	0	0.001	0.001	
05/16/11 07:57:24	60.02939	471		0	0				-653	29886.6	0	0	0	0.001	0.001	
05/16/11 07:57:26	60.03036	471		0	0				-653	29886.6	0	0	0	0.001	0.001	
05/16/11 07:57:28	60.02875	471		0	0				-653	29886.6	0	0	0	-0.002	0.002	
05/16/11 07:57:30	60.02682	471		0	0				-653	29886.6	0	0	0	-0.002	0.002	
05/16/11 07:57:32	60.02457	471		0	0				-653	29886.6	0	0	0	-0.002	0.002	
05/16/11 07:57:34	60.02261	471		0	0				-653	29891.67	0	0	0	-0.002	0.002	
05/16/11 07:57:36	60.02231	471		0	0				-653	29891.67	0	0	0	0.000	0.000	
05/16/11 07:57:38	60.02295	471		0	0				-653	29891.67	0	0	0	0.001	0.001	
05/16/11 07:57:40	60.02359	471		0	0				-653	29891.67	0	0	0	0.001	0.001	
05/16/11 07:57:42	60.02261	471		0	0				-653	29891.67	0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:57:44	60.02164	471		0	0				-653	29891.64
05/16/11 07:57:46	60.01971	471		0	0				-653	29891.64
05/16/11 07:57:48	60.01776	471		0	0				-653	29891.64
05/16/11 07:57:50	60.01746	471		0	0				-653	29891.64
05/16/11 07:57:52	60.01682	471		0	0				-653	29891.64
05/16/11 07:57:54	60.01712	471		0	0				-653	29891.51
05/16/11 07:57:56	60.0184	471		0	0				-653	29891.51
05/16/11 07:57:58	60.01874	471		0	0				-653	29891.51
05/16/11 07:58:00	60.0181	471		0	0				-653	29891.51
05/16/11 07:58:02	60.01682	471		0	0				-653	29891.51
05/16/11 07:58:04	60.0152	471		0	0				-653	29891.6
05/16/11 07:58:06	60.0152	471		0	0				-653	29891.6
05/16/11 07:58:08	60.0155	471		0	0				-653	29891.6
05/16/11 07:58:10	60.0155	471		0	0				-653	29891.6
05/16/11 07:58:12	60.01453	471		0	0				-653	29891.6
05/16/11 07:58:14	60.01453	471		0	0				-653	29884.5
05/16/11 07:58:16	60.0152	471		0	0				-653	29884.5
05/16/11 07:58:18	60.01584	471		0	0				-653	29884.5
05/16/11 07:58:20	60.01614	471		0	0				-653	29884.5
05/16/11 07:58:22	60.01584	471		0	0				-653	29884.5
05/16/11 07:58:24	60.0152	471		0	0				-653	29881.79
05/16/11 07:58:26	60.0155	471		0	0				-653	29881.79
05/16/11 07:58:28	60.01614	471		0	0				-653	29881.79
05/16/11 07:58:30	60.01776	471		0	0				-653	29881.79
05/16/11 07:58:32	60.01907	471		0	0				-653	29881.79
05/16/11 07:58:34	60.02069	471		0	0				-653	29887.14
05/16/11 07:58:36	60.02133	471		0	0				-653	29887.14
05/16/11 07:58:38	60.02069	471		0	0				-653	29887.14
05/16/11 07:58:40	60.01907	471		0	0				-653	29887.14
05/16/11 07:58:42	60.01746	471		0	0				-653	29887.14
05/16/11 07:58:44	60.01614	471		0	0				-653	29873.08
05/16/11 07:58:46	60.0152	471		0	0				-653	29873.08
05/16/11 07:58:48	60.01453	471		0	0				-653	29873.08
05/16/11 07:58:50	60.01389	471		0	0				-653	29873.08
05/16/11 07:58:52	60.01358	471		0	0				-653	29873.08
05/16/11 07:58:54	60.01099	471		0	0				-653	29862.1
05/16/11 07:58:56	60.00549	471		0	0				-653	29862.1
05/16/11 07:58:58	59.99966	471		0	0				-653	29862.1

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.005	0.005	
0	0	0	-0.006	0.006	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 07:59:00	59.99451	471		0	0				-653	29862.1
05/16/11 07:59:02	59.99127	471		0	0				-653	29862.1
05/16/11 07:59:04	59.98965	471		0	0				-653	29861.95
05/16/11 07:59:06	59.98868	471		0	0				-653	29861.95
05/16/11 07:59:08	59.98676	471		0	0				-653	29861.95
05/16/11 07:59:10	59.9848	471		0	0				-653	29861.95
05/16/11 07:59:12	59.98288	471		0	0				-653	29861.95
05/16/11 07:59:14	59.98062	471		0	0				-653	29906.21
05/16/11 07:59:16	59.97803	471		0	0				-653	29906.21
05/16/11 07:59:18	59.9761	471		0	0				-653	29906.21
05/16/11 07:59:20	59.97577	471		0	0				-653	29906.21
05/16/11 07:59:22	59.9761	471		0	0				-653	29906.21
05/16/11 07:59:24	59.9761	471		0	0				-653	29878.69
05/16/11 07:59:26	59.97641	471		0	0				-653	29878.69
05/16/11 07:59:28	59.97543	471		0	0				-653	29878.69
05/16/11 07:59:30	59.97479	471		0	0				-653	29878.69
05/16/11 07:59:32	59.97382	471		0	0				-653	29878.69
05/16/11 07:59:34	59.97253	471		0	0				-653	29900.56
05/16/11 07:59:36	59.97223	471		0	0				-653	29900.56
05/16/11 07:59:38	59.97253	471		0	0				-653	29900.56
05/16/11 07:59:40	59.97351	471		0	0				-653	29900.56
05/16/11 07:59:42	59.97351	471		0	0				-653	29900.56
05/16/11 07:59:44	59.97318	471		0	0				-653	29896.99
05/16/11 07:59:46	59.97189	471		0	0				-653	29896.99
05/16/11 07:59:48	59.97092	471		0	0				-653	29896.99
05/16/11 07:59:50	59.97028	471		0	0				-653	29896.99
05/16/11 07:59:52	59.97028	471		0	0				-653	29896.99
05/16/11 07:59:54	59.97028	471		0	0				-653	29905.8
05/16/11 07:59:56	59.97028	471		0	0				-653	29905.8
05/16/11 07:59:58	59.97061	471		0	0				-653	29905.8
05/16/11 08:00:00	59.97287	471		0	0				-653	29905.8
05/16/11 08:00:02	59.97287	471		0	0				-653	29905.8
05/16/11 08:00:04	59.97479	471		0	0				-653	29905.77
05/16/11 08:00:06	59.97479	471		0	0				-653	29905.77
05/16/11 08:00:08	59.97382	471		0	0				-653	29905.77
05/16/11 08:00:10	59.96832	471		0	0				-653	29905.77
05/16/11 08:00:12	59.96802	471		0	0				-653	29905.77
05/16/11 08:00:14	59.96899	471		0	0				-653	29914.9

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.005	0.005	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.005	0.005	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:00:16	59.96994	471		0	0				-653	29914.9
05/16/11 08:00:18	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:20	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:22	59.97382	471		0	0				-653	29914.9
05/16/11 08:00:24	59.97769	471		0	0				-653	29925.58
05/16/11 08:00:26	59.97739	471		0	0				-653	29925.58
05/16/11 08:00:28	59.9761	471		0	0				-653	29925.58
05/16/11 08:00:30	59.9761	471		0	0				-653	29925.58
05/16/11 08:00:32	59.97705	471		0	0				-653	29925.58
05/16/11 08:00:34	59.97769	471		0	0				-653	29938.87
05/16/11 08:00:36	59.97803	471		0	0				-653	29938.87
05/16/11 08:00:38	59.97803	471		0	0				-653	29938.87
05/16/11 08:00:40	59.97739	471		0	0				-653	29938.87
05/16/11 08:00:42	59.97675	471		0	0				-653	29938.87
05/16/11 08:00:44	59.97641	471		0	0				-653	29952.51
05/16/11 08:00:46	59.97479	471		0	0				-653	29952.51
05/16/11 08:00:48	59.97449	471		0	0				-653	29952.51
05/16/11 08:00:50	59.97543	471		0	0				-653	29952.51
05/16/11 08:00:52	59.97705	471		0	0				-653	29952.51
05/16/11 08:00:54	59.97931	471		0	0				-653	29952.51
05/16/11 08:00:56	59.97964	471		0	0				-653	29948.95
05/16/11 08:00:58	59.979	471		0	0				-653	29948.95
05/16/11 08:01:00	59.97803	471		0	0				-653	29948.95
05/16/11 08:01:02	59.97803	471		0	0				-653	29948.95
05/16/11 08:01:04	59.979	471		0	0				-653	29948.95
05/16/11 08:01:06	59.98029	471		0	0				-653	29948.95
05/16/11 08:01:08	59.9819	471		0	0				-653	29948.95
05/16/11 08:01:10	59.98318	471		0	0				-653	29948.95
05/16/11 08:01:12	59.9845	471		0	0				-653	29948.95
05/16/11 08:01:14	59.98578	471		0	0				-653	29951.05
05/16/11 08:01:16	59.98642	471		0	0				-653	29951.05
05/16/11 08:01:18	59.98642	471		0	0				-653	29951.05
05/16/11 08:01:20	59.98709	471		0	0				-653	29951.05
05/16/11 08:01:22	59.98773	471		0	0				-653	29951.05
05/16/11 08:01:24	59.98965	471		0	0				-653	29955.09
05/16/11 08:01:26	59.99161	471		0	0				-653	29955.09
05/16/11 08:01:28	59.99255	471		0	0				-653	29955.09
05/16/11 08:01:30	59.99323	471		0	0				-653	29955.09

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.001	0.001	
0	0	0	0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:01:32	59.99289	471		0	0				-653	29955.09
05/16/11 08:01:34	59.99097	471		0	0				-653	29967.69
05/16/11 08:01:36	59.98804	471		0	0				-653	29967.69
05/16/11 08:01:38	59.98578	471		0	0				-653	29967.69
05/16/11 08:01:40	59.98386	471		0	0				-653	29967.69
05/16/11 08:01:42	59.98318	471		0	0				-653	29967.69
05/16/11 08:01:44	59.98318	471		0	0				-653	29983.13
05/16/11 08:01:46	59.98288	471		0	0				-653	29983.13
05/16/11 08:01:48	59.98126	471		0	0				-653	29983.13
05/16/11 08:01:50	59.97998	471		0	0				-653	29983.13
05/16/11 08:01:52	59.97964	471		0	0				-653	29983.13
05/16/11 08:01:54	59.98029	471		0	0				-653	29976.75
05/16/11 08:01:56	59.98126	471		0	0				-653	29976.75
05/16/11 08:01:58	59.98352	471		0	0				-653	29976.75
05/16/11 08:02:00	59.98386	471		0	0				-653	29976.75
05/16/11 08:02:02	59.98126	471		0	0				-653	29976.75
05/16/11 08:02:04	59.97543	471		0	0				-653	29976.78
05/16/11 08:02:06	59.96832	471		0	0				-653	29976.78
05/16/11 08:02:08	59.9635	471		0	0				-653	29976.78
05/16/11 08:02:10	59.96155	471		0	0				-653	29976.78
05/16/11 08:02:12	59.96091	471		0	0				-653	29976.78
05/16/11 08:02:14	59.96155	471		0	0				-653	30008.51
05/16/11 08:02:16	59.96057	471		0	0				-653	30008.51
05/16/11 08:02:18	59.95801	471		0	0				-653	30008.51
05/16/11 08:02:20	59.95575	471		0	0				-653	30008.51
05/16/11 08:02:22	59.95575	471		0	0				-653	30008.51
05/16/11 08:02:24	59.95703	471		0	0				-653	30037.25
05/16/11 08:02:26	59.95895	471		0	0				-653	30037.25
05/16/11 08:02:28	59.96057	471		0	0				-653	30037.25
05/16/11 08:02:30	59.96155	471		0	0				-653	30037.25
05/16/11 08:02:32	59.96252	471		0	0				-653	30037.25
05/16/11 08:02:34	59.96414	471		0	0				-653	30055.73
05/16/11 08:02:36	59.96512	471		0	0				-653	30055.73
05/16/11 08:02:38	59.96512	471		0	0				-653	30055.73
05/16/11 08:02:40	59.96576	471		0	0				-653	30055.73
05/16/11 08:02:42	59.96704	471		0	0				-653	30055.73
05/16/11 08:02:44	59.96994	471		0	0				-653	30068.76
05/16/11 08:02:46	59.97253	471		0	0				-653	30068.76

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	-0.003	0.003	
0	0	0	-0.006	0.006	
0	0	0	-0.007	0.007	
0	0	0	-0.005	0.005	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.003	0.003	
0	0	0	-0.002	0.002	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:02:48	59.97415	471		0	0				-653	30068.76	0	0	0	0.002	0.002	
05/16/11 08:02:50	59.9761	471		0	0				-653	30068.76	0	0	0	0.002	0.002	
05/16/11 08:02:52	59.97739	471		0	0				-653	30068.76	0	0	0	0.001	0.001	
05/16/11 08:02:54	59.97931	471		0	0				-653	30068.21	0	0	0	0.002	0.002	
05/16/11 08:02:56	59.98029	471		0	0				-653	30068.21	0	0	0	0.001	0.001	
05/16/11 08:02:58	59.98062	471		0	0				-653	30068.21	0	0	0	0.000	0.000	
05/16/11 08:03:00	59.98029	471		0	0				-653	30068.21	0	0	0	0.000	0.000	
05/16/11 08:03:02	59.98029	471		0	0				-653	30068.21	0	0	0	0.000	0.000	
05/16/11 08:03:04	59.97836	471		0	0				-653	30068.24	0	0	0	-0.002	0.002	
05/16/11 08:03:06	59.97836	471		0	0				-653	30068.24	0	0	0	0.000	0.000	
05/16/11 08:03:08	59.979	471		0	0				-653	30068.24	0	0	0	0.001	0.001	
05/16/11 08:03:10	59.97998	471		0	0				-653	30068.24	0	0	0	0.001	0.001	
05/16/11 08:03:12	59.98029	471		0	0				-653	30068.24	0	0	0	0.000	0.000	
05/16/11 08:03:14	59.98093	471		0	0				-653	30076.2	0	0	0	0.001	0.001	
05/16/11 08:03:16	59.98093	471		0	0				-653	30076.2	0	0	0	0.000	0.000	
05/16/11 08:03:18	59.97998	471		0	0				-653	30076.2	0	0	0	-0.001	0.001	
05/16/11 08:03:20	59.98062	471		0	0				-653	30076.2	0	0	0	0.001	0.001	
05/16/11 08:03:22	59.98029	471		0	0				-653	30076.2	0	0	0	0.000	0.000	
05/16/11 08:03:24	59.97998	471		0	0				-653	30093.95	0	0	0	0.000	0.000	
05/16/11 08:03:26	59.979	471		0	0				-653	30093.95	0	0	0	-0.001	0.001	
05/16/11 08:03:28	59.97931	471		0	0				-653	30093.95	0	0	0	0.000	0.000	
05/16/11 08:03:30	59.97998	471		0	0				-653	30093.95	0	0	0	0.001	0.001	
05/16/11 08:03:32	59.98029	471		0	0				-653	30093.95	0	0	0	0.000	0.000	
05/16/11 08:03:34	59.98029	471		0	0				-653	30100.97	0	0	0	0.000	0.000	
05/16/11 08:03:36	59.98029	471		0	0				-653	30100.97	0	0	0	0.000	0.000	
05/16/11 08:03:38	59.97964	471		0	0				-653	30100.97	0	0	0	-0.001	0.001	
05/16/11 08:03:40	59.979	471		0	0				-653	30100.97	0	0	0	-0.001	0.001	
05/16/11 08:03:42	59.97803	471		0	0				-653	30100.97	0	0	0	-0.001	0.001	
05/16/11 08:03:44	59.97803	471		0	0				-653	30118.87	0	0	0	0.000	0.000	
05/16/11 08:03:46	59.97867	471		0	0				-653	30118.87	0	0	0	0.001	0.001	
05/16/11 08:03:48	59.97964	471		0	0				-653	30118.87	0	0	0	0.001	0.001	
05/16/11 08:03:50	59.98224	471		0	0				-653	30118.87	0	0	0	0.003	0.003	
05/16/11 08:03:52	59.9848	471		0	0				-653	30118.87	0	0	0	0.003	0.003	
05/16/11 08:03:54	59.98514	471		0	0				-653	30118.77	0	0	0	0.000	0.000	
05/16/11 08:03:56	59.98416	471		0	0				-653	30118.77	0	0	0	-0.001	0.001	
05/16/11 08:03:58	59.98224	471		0	0				-653	30118.77	0	0	0	-0.002	0.002	
05/16/11 08:04:00	59.98029	471		0	0				-653	30118.77	0	0	0	-0.002	0.002	
05/16/11 08:04:02	59.979	471		0	0				-653	30118.77	0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:04:04	59.97867	471		0	0				-653	30118.74
05/16/11 08:04:06	59.97931	471		0	0				-653	30118.74
05/16/11 08:04:08	59.97998	471		0	0				-653	30118.74
05/16/11 08:04:10	59.97931	471		0	0				-653	30118.74
05/16/11 08:04:12	59.979	471		0	0				-653	30118.74
05/16/11 08:04:14	59.97803	471		0	0				-653	30106.93
05/16/11 08:04:16	59.97675	471		0	0				-653	30106.93
05/16/11 08:04:18	59.97739	471		0	0				-653	30106.93
05/16/11 08:04:20	59.979	471		0	0				-653	30106.93
05/16/11 08:04:22	59.97964	471		0	0				-653	30106.93
05/16/11 08:04:24	59.98093	471		0	0				-653	30106.61
05/16/11 08:04:26	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:28	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:30	59.98318	471		0	0				-653	30106.61
05/16/11 08:04:32	59.98224	471		0	0				-653	30106.61
05/16/11 08:04:34	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:36	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:38	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:40	59.9816	471		0	0				-653	30116.02
05/16/11 08:04:42	59.9819	471		0	0				-653	30116.02
05/16/11 08:04:44	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:46	59.98126	471		0	0				-653	30141.59
05/16/11 08:04:48	59.9816	471		0	0				-653	30141.59
05/16/11 08:04:50	59.98254	471		0	0				-653	30141.59
05/16/11 08:04:52	59.98352	471		0	0				-653	30141.59
05/16/11 08:04:54	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:56	59.98416	471		0	0				-653	30144.23
05/16/11 08:04:58	59.98416	471		0	0				-653	30144.23
05/16/11 08:05:00	59.98514	471		0	0				-653	30144.23
05/16/11 08:05:02	59.9874	471		0	0				-653	30144.23
05/16/11 08:05:04	59.98901	471		0	0				-653	30144.23
05/16/11 08:05:06	59.98804	471		0	0				-653	30144.23
05/16/11 08:05:08	59.98642	471		0	0				-653	30144.23
05/16/11 08:05:10	59.98288	471		0	0				-653	30144.23
05/16/11 08:05:12	59.98254	471		0	0				-653	30144.23
05/16/11 08:05:14	59.98318	471		0	0				-653	30148.67
05/16/11 08:05:16	59.9819	471		0	0				-653	30148.67
05/16/11 08:05:18	59.98062	471		0	0				-653	30148.67

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.004	0.004	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:05:20	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:22	59.97964	471		0	0				-653	30148.67
05/16/11 08:05:24	59.97964	471		0	0				-653	30155.67
05/16/11 08:05:26	59.98029	471		0	0				-653	30155.67
05/16/11 08:05:28	59.98224	471		0	0				-653	30155.67
05/16/11 08:05:30	59.98352	471		0	0				-653	30155.67
05/16/11 08:05:32	59.98578	471		0	0				-653	30155.67
05/16/11 08:05:34	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:36	59.98804	471		0	0				-653	30142.79
05/16/11 08:05:38	59.9874	471		0	0				-653	30142.79
05/16/11 08:05:40	59.98611	471		0	0				-653	30142.79
05/16/11 08:05:42	59.9848	471		0	0				-653	30142.79
05/16/11 08:05:44	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:46	59.98318	471		0	0				-653	30154.67
05/16/11 08:05:48	59.98352	471		0	0				-653	30154.67
05/16/11 08:05:50	59.98416	471.3000183		0	0				-653	30150.35
05/16/11 08:05:52	59.98514	471.3000183		0	0				-653	30150.35
05/16/11 08:05:54	59.98547	471.3000183		0	0				-653	30159.63
05/16/11 08:05:56	59.98642	471.3000183		0	0				-653	30159.63
05/16/11 08:05:58	59.98676	471.8999939		0	0				-653	30159.63
05/16/11 08:06:00	59.9874	471.8999939		0	0				-653	30159.63
05/16/11 08:06:02	59.98773	471.8999939		0	0				-653	30151.42
05/16/11 08:06:04	59.98901	471.8999939		0	0				-653	30151.42
05/16/11 08:06:06	59.98901	471.8999939		0	0				-653	30156.16
05/16/11 08:06:08	59.98804	471.3999939		0	0				-653	30156.16
05/16/11 08:06:10	59.98642	471.3999939		0	0				-653	30156.16
05/16/11 08:06:12	59.98547	471.3999939		0	0				-653	30156.16
05/16/11 08:06:14	59.98642	471.3999939		0	0				-653	30164.15
05/16/11 08:06:16	59.98935	471.3999939		0	0				-653	30164.15
05/16/11 08:06:18	59.99225	471.3999939		0	0				-653	30164.15
05/16/11 08:06:20	59.99515	471.3999939		0	0				-653	30164.15
05/16/11 08:06:22	59.99579	471.3999939		0	0				-653	30203.91
05/16/11 08:06:24	59.99515	471.3999939		0	0				-653	30203.91
05/16/11 08:06:26	59.99548	471.3999939		0	0				-653	30203.73
05/16/11 08:06:28	59.99741	470.8999939		0	0				-653	30203.73
05/16/11 08:06:30	60	470.8999939		0	0				-653	30203.73
05/16/11 08:06:32	60.00162	470.8999939		0	0				-653	30203.73
05/16/11 08:06:34	60.00162	470.8999939		0	0				-653	30199.61

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	0.002	0.002	
0	0	0	0.002	0.002	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	-0.001	0.001	
0	0	0	-0.002	0.002	
0	0	0	-0.001	0.001	
0	0	0	0.001	0.001	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.003	0.003	
0	0	0	0.001	0.001	
0	0	0	-0.001	0.001	
0	0	0	0.000	0.000	
0	0	0	0.002	0.002	
0	0	0	0.003	0.003	
0	0	0	0.002	0.002	
0	0	0	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:06:36	60.00195	470.8999939		0	0				-653	30199.61
05/16/11 08:06:38	59.95963	0		0	0				-653	30199.61
05/16/11 08:06:40	59.88144	0		0	0				-653	30199.61
05/16/11 08:06:42	59.87237	0		0	0				-653	30086.11
05/16/11 08:06:44	59.87011	0		0	0				-653	30086.11
05/16/11 08:06:46	59.87432	0		0	0				-653	30086.14
05/16/11 08:06:48	59.88076	0		0	0				-653	30086.14
05/16/11 08:06:50	59.88531	0		0	0				-653	30086.14
05/16/11 08:06:52	59.88787	0		0	0				-653	30086.14
05/16/11 08:06:54	59.88949	0		0	0				-653	30094.43
05/16/11 08:06:56	59.8908	0		0	0				-653	30094.43
05/16/11 08:06:58	59.89175	0		0	0				-653	30094.43
05/16/11 08:07:00	59.89242	0		0	0				-653	30094.43
05/16/11 08:07:02	59.89306	0		0	0				-653	30139.49
05/16/11 08:07:04	59.89306	0		0	0				-653	30139.49
05/16/11 08:07:06	59.89306	0		0	0				-653	30133.38
05/16/11 08:07:08	59.89532	0		0	0				-653	30133.38
05/16/11 08:07:10	59.89788	0		0	0				-653	30133.38
05/16/11 08:07:12	59.8995	0		0	0				-653	30133.38
05/16/11 08:07:14	59.90081	0		0	0				-653	30137.26
05/16/11 08:07:16	59.9021	0		0	0				-653	30137.26
05/16/11 08:07:18	59.90179	0		0	0				-653	30137.26
05/16/11 08:07:20	59.90081	0		0	0				-653	30137.26
05/16/11 08:07:22	59.90081	0		0	0				-653	30171.38
05/16/11 08:07:24	59.90048	0		0	0				-653	30171.38
05/16/11 08:07:26	59.8992	0		0	0				-653	30168.76
05/16/11 08:07:28	59.89886	0		0	0				-653	30168.76
05/16/11 08:07:30	59.89856	0		0	0				-653	30168.76
05/16/11 08:07:32	59.90017	0		0	0				-653	30168.76
05/16/11 08:07:34	59.90243	0		0	0				-653	30208.99
05/16/11 08:07:36	59.90469	0		0	0				-653	30208.99
05/16/11 08:07:38	59.90695	0		0	0				-653	30208.99
05/16/11 08:07:40	59.90887	0		0	0				-653	30208.99
05/16/11 08:07:42	59.90921	0		0	0				-653	30205.66
05/16/11 08:07:44	59.90857	0		0	0				-653	30205.66
05/16/11 08:07:46	59.90887	0		0	0				-653	30205.66
05/16/11 08:07:48	59.91018	0		0	0				-653	30205.66
05/16/11 08:07:50	59.91244	0		0	0				-653	30205.66

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
0	0	0	0.000	0.000	
0	0	1	-0.042	0.042	
1	0	1	-0.078	0.078	
1	0	1	-0.009	0.009	
1	0	1	-0.002	0.002	
1	0	1	0.004	0.004	
1	0	1	0.006	0.006	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:07:52	59.9147	0		0	0				-653	30205.66
05/16/11 08:07:54	59.9176	0		0	0				-653	30211.75
05/16/11 08:07:56	59.91922	0		0	0				-653	30211.75
05/16/11 08:07:58	59.92083	0		0	0				-653	30211.75
05/16/11 08:08:00	59.92215	0		0	0				-653	30211.75
05/16/11 08:08:02	59.92309	0		0	0				-653	30217.55
05/16/11 08:08:04	59.92505	0		0	0				-653	30217.55
05/16/11 08:08:06	59.92505	0		0	0				-653	30217.57
05/16/11 08:08:08	59.9273	0		0	0				-653	30217.57
05/16/11 08:08:10	59.93246	0		0	0				-653	30217.57
05/16/11 08:08:12	59.93505	0		0	0				-653	30217.57
05/16/11 08:08:14	59.93701	0		0	0				-653	30217.59
05/16/11 08:08:16	59.93765	0		0	0				-653	30217.59
05/16/11 08:08:18	59.93927	0		0	0				-653	30217.59
05/16/11 08:08:20	59.94183	0		0	0				-653	30217.59
05/16/11 08:08:22	59.94409	0		0	0				-653	30210.49
05/16/11 08:08:24	59.94571	0		0	0				-653	30210.49
05/16/11 08:08:26	59.94797	0		0	0				-653	30210.26
05/16/11 08:08:28	59.94766	0		0	0				-653	30210.26
05/16/11 08:08:30	59.9454	0		0	0				-653	30210.26
05/16/11 08:08:32	59.94443	0		0	0				-653	30210.26
05/16/11 08:08:34	59.94409	0		0	0				-653	30234.59
05/16/11 08:08:36	59.94507	0		0	0				-653	30234.59
05/16/11 08:08:38	59.94604	0		0	0				-653	30234.59
05/16/11 08:08:40	59.94638	0		0	0				-653	30234.59
05/16/11 08:08:42	59.94733	0		0	0				-653	30223.6
05/16/11 08:08:44	59.9483	0		0	0				-653	30223.6
05/16/11 08:08:46	59.94894	0		0	0				-653	30223.73
05/16/11 08:08:48	59.94992	0		0	0				-653	30223.73
05/16/11 08:08:50	59.9509	0		0	0				-653	30223.73
05/16/11 08:08:52	59.95154	0		0	0				-653	30223.73
05/16/11 08:08:54	59.95187	0		0	0				-653	30224.39
05/16/11 08:08:56	59.95346	0		0	0				-653	30224.39
05/16/11 08:08:58	59.95508	0		0	0				-653	30224.39
05/16/11 08:09:00	59.95575	0		0	0				-653	30224.39
05/16/11 08:09:02	59.95639	0		0	0				-653	30255.53
05/16/11 08:09:04	59.95801	0		0	0				-653	30255.53
05/16/11 08:09:06	59.96124	0		0	0				-653	30252.87

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:09:08	59.96252	0		0	0				-653	30252.87
05/16/11 08:09:10	59.96188	0		0	0				-653	30252.87
05/16/11 08:09:12	59.96124	0		0	0				-653	30252.87
05/16/11 08:09:14	59.96027	0		0	0				-653	30232.45
05/16/11 08:09:16	59.96057	0		0	0				-653	30232.45
05/16/11 08:09:18	59.96219	0		0	0				-653	30232.45
05/16/11 08:09:20	59.96512	0		0	0				-653	30232.45
05/16/11 08:09:22	59.96738	0		0	0				-653	30263.99
05/16/11 08:09:24	59.96899	0		0	0				-653	30263.99
05/16/11 08:09:26	59.97061	0		0	0				-653	30263.68
05/16/11 08:09:28	59.97318	0		0	0				-653	30263.68
05/16/11 08:09:30	59.97351	0		0	0				-653	30263.68
05/16/11 08:09:32	59.97287	0		0	0				-653	30263.68
05/16/11 08:09:34	59.97253	0		0	0				-653	30264.96
05/16/11 08:09:36	59.97318	0		0	0				-653	30264.96
05/16/11 08:09:38	59.97415	0		0	0				-653	30264.96
05/16/11 08:09:40	59.97543	0		0	0				-653	30264.96
05/16/11 08:09:42	59.97577	0		0	0				-653	30263.63
05/16/11 08:09:44	59.9761	0		0	0				-653	30263.63
05/16/11 08:09:46	59.97675	0		0	0				-653	30279.39
05/16/11 08:09:48	59.97803	0		0	0				-653	30279.39
05/16/11 08:09:50	59.97931	0		0	0				-653	30279.39
05/16/11 08:09:52	59.97998	0		0	0				-653	30279.39
05/16/11 08:09:54	59.97964	0		0	0				-653	30255.32
05/16/11 08:09:56	59.979	0		0	0				-653	30255.32
05/16/11 08:09:58	59.97964	0		0	0				-653	30255.32
05/16/11 08:10:00	59.98093	0		0	0				-653	30255.32
05/16/11 08:10:02	59.98224	0		0	0				-653	30260.67
05/16/11 08:10:04	59.98386	0		0	0				-653	30260.67
05/16/11 08:10:06	59.98514	0		0	0				-653	30259.99
05/16/11 08:10:08	59.98773	0		0	0				-653	30259.99
05/16/11 08:10:10	59.9903	0		0	0				-653	30259.99
05/16/11 08:10:12	59.99289	0		0	0				-653	30259.99
05/16/11 08:10:14	59.99579	0		0	0				-653	30274.08
05/16/11 08:10:16	59.99646	0		0	0				-653	30274.08
05/16/11 08:10:18	59.99579	0		0	0				-653	30274.08
05/16/11 08:10:20	59.99612	0		0	0				-653	30274.08
05/16/11 08:10:22	59.99579	0		0	0				-653	30297.68

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 t(0) 8:10:30 t(Recovery) 03:52 Event Length mm:ss	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:10:24	59.99484	0		0	0				-653	30297.68	1	0	1	-0.001	0.001	
05/16/11 08:10:26	59.99484	0		0	0				-653	30297.65	1	0	1	0.000	0.000	
05/16/11 08:10:28	59.99805	0		0	0				-653	30297.65	1	0	1	0.003	0.003	
05/16/11 08:10:30	59.99872	0		0	0				-653	30297.65	1	1	1	0.001	0.001	
05/16/11 08:10:32	60.00034	0		0	0				-653	30297.65	1	1	1	0.002	0.002	
05/16/11 08:10:34	60.00195	0		0	0				-653	30300.1	1	1	1	0.002	0.002	
05/16/11 08:10:36	60.00259	0		0	0				-653	30300.1	1	1	1	0.001	0.001	
05/16/11 08:10:38	60.00226	0		0	0				-653	30300.1	1	1	1	0.000	0.000	
05/16/11 08:10:40	60.00195	0		0	0				-653	30300.1	1	1	1	0.000	0.000	
05/16/11 08:10:42	60.00064	0		0	0				-653	30314.84	1	1	1	-0.001	0.001	
05/16/11 08:10:44	59.99646	0		0	0				-653	30314.84	1	0	1	-0.004	0.004	
05/16/11 08:10:46	59.99191	0		0	0				-653	30309.71	1	0	1	-0.005	0.005	
05/16/11 08:10:48	59.98901	0		0	0				-653	30309.71	1	0	1	-0.003	0.003	
05/16/11 08:10:50	59.98773	0		0	0				-653	30309.71	1	0	1	-0.001	0.001	
05/16/11 08:10:52	59.98901	0		0	0				-653	30309.71	1	0	1	0.001	0.001	
05/16/11 08:10:54	59.99255	0		0	0				-653	30319.5	1	0	1	0.004	0.004	
05/16/11 08:10:56	59.99579	0		0	0				-653	30319.5	1	0	1	0.003	0.003	
05/16/11 08:10:58	59.99902	0		0	0				-653	30319.5	1	1	1	0.003	0.003	
05/16/11 08:11:00	60.00195	0		0	0				-653	30319.5	1	1	1	0.003	0.003	
05/16/11 08:11:02	60.00485	0		0	0				-653	30357.21	1	1	1	0.003	0.003	
05/16/11 08:11:04	60.00809	0		0	0				-653	30357.21	1	1	1	0.003	0.003	
05/16/11 08:11:06	60.01163	0		0	0				-653	30357.18	1	1	1	0.004	0.004	
05/16/11 08:11:08	60.01422	0		0	0				-653	30357.18	1	1	1	0.003	0.003	
05/16/11 08:11:10	60.0152	0		0	0				-653	30357.18	1	1	1	0.001	0.001	
05/16/11 08:11:12	60.0155	0		0	0				-653	30357.18	1	1	1	0.000	0.000	
05/16/11 08:11:14	60.0155	0		0	0				-653	30354.26	1	1	1	0.000	0.000	
05/16/11 08:11:16	60.01682	0		0	0				-653	30354.26	1	1	1	0.001	0.001	
05/16/11 08:11:18	60.01907	0		0	0				-653	30354.26	1	1	1	0.002	0.002	
05/16/11 08:11:20	60.02295	0		0	0				-653	30354.26	1	1	1	0.004	0.004	
05/16/11 08:11:22	60.02618	0		0	0				-653	30354.48	1	1	1	0.003	0.003	
05/16/11 08:11:24	60.02972	0		0	0				-653	30354.48	1	1	1	0.004	0.004	
05/16/11 08:11:26	60.03262	0		0	0				-653	30353.83	1	1	1	0.003	0.003	
05/16/11 08:11:28	60.03458	0		0	0				-653	30353.83	1	1	1	0.002	0.002	
05/16/11 08:11:30	60.03522	0		0	0				-653	30353.83	1	1	1	0.001	0.001	
05/16/11 08:11:32	60.03424	0		0	0				-653	30353.83	1	1	1	-0.001	0.001	
05/16/11 08:11:34	60.0336	0		0	0				-653	30370.41	1	1	1	-0.001	0.001	
05/16/11 08:11:36	60.03522	0		0	0				-653	30370.41	1	1	1	0.002	0.002	
05/16/11 08:11:38	60.03812	0		0	0				-653	30370.41	1	1	1	0.003	0.003	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 t(0) 8:10:30 t(Recovery) 03:52 Event Length mm:ss	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:11:40	60.04037	0		0	0				-653	30370.41	1	1	1	0.002	0.002	
05/16/11 08:11:42	60.04105	0		0	0				-653	30374.79	1	1	1	0.001	0.001	
05/16/11 08:11:44	60.04199	0		0	0				-653	30374.79	1	1	1	0.001	0.001	
05/16/11 08:11:46	60.04233	0		0	0				-653	30366.14	1	1	1	0.000	0.000	
05/16/11 08:11:48	60.0433	0		0	0				-653	30366.14	1	1	1	0.001	0.001	
05/16/11 08:11:50	60.04425	0		0	0				-653	30366.14	1	1	1	0.001	0.001	
05/16/11 08:11:52	60.04492	0		0	0				-653	30366.14	1	1	1	0.001	0.001	
05/16/11 08:11:54	60.04556	0		0	0				-653	30373.53	1	1	1	0.001	0.001	
05/16/11 08:11:56	60.04587	0		0	0				-653	30373.53	1	1	1	0.000	0.000	
05/16/11 08:11:58	60.04654	0		0	0				-653	30373.53	1	1	1	0.001	0.001	
05/16/11 08:12:00	60.0488	0		0	0				-653	30373.53	1	1	1	0.002	0.002	
05/16/11 08:12:02	60.04974	0		0	0				-653	30343.46	1	1	1	0.001	0.001	
05/16/11 08:12:04	60.0491	0		0	0				-653	30343.46	1	1	1	-0.001	0.001	
05/16/11 08:12:06	60.0491	0		0	0				-653	30335.12	1	1	1	0.000	0.000	
05/16/11 08:12:08	60.05042	0		0	0				-653	30335.12	1	1	1	0.001	0.001	
05/16/11 08:12:10	60.04974	0		0	0				-653	30335.12	1	1	1	-0.001	0.001	
05/16/11 08:12:12	60.04846	0		0	0				-653	30335.12	1	1	1	-0.001	0.001	
05/16/11 08:12:14	60.04718	0		0	0				-653	30337.29	1	1	1	-0.001	0.001	
05/16/11 08:12:16	60.04587	0		0	0				-653	30337.29	1	1	1	-0.001	0.001	
05/16/11 08:12:18	60.04587	0		0	0				-653	30337.29	1	1	1	0.000	0.000	
05/16/11 08:12:20	60.04556	0		0	0				-653	30337.29	1	1	1	0.000	0.000	
05/16/11 08:12:22	60.04425	0		0	0				-653	30350.2	1	1	1	-0.001	0.001	
05/16/11 08:12:24	60.04297	0		0	0				-653	30350.2	1	1	1	-0.001	0.001	
05/16/11 08:12:26	60.04169	0		0	0				-653	30350.07	1	1	1	-0.001	0.001	
05/16/11 08:12:28	60.04233	0		0	0				-653	30350.07	1	1	1	0.001	0.001	
05/16/11 08:12:30	60.04459	0		0	0				-653	30350.07	1	1	1	0.002	0.002	
05/16/11 08:12:32	60.04654	0		0	0				-653	30350.07	1	1	1	0.002	0.002	
05/16/11 08:12:34	60.04718	0		0	0				-653	30354.77	1	1	1	0.001	0.001	
05/16/11 08:12:36	60.0462	0		0	0				-653	30354.77	1	1	1	-0.001	0.001	
05/16/11 08:12:38	60.04425	0		0	0				-653	30354.77	1	1	1	-0.002	0.002	
05/16/11 08:12:40	60.04492	0		0	0				-653	30354.77	1	1	1	0.001	0.001	
05/16/11 08:12:42	60.04523	0		0	0				-653	30372.38	1	1	1	0.000	0.000	
05/16/11 08:12:44	60.04523	0		0	0				-653	30372.38	1	1	1	0.000	0.000	
05/16/11 08:12:46	60.04556	0		0	0				-653	30372.38	1	1	1	0.000	0.000	
05/16/11 08:12:48	60.0462	0		0	0				-653	30372.38	1	1	1	0.001	0.001	
05/16/11 08:12:50	60.04654	0		0	0				-653	30372.38	1	1	1	0.000	0.000	
05/16/11 08:12:52	60.04654	0		0	0				-653	30372.38	1	1	1	0.000	0.000	
05/16/11 08:12:54	60.04523	0		0	0				-653	30349.1	1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 t(0) 8:10:30 t(Recovery) 03:52 Event Length mm:ss	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:12:56	60.04361	0		0	0				-653	30349.1	1	1	1	-0.002	0.002	
05/16/11 08:12:58	60.04199	0		0	0				-653	30349.1	1	1	1	-0.002	0.002	
05/16/11 08:13:00	60.04071	0		0	0				-653	30349.1	1	1	1	-0.001	0.001	
05/16/11 08:13:02	60.03876	0		0	0				-653	30363.65	1	1	1	-0.002	0.002	
05/16/11 08:13:04	60.03586	0		0	0				-653	30363.65	1	1	1	-0.003	0.003	
05/16/11 08:13:06	60.03394	0		0	0				-653	30363.88	1	1	1	-0.002	0.002	
05/16/11 08:13:08	60.0336	0		0	0				-653	30363.88	1	1	1	0.000	0.000	
05/16/11 08:13:10	60.03262	0		0	0				-653	30363.88	1	1	1	-0.001	0.001	
05/16/11 08:13:12	60.03006	0		0	0				-653	30363.88	1	1	1	-0.003	0.003	
05/16/11 08:13:14	60.02747	0		0	0				-653	30364.77	1	1	1	-0.003	0.003	
05/16/11 08:13:16	60.02682	0		0	0				-653	30364.77	1	1	1	-0.001	0.001	
05/16/11 08:13:18	60.02585	0		0	0				-653	30364.77	1	1	1	-0.001	0.001	
05/16/11 08:13:20	60.02359	0		0	0				-653	30364.77	1	1	1	-0.002	0.002	
05/16/11 08:13:22	60.02197	0		0	0				-653	30374.33	1	1	1	-0.002	0.002	
05/16/11 08:13:24	60.02164	0		0	0				-653	30374.33	1	1	1	0.000	0.000	
05/16/11 08:13:26	60.02231	0		0	0				-653	30364.67	1	1	1	0.001	0.001	
05/16/11 08:13:28	60.02133	0		0	0				-653	30364.67	1	1	1	-0.001	0.001	
05/16/11 08:13:30	60.02133	0		0	0				-653	30364.67	1	1	1	0.000	0.000	
05/16/11 08:13:32	60.02002	0		0	0				-653	30364.67	1	1	1	-0.001	0.001	
05/16/11 08:13:34	60.01776	0		0	0				-653	30361.56	1	1	1	-0.002	0.002	
05/16/11 08:13:36	60.01584	0		0	0				-653	30361.56	1	1	1	-0.002	0.002	
05/16/11 08:13:38	60.01291	0		0	0				-653	30361.56	1	1	1	-0.003	0.003	
05/16/11 08:13:40	60.01132	0		0	0				-653	30361.56	1	1	1	-0.002	0.002	
05/16/11 08:13:42	60.01001	0		0	0				-653	30350.69	1	1	1	-0.001	0.001	
05/16/11 08:13:44	60.00937	0		0	0				-653	30350.69	1	1	1	-0.001	0.001	
05/16/11 08:13:46	60.00775	0		0	0				-653	30344.52	1	1	1	-0.002	0.002	
05/16/11 08:13:48	60.00516	0		0	0				-653	30344.52	1	1	1	-0.003	0.003	
05/16/11 08:13:50	60.00452	0		0	0				-653	30344.52	1	1	1	-0.001	0.001	
05/16/11 08:13:52	60.00613	0		0	0				-653	30344.52	1	1	1	0.002	0.002	
05/16/11 08:13:54	60.00613	0		0	0				-653	30354.37	1	1	1	0.000	0.000	
05/16/11 08:13:56	60.00549	0		0	0				-653	30354.37	1	1	1	-0.001	0.001	
05/16/11 08:13:58	60.00516	0		0	0				-653	30354.37	1	1	1	0.000	0.000	
05/16/11 08:14:00	60.00388	0		0	0				-653	30354.37	1	1	1	-0.001	0.001	
05/16/11 08:14:02	60.00259	0		0	0				-653	30373.31	1	1	1	-0.001	0.001	
05/16/11 08:14:04	60.00128	0		0	0				-653	30373.31	1	1	1	-0.001	0.001	
05/16/11 08:14:06	60.00128	0		0	0				-653	30373.78	1	1	1	0.000	0.000	
05/16/11 08:14:08	60.00064	0		0	0				-653	30373.78	1	1	1	-0.001	0.001	
05/16/11 08:14:10	60.00034	0		0	0				-653	30373.78	1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 t(0) 8:10:30 t(Recovery) 03:52 Event Length mm:ss	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:14:12	60.00226	0		0	0				-653	30373.78	1	1	1	0.002	0.002	
05/16/11 08:14:14	60.00421	0		0	0				-653	30366.33	1	1	1	0.002	0.002	
05/16/11 08:14:16	60.00677	0		0	0				-653	30366.33	1	1	1	0.003	0.003	
05/16/11 08:14:18	60.00903	0		0	0				-653	30366.33	1	1	1	0.002	0.002	
05/16/11 08:14:20	60.01291	0		0	0				-653	30366.33	1	1	1	0.004	0.004	
05/16/11 08:14:22	60.01486	0		0	0				-653	30373.85	1	1	1	0.002	0.002	
05/16/11 08:14:24	60.01453	0		0	0				-653	30373.85	1	1	1	0.000	0.000	
05/16/11 08:14:26	60.01422	0		0	0				-653	30373.05	1	1	1	0.000	0.000	
05/16/11 08:14:28	60.0152	0		0	0				-653	30373.05	1	1	1	0.001	0.001	
05/16/11 08:14:30	60.01614	0		0	0				-653	30373.05	1	1	1	0.001	0.001	
05/16/11 08:14:32	60.01682	0		0	0				-653	30373.05	1	1	1	0.001	0.001	
05/16/11 08:14:34	60.01746	0		0	0				-653	30369.77	1	1	1	0.001	0.001	
05/16/11 08:14:36	60.01712	0		0	0				-653	30369.77	1	1	1	0.000	0.000	
05/16/11 08:14:38	60.01682	0		0	0				-653	30369.77	1	1	1	0.000	0.000	
05/16/11 08:14:40	60.01648	0		0	0				-653	30369.77	1	1	1	0.000	0.000	
05/16/11 08:14:42	60.01614	0		0	0				-653	30388.99	1	1	1	0.000	0.000	
05/16/11 08:14:44	60.01746	0		0	0				-653	30388.99	1	1	1	0.001	0.001	
05/16/11 08:14:46	60.01776	0		0	0				-653	30388.16	1	1	1	0.000	0.000	
05/16/11 08:14:48	60.01776	0		0	0				-653	30388.16	1	1	1	0.000	0.000	
05/16/11 08:14:50	60.01648	0		0	0				-653	30388.16	1	1	1	-0.001	0.001	
05/16/11 08:14:52	60.01584	0		0	0				-653	30388.16	1	1	1	-0.001	0.001	
05/16/11 08:14:54	60.01648	0		0	0				-653	30376.94	1	1	1	0.001	0.001	
05/16/11 08:14:56	60.01584	0		0	0				-653	30376.94	1	1	1	-0.001	0.001	
05/16/11 08:14:58	60.01358	0		0	0				-653	30376.94	1	1	1	-0.002	0.002	
05/16/11 08:15:00	60.01163	0		0	0				-653	30376.94	1	1	1	-0.002	0.002	
05/16/11 08:15:02	60.01132	0		0	0				-653	30371.85	1	1	1	0.000	0.000	
05/16/11 08:15:04	60.01132	0		0	0				-653	30371.85	1	1	1	0.000	0.000	
05/16/11 08:15:06	60.01099	0		0	0				-653	30362.65	1	1	1	0.000	0.000	
05/16/11 08:15:08	60.01099	0		0	0				-653	30362.65	1	1	1	0.000	0.000	
05/16/11 08:15:10	60.01291	0		0	0				-653	30362.65	1	1	1	0.002	0.002	
05/16/11 08:15:12	60.01486	0		0	0				-653	30362.65	1	1	1	0.002	0.002	
05/16/11 08:15:14	60.01776	0		0	0				-653	30395.46	1	1	1	0.003	0.003	
05/16/11 08:15:16	60.01776	0		0	0				-653	30395.46	1	1	1	0.000	0.000	
05/16/11 08:15:18	60.0184	0		0	0				-653	30395.46	1	1	1	0.001	0.001	
05/16/11 08:15:20	60.0181	0		0	0				-653	30395.46	1	1	1	0.000	0.000	
05/16/11 08:15:22	60.01746	0		0	0				-653	30397.03	1	1	1	-0.001	0.001	
05/16/11 08:15:24	60.0152	0		0	0				-653	30397.03	1	1	1	-0.002	0.002	
05/16/11 08:15:26	60.0152	0		0	0				-653	30396.67	1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
											805	8:06:38	t(0)			
											921	8:10:30	t(Recovery)			
											806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
05/16/11 08:15:28	60.01389	0		0	0				-653	30396.67	1	1	1	-0.001	0.001	
05/16/11 08:15:30	60.01746	0		0	0				-653	30396.67	1	1	1	0.004	0.004	
05/16/11 08:15:32	60.01907	0		0	0				-653	30396.67	1	1	1	0.002	0.002	
05/16/11 08:15:34	60.01907	0		0	0				-653	30388.62	1	1	1	0.000	0.000	
05/16/11 08:15:36	60.02036	0		0	0				-653	30388.62	1	1	1	0.001	0.001	
05/16/11 08:15:38	60.01874	0		0	0				-653	30388.62	1	1	1	-0.002	0.002	
05/16/11 08:15:40	60.01874	0		0	0				-653	30388.62	1	1	1	0.000	0.000	
05/16/11 08:15:42	60.01971	0		0	0				-653	30381.78	1	1	1	0.001	0.001	
05/16/11 08:15:44	60.01971	0		0	0				-653	30381.78	1	1	1	0.000	0.000	
05/16/11 08:15:46	60.01971	0		0	0				-653	30382.96	1	1	1	0.000	0.000	
05/16/11 08:15:48	60.0184	0		0	0				-653	30382.96	1	1	1	-0.001	0.001	
05/16/11 08:15:50	60.01486	0		0	0				-653	30382.96	1	1	1	-0.004	0.004	
05/16/11 08:15:52	60.01358	0		0	0				-653	30382.96	1	1	1	-0.001	0.001	
05/16/11 08:15:54	60.01389	0		0	0				-653	30381.48	1	1	1	0.000	0.000	
05/16/11 08:15:56	60.01227	0		0	0				-653	30381.48	1	1	1	-0.002	0.002	
05/16/11 08:15:58	60.01001	0		0	0				-653	30381.48	1	1	1	-0.002	0.002	
05/16/11 08:16:00	60.00583	0		0	0				-653	30381.48	1	1	1	-0.004	0.004	
05/16/11 08:16:02	60.00162	0		0	0				-653	30394.03	1	1	1	-0.004	0.004	
05/16/11 08:16:04	60.00162	0		0	0				-653	30394.03	1	1	1	0.000	0.000	
05/16/11 08:16:06	59.99805	0		0	0				-653	30394.07	1	0	1	-0.004	0.004	
05/16/11 08:16:08	59.99353	0		0	0				-653	30394.07	1	0	1	-0.005	0.005	
05/16/11 08:16:10	59.99255	0		0	0				-653	30394.07	1	0	1	-0.001	0.001	
05/16/11 08:16:12	59.99225	0		0	0				-653	30394.07	1	0	1	0.000	0.000	
05/16/11 08:16:14	59.98999	0		0	0				-653	30376.91	1	0	1	-0.002	0.002	
05/16/11 08:16:16	59.98837	0		0	0				-653	30376.91	1	0	1	-0.002	0.002	
05/16/11 08:16:18	59.98416	0		0	0				-653	30376.91	1	0	1	-0.004	0.004	
05/16/11 08:16:20	59.9816	0		0	0				-653	30376.91	1	0	1	-0.003	0.003	
05/16/11 08:16:22	59.98093	0		0	0				-653	30367.96	1	0	1	-0.001	0.001	
05/16/11 08:16:24	59.98029	0		0	0				-653	30367.96	1	0	1	-0.001	0.001	
05/16/11 08:16:26	59.97998	0		0	0				-653	30367.46	1	0	1	0.000	0.000	
05/16/11 08:16:28	59.97836	0		0	0				-653	30367.46	1	0	1	-0.002	0.002	
05/16/11 08:16:30	59.97513	0		0	0				-653	30367.46	1	0	1	-0.003	0.003	
05/16/11 08:16:32	59.97287	0		0	0				-653	30367.46	1	0	1	-0.002	0.002	
05/16/11 08:16:34	59.97189	0		0	0				-653	30361.18	1	0	1	-0.001	0.001	
05/16/11 08:16:36	59.97156	0		0	0				-653	30361.18	1	0	1	0.000	0.000	
05/16/11 08:16:38	59.97382	0		0	0				-653	30361.18	1	0	1	0.002	0.002	
05/16/11 08:16:40	59.97641	0		0	0				-653	30361.18	1	0	1	0.003	0.003	
05/16/11 08:16:42	59.97836	0		0	0				-653	30365.59	1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:16:44	59.97705	0		0	0				-653	30365.59
05/16/11 08:16:46	59.97449	0		0	0				-653	30365.19
05/16/11 08:16:48	59.97125	0		0	0				-653	30365.19
05/16/11 08:16:50	59.97092	0		0	0				-653	30365.19
05/16/11 08:16:52	59.97287	0		0	0				-653	30365.19
05/16/11 08:16:54	59.97449	0		0	0				-653	30375.91
05/16/11 08:16:56	59.97382	0		0	0				-653	30375.91
05/16/11 08:16:58	59.97318	0		0	0				-653	30375.91
05/16/11 08:17:00	59.97449	0		0	0				-653	30375.91
05/16/11 08:17:02	59.9761	0		0	0				-653	30367.4
05/16/11 08:17:04	59.97739	0		0	0				-653	30367.4
05/16/11 08:17:06	59.97836	0		0	0				-653	30367.72
05/16/11 08:17:08	59.97769	0		0	0				-653	30367.72
05/16/11 08:17:10	59.97705	0		0	0				-653	30367.72
05/16/11 08:17:12	59.97641	0		0	0				-653	30367.72
05/16/11 08:17:14	59.97543	0		0	0				-653	30416.87
05/16/11 08:17:16	59.97382	0		0	0				-653	30416.87
05/16/11 08:17:18	59.97318	0		0	0				-653	30416.87
05/16/11 08:17:20	59.97223	0		0	0				-653	30416.87
05/16/11 08:17:22	59.97189	0		0	0				-653	30413.65
05/16/11 08:17:24	59.97092	0		0	0				-653	30413.65
05/16/11 08:17:26	59.96994	0		0	0				-653	30406.3
05/16/11 08:17:28	59.96832	0		0	0				-653	30406.3
05/16/11 08:17:30	59.96606	0		0	0				-653	30406.3
05/16/11 08:17:32	59.96542	0		0	0				-653	30406.3
05/16/11 08:17:34	59.96606	0		0	0				-653	30418.59
05/16/11 08:17:36	59.9693	0		0	0				-653	30418.59
05/16/11 08:17:38	59.97253	0		0	0				-653	30418.59
05/16/11 08:17:40	59.97351	0		0	0				-653	30418.59
05/16/11 08:17:42	59.97382	0		0	0				-653	30433.31
05/16/11 08:17:44	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:46	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:48	59.97253	0		0	0				-653	30433.31
05/16/11 08:17:50	59.96768	0		0	0				-653	30433.31
05/16/11 08:17:52	59.97125	0		0	0				-653	30433.31
05/16/11 08:17:54	59.97577	0		0	0				-653	30451.3
05/16/11 08:17:56	59.97577	0		0	0				-653	30451.3
05/16/11 08:17:58	59.97577	0		0	0				-653	30451.3

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.005	0.005	
1	0	1	0.004	0.004	
1	0	1	0.005	0.005	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:18:00	59.98416	0		0	0				-653	30451.3
05/16/11 08:18:02	59.9819	0		0	0				-653	30425.74
05/16/11 08:18:04	59.979	0		0	0				-653	30425.74
05/16/11 08:18:06	59.97769	0		0	0				-653	30419.18
05/16/11 08:18:08	59.97769	0		0	0				-653	30419.18
05/16/11 08:18:10	59.98126	0		0	0				-653	30419.18
05/16/11 08:18:12	59.9848	0		0	0				-653	30419.18
05/16/11 08:18:14	59.98868	0		0	0				-653	30424.29
05/16/11 08:18:16	59.99161	0		0	0				-653	30424.29
05/16/11 08:18:18	59.99353	0		0	0				-653	30424.29
05/16/11 08:18:20	59.99579	0		0	0				-653	30424.29
05/16/11 08:18:22	59.99677	0		0	0				-653	30440.82
05/16/11 08:18:24	59.99774	0		0	0				-653	30440.82
05/16/11 08:18:26	59.99838	0		0	0				-653	30431.58
05/16/11 08:18:28	59.99774	0		0	0				-653	30431.58
05/16/11 08:18:30	59.9971	0		0	0				-653	30431.58
05/16/11 08:18:32	59.99741	0		0	0				-653	30431.58
05/16/11 08:18:34	59.99741	0		0	0				-653	30444.25
05/16/11 08:18:36	59.99741	0		0	0				-653	30444.25
05/16/11 08:18:38	60.00064	0		0	0				-653	30444.25
05/16/11 08:18:40	60.00323	0		0	0				-653	30444.25
05/16/11 08:18:42	60.00354	0		0	0				-653	30465.11
05/16/11 08:18:44	60.00259	0		0	0				-653	30465.11
05/16/11 08:18:46	60.00098	0		0	0				-653	30465.3
05/16/11 08:18:48	59.99936	0		0	0				-653	30465.3
05/16/11 08:18:50	59.99741	0		0	0				-653	30465.3
05/16/11 08:18:52	59.99677	0		0	0				-653	30465.3
05/16/11 08:18:54	59.99677	0		0	0				-653	30478.25
05/16/11 08:18:56	59.9971	0		0	0				-653	30478.25
05/16/11 08:18:58	59.99774	0		0	0				-653	30478.25
05/16/11 08:19:00	59.99872	0		0	0				-653	30478.25
05/16/11 08:19:02	59.99966	0		0	0				-653	30473.86
05/16/11 08:19:04	60	0		0	0				-653	30473.86
05/16/11 08:19:06	60.00034	0		0	0				-653	30468.84
05/16/11 08:19:08	60.00098	0		0	0				-653	30468.84
05/16/11 08:19:10	60.00226	0		0	0				-653	30468.84
05/16/11 08:19:12	60.0029	0		0	0				-653	30468.84
05/16/11 08:19:14	60.00259	0		0	0				-653	30469.63

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.008	0.008	
1	0	1	-0.002	0.002	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	0.004	0.004	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:19:16	60.00226	0		0	0				-653	30469.63
05/16/11 08:19:18	60.00226	0		0	0				-653	30469.63
05/16/11 08:19:20	60.00323	0		0	0				-653	30469.63
05/16/11 08:19:22	60.00421	0		0	0				-653	30488.41
05/16/11 08:19:24	60.00485	0		0	0				-653	30488.41
05/16/11 08:19:26	60.00452	0		0	0				-653	30480.29
05/16/11 08:19:28	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:30	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:32	60.00354	0		0	0				-653	30480.29
05/16/11 08:19:34	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:36	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:38	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:40	60.00354	0		0	0				-653	30477.13
05/16/11 08:19:42	60.00613	0		0	0				-653	30487.82
05/16/11 08:19:44	60.00485	0		0	0				-653	30487.82
05/16/11 08:19:46	60.00452	0		0	0				-653	30489.73
05/16/11 08:19:48	60.00452	0		0	0				-653	30489.73
05/16/11 08:19:50	60.00354	0		0	0				-653	30489.73
05/16/11 08:19:52	60.0029	0		0	0				-653	30489.73
05/16/11 08:19:54	60.00162	0		0	0				-653	30480.09
05/16/11 08:19:56	60.00162	0		0	0				-653	30480.09
05/16/11 08:19:58	60.00421	0		0	0				-653	30480.09
05/16/11 08:20:00	60.00421	0		0	0				-653	30480.09
05/16/11 08:20:02	60.0029	0		0	0				-653	30480.91
05/16/11 08:20:04	60.00034	0		0	0				-653	30480.91
05/16/11 08:20:06	59.99805	0		0	0				-653	30480.84
05/16/11 08:20:08	59.99646	0		0	0				-653	30480.84
05/16/11 08:20:10	59.99515	0		0	0				-653	30480.84
05/16/11 08:20:12	59.99387	0		0	0				-653	30480.84
05/16/11 08:20:14	59.99289	0		0	0				-653	30476.09
05/16/11 08:20:16	59.99255	0		0	0				-653	30476.09
05/16/11 08:20:18	59.99225	0		0	0				-653	30476.09
05/16/11 08:20:20	59.98965	0		0	0				-653	30476.09
05/16/11 08:20:22	59.98514	0		0	0				-653	30456.76
05/16/11 08:20:24	59.98254	0		0	0				-653	30456.76
05/16/11 08:20:26	59.97836	0		0	0				-653	30457.12
05/16/11 08:20:28	59.97641	0		0	0				-653	30457.12
05/16/11 08:20:30	59.97705	0		0	0				-653	30457.12

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.005	0.005	
1	0	1	-0.003	0.003	
1	0	1	-0.004	0.004	
1	0	1	-0.002	0.002	
1	0	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
											805	8:06:38	t(0)			
											921	8:10:30	t(Recovery)			
											806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
05/16/11 08:20:32	59.97705	0		0	0				-653	30457.12	1	0	1	0.000	0.000	
05/16/11 08:20:34	59.97705	0		0	0				-653	30446.98	1	0	1	0.000	0.000	
05/16/11 08:20:36	59.97803	0		0	0				-653	30446.98	1	0	1	0.001	0.001	
05/16/11 08:20:38	59.97964	0		0	0				-653	30446.98	1	0	1	0.002	0.002	
05/16/11 08:20:40	59.9816	0		0	0				-653	30446.98	1	0	1	0.002	0.002	
05/16/11 08:20:42	59.98126	0		0	0				-653	30461.02	1	0	1	0.000	0.000	
05/16/11 08:20:44	59.97931	0		0	0				-653	30461.02	1	0	1	-0.002	0.002	
05/16/11 08:20:46	59.9761	0		0	0				-653	30460.94	1	0	1	-0.003	0.003	
05/16/11 08:20:48	59.97543	0		0	0				-653	30460.94	1	0	1	-0.001	0.001	
05/16/11 08:20:50	59.97577	0		0	0				-653	30460.94	1	0	1	0.000	0.000	
05/16/11 08:20:52	59.97675	0		0	0				-653	30460.94	1	0	1	0.001	0.001	
05/16/11 08:20:54	59.97803	0		0	0				-653	30469.23	1	0	1	0.001	0.001	
05/16/11 08:20:56	59.979	0		0	0				-653	30469.23	1	0	1	0.001	0.001	
05/16/11 08:20:58	59.97964	0		0	0				-653	30469.23	1	0	1	0.001	0.001	
05/16/11 08:21:00	59.98062	0		0	0				-653	30469.23	1	0	1	0.001	0.001	
05/16/11 08:21:02	59.9819	0		0	0				-653	30481.49	1	0	1	0.001	0.001	
05/16/11 08:21:04	59.98224	0		0	0				-653	30481.49	1	0	1	0.000	0.000	
05/16/11 08:21:06	59.98254	0		0	0				-653	30480.29	1	0	1	0.000	0.000	
05/16/11 08:21:08	59.98288	0		0	0				-653	30480.29	1	0	1	0.000	0.000	
05/16/11 08:21:10	59.98254	0		0	0				-653	30480.29	1	0	1	0.000	0.000	
05/16/11 08:21:12	59.98254	0		0	0				-653	30480.29	1	0	1	0.000	0.000	
05/16/11 08:21:14	59.98288	0		0	0				-653	30473.15	1	0	1	0.000	0.000	
05/16/11 08:21:16	59.98611	0		0	0				-653	30473.15	1	0	1	0.003	0.003	
05/16/11 08:21:18	59.99387	0		0	0				-653	30473.15	1	0	1	0.008	0.008	
05/16/11 08:21:20	60.00226	0		0	0				-653	30473.15	1	1	1	0.008	0.008	
05/16/11 08:21:22	60.01099	0		0	0				-653	30470.66	1	1	1	0.009	0.009	
05/16/11 08:21:24	60.01712	0		0	0				-653	30470.66	1	1	1	0.006	0.006	
05/16/11 08:21:26	60.02069	0		0	0				-653	30470.6	1	1	1	0.004	0.004	
05/16/11 08:21:28	60.02133	0		0	0				-653	30470.6	1	1	1	0.001	0.001	
05/16/11 08:21:30	60.02133	0		0	0				-653	30470.6	1	1	1	0.000	0.000	
05/16/11 08:21:32	60.02133	0		0	0				-653	30470.6	1	1	1	0.000	0.000	
05/16/11 08:21:34	60.02325	0		0	0				-653	30461.28	1	1	1	0.002	0.002	
05/16/11 08:21:36	60.02551	0		0	0				-653	30461.28	1	1	1	0.002	0.002	
05/16/11 08:21:38	60.02682	0		0	0				-653	30461.28	1	1	1	0.001	0.001	
05/16/11 08:21:40	60.02844	0		0	0				-653	30461.28	1	1	1	0.002	0.002	
05/16/11 08:21:42	60.02972	0		0	0				-653	30450.44	1	1	1	0.001	0.001	
05/16/11 08:21:44	60.03101	0		0	0				-653	30450.44	1	1	1	0.001	0.001	
05/16/11 08:21:46	60.03198	0		0	0				-653	30451.91	1	1	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:21:48	60.03296	0		0	0				-653	30451.91
05/16/11 08:21:50	60.03458	0		0	0				-653	30451.91
05/16/11 08:21:52	60.03488	0		0	0				-653	30451.91
05/16/11 08:21:54	60.03488	0		0	0				-653	30446.52
05/16/11 08:21:56	60.03424	0		0	0				-653	30446.52
05/16/11 08:21:58	60.03458	0		0	0				-653	30446.52
05/16/11 08:22:00	60.03458	0		0	0				-653	30446.52
05/16/11 08:22:02	60.03555	0		0	0				-653	30452.43
05/16/11 08:22:04	60.03586	0		0	0				-653	30452.43
05/16/11 08:22:06	60.03683	0		0	0				-653	30452.43
05/16/11 08:22:08	60.03748	0		0	0				-653	30452.43
05/16/11 08:22:10	60.03748	0		0	0				-653	30452.43
05/16/11 08:22:12	60.03717	0		0	0				-653	30452.43
05/16/11 08:22:14	60.03781	0		0	0				-653	30473.21
05/16/11 08:22:16	60.03781	0		0	0				-653	30473.21
05/16/11 08:22:18	60.03748	0		0	0				-653	30473.21
05/16/11 08:22:20	60.0365	0		0	0				-653	30473.21
05/16/11 08:22:22	60.03683	0		0	0				-653	30476.61
05/16/11 08:22:24	60.03748	0		0	0				-653	30476.61
05/16/11 08:22:26	60.03748	0		0	0				-653	30476.55
05/16/11 08:22:28	60.03812	0		0	0				-653	30476.55
05/16/11 08:22:30	60.03876	0		0	0				-653	30476.55
05/16/11 08:22:32	60.04007	0		0	0				-653	30476.55
05/16/11 08:22:34	60.04169	0		0	0				-653	30473.8
05/16/11 08:22:36	60.04361	0		0	0				-653	30473.8
05/16/11 08:22:38	60.04523	0		0	0				-653	30473.8
05/16/11 08:22:40	60.04492	0		0	0				-653	30473.8
05/16/11 08:22:42	60.04459	0		0	0				-653	30471
05/16/11 08:22:44	60.04395	0		0	0				-653	30471
05/16/11 08:22:46	60.04199	0		0	0				-653	30471.97
05/16/11 08:22:48	60.03717	0		0	0				-653	30471.97
05/16/11 08:22:50	60.03296	0		0	0				-653	30471.97
05/16/11 08:22:52	60.03101	0		0	0				-653	30471.97
05/16/11 08:22:54	60.03134	0		0	0				-653	30485.47
05/16/11 08:22:56	60.03168	0		0	0				-653	30485.47
05/16/11 08:22:58	60.03101	0		0	0				-653	30485.47
05/16/11 08:23:00	60.03101	0		0	0				-653	30485.47
05/16/11 08:23:02	60.03232	0		0	0				-653	30505.49

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.005	0.005	
1	1	1	-0.004	0.004	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
											805	8:06:38	t(0)			
											921	8:10:30	t(Recovery)			
											806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
05/16/11 08:23:04	60.03326	0		0	0				-653	30505.49	1	1	1	0.001	0.001	
05/16/11 08:23:06	60.03326	0		0	0				-653	30505.26	1	1	1	0.000	0.000	
05/16/11 08:23:08	60.03394	0		0	0				-653	30505.26	1	1	1	0.001	0.001	
05/16/11 08:23:10	60.03296	0		0	0				-653	30505.26	1	1	1	-0.001	0.001	
05/16/11 08:23:12	60.03232	0		0	0				-653	30505.26	1	1	1	-0.001	0.001	
05/16/11 08:23:14	60.03168	0		0	0				-653	30515.6	1	1	1	-0.001	0.001	
05/16/11 08:23:16	60.03168	0		0	0				-653	30515.6	1	1	1	0.000	0.000	
05/16/11 08:23:18	60.03232	0		0	0				-653	30515.6	1	1	1	0.001	0.001	
05/16/11 08:23:20	60.03232	0		0	0				-653	30515.6	1	1	1	0.000	0.000	
05/16/11 08:23:22	60.03168	0		0	0				-653	30505.28	1	1	1	-0.001	0.001	
05/16/11 08:23:24	60.03168	0		0	0				-653	30505.28	1	1	1	0.000	0.000	
05/16/11 08:23:26	60.03134	0		0	0				-653	30506.12	1	1	1	0.000	0.000	
05/16/11 08:23:28	60.03101	0		0	0				-653	30506.12	1	1	1	0.000	0.000	
05/16/11 08:23:30	60.03036	0		0	0				-653	30506.12	1	1	1	-0.001	0.001	
05/16/11 08:23:32	60.03036	0		0	0				-653	30506.12	1	1	1	0.000	0.000	
05/16/11 08:23:34	60.02972	0		0	0				-653	30493.68	1	1	1	-0.001	0.001	
05/16/11 08:23:36	60.02875	0		0	0				-653	30493.68	1	1	1	-0.001	0.001	
05/16/11 08:23:38	60.03006	0		0	0				-653	30493.68	1	1	1	0.001	0.001	
05/16/11 08:23:40	60.03198	0		0	0				-653	30493.68	1	1	1	0.002	0.002	
05/16/11 08:23:42	60.03326	0		0	0				-653	30529.28	1	1	1	0.001	0.001	
05/16/11 08:23:44	60.03458	0		0	0				-653	30529.28	1	1	1	0.001	0.001	
05/16/11 08:23:46	60.03488	0		0	0				-653	30529.08	1	1	1	0.000	0.000	
05/16/11 08:23:48	60.0336	0		0	0				-653	30529.08	1	1	1	-0.001	0.001	
05/16/11 08:23:50	60.03326	0		0	0				-653	30529.08	1	1	1	0.000	0.000	
05/16/11 08:23:52	60.03232	0		0	0				-653	30529.08	1	1	1	-0.001	0.001	
05/16/11 08:23:54	60.03134	0		0	0				-653	30529.52	1	1	1	-0.001	0.001	
05/16/11 08:23:56	60.03168	0		0	0				-653	30529.52	1	1	1	0.000	0.000	
05/16/11 08:23:58	60.03326	0		0	0				-653	30529.52	1	1	1	0.002	0.002	
05/16/11 08:24:00	60.03458	0		0	0				-653	30529.52	1	1	1	0.001	0.001	
05/16/11 08:24:02	60.03586	0		0	0				-653	30535.57	1	1	1	0.001	0.001	
05/16/11 08:24:04	60.0365	0		0	0				-653	30535.57	1	1	1	0.001	0.001	
05/16/11 08:24:06	60.03748	0		0	0				-653	30533.89	1	1	1	0.001	0.001	
05/16/11 08:24:08	60.03683	0		0	0				-653	30533.89	1	1	1	-0.001	0.001	
05/16/11 08:24:10	60.03619	0		0	0				-653	30533.89	1	1	1	-0.001	0.001	
05/16/11 08:24:12	60.03522	0		0	0				-653	30533.89	1	1	1	-0.001	0.001	
05/16/11 08:24:14	60.03424	0		0	0				-653	30521.82	1	1	1	-0.001	0.001	
05/16/11 08:24:16	60.03296	0		0	0				-653	30521.82	1	1	1	-0.001	0.001	
05/16/11 08:24:18	60.03198	0		0	0				-653	30521.82	1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
											805	8:06:38	t(0)			
											921	8:10:30	t(Recovery)			
											806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
05/16/11 08:24:20	60.03134	0		0	0				-653	30521.82	1	1	1	-0.001	0.001	
05/16/11 08:24:22	60.03168	0		0	0				-653	30533.64	1	1	1	0.000	0.000	
05/16/11 08:24:24	60.03134	0		0	0				-653	30533.64	1	1	1	0.000	0.000	
05/16/11 08:24:26	60.03101	0		0	0				-653	30532.32	1	1	1	0.000	0.000	
05/16/11 08:24:28	60.03036	0		0	0				-653	30532.32	1	1	1	-0.001	0.001	
05/16/11 08:24:30	60.02972	0		0	0				-653	30532.32	1	1	1	-0.001	0.001	
05/16/11 08:24:32	60.03006	0		0	0				-653	30532.32	1	1	1	0.000	0.000	
05/16/11 08:24:34	60.0307	0		0	0				-653	30551.2	1	1	1	0.001	0.001	
05/16/11 08:24:36	60.03168	0		0	0				-653	30551.2	1	1	1	0.001	0.001	
05/16/11 08:24:38	60.0336	0		0	0				-653	30551.2	1	1	1	0.002	0.002	
05/16/11 08:24:40	60.03488	0		0	0				-653	30551.2	1	1	1	0.001	0.001	
05/16/11 08:24:42	60.03522	0		0	0				-653	30548.06	1	1	1	0.000	0.000	
05/16/11 08:24:44	60.03586	0		0	0				-653	30548.06	1	1	1	0.001	0.001	
05/16/11 08:24:46	60.03717	0		0	0				-653	30543.69	1	1	1	0.001	0.001	
05/16/11 08:24:48	60.03812	0		0	0				-653	30543.69	1	1	1	0.001	0.001	
05/16/11 08:24:50	60.03717	0		0	0				-653	30543.69	1	1	1	-0.001	0.001	
05/16/11 08:24:52	60.03748	0		0	0				-653	30543.69	1	1	1	0.000	0.000	
05/16/11 08:24:54	60.03845	0		0	0				-653	30546.32	1	1	1	0.001	0.001	
05/16/11 08:24:56	60.03876	0		0	0				-653	30546.32	1	1	1	0.000	0.000	
05/16/11 08:24:58	60.03781	0		0	0				-653	30546.32	1	1	1	-0.001	0.001	
05/16/11 08:25:00	60.03619	0		0	0				-653	30546.32	1	1	1	-0.002	0.002	
05/16/11 08:25:02	60.03488	0		0	0				-653	30546.28	1	1	1	-0.001	0.001	
05/16/11 08:25:04	60.03394	0		0	0				-653	30546.28	1	1	1	-0.001	0.001	
05/16/11 08:25:06	60.0336	0		0	0				-653	30546.38	1	1	1	0.000	0.000	
05/16/11 08:25:08	60.0336	0		0	0				-653	30546.38	1	1	1	0.000	0.000	
05/16/11 08:25:10	60.03458	0		0	0				-653	30546.38	1	1	1	0.001	0.001	
05/16/11 08:25:12	60.0365	0		0	0				-653	30546.38	1	1	1	0.002	0.002	
05/16/11 08:25:14	60.03748	0		0	0				-653	30556.84	1	1	1	0.001	0.001	
05/16/11 08:25:16	60.03781	0		0	0				-653	30556.84	1	1	1	0.000	0.000	
05/16/11 08:25:18	60.03748	0		0	0				-653	30556.84	1	1	1	0.000	0.000	
05/16/11 08:25:20	60.0365	0		0	0				-653	30556.84	1	1	1	-0.001	0.001	
05/16/11 08:25:22	60.03488	0		0	0				-653	30557.42	1	1	1	-0.002	0.002	
05/16/11 08:25:24	60.0336	0		0	0				-653	30557.42	1	1	1	-0.001	0.001	
05/16/11 08:25:26	60.03232	0		0	0				-653	30557.43	1	1	1	-0.001	0.001	
05/16/11 08:25:28	60.03134	0		0	0				-653	30557.43	1	1	1	-0.001	0.001	
05/16/11 08:25:30	60.03101	0		0	0				-653	30557.43	1	1	1	0.000	0.000	
05/16/11 08:25:32	60.03101	0		0	0				-653	30557.43	1	1	1	0.000	0.000	
05/16/11 08:25:34	60.0307	0		0	0				-653	30566.39	1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:25:36	60.02972	0		0	0				-653	30566.39
05/16/11 08:25:38	60.02908	0		0	0				-653	30566.39
05/16/11 08:25:40	60.02811	0		0	0				-653	30566.39
05/16/11 08:25:42	60.02649	0		0	0				-653	30567.26
05/16/11 08:25:44	60.02521	0		0	0				-653	30567.26
05/16/11 08:25:46	60.02359	0		0	0				-653	30562.43
05/16/11 08:25:48	60.02133	0		0	0				-653	30562.43
05/16/11 08:25:50	60.02002	0		0	0				-653	30562.43
05/16/11 08:25:52	60.02002	0		0	0				-653	30562.43
05/16/11 08:25:54	60.02069	0		0	0				-653	30573.32
05/16/11 08:25:56	60.02133	0		0	0				-653	30573.32
05/16/11 08:25:58	60.021	0		0	0				-653	30573.32
05/16/11 08:26:00	60.02036	0		0	0				-653	30573.32
05/16/11 08:26:02	60.01938	0		0	0				-653	30567
05/16/11 08:26:04	60.01938	0		0	0				-653	30567
05/16/11 08:26:06	60.01938	0		0	0				-653	30567.04
05/16/11 08:26:08	60.01971	0		0	0				-653	30567.04
05/16/11 08:26:10	60.01971	0		0	0				-653	30567.04
05/16/11 08:26:12	60.01907	0		0	0				-653	30567.04
05/16/11 08:26:14	60.01938	0		0	0				-653	30556.49
05/16/11 08:26:16	60.02036	0		0	0				-653	30556.49
05/16/11 08:26:18	60.02036	0		0	0				-653	30556.49
05/16/11 08:26:20	60.01907	0		0	0				-653	30556.49
05/16/11 08:26:22	60.01712	0		0	0				-653	30530.19
05/16/11 08:26:24	60.01584	0		0	0				-653	30530.19
05/16/11 08:26:26	60.0152	0		0	0				-653	30530.04
05/16/11 08:26:28	60.0155	0		0	0				-653	30530.04
05/16/11 08:26:30	60.01614	0		0	0				-653	30530.04
05/16/11 08:26:32	60.01746	0		0	0				-653	30530.04
05/16/11 08:26:34	60.0181	0		0	0				-653	30542.27
05/16/11 08:26:36	60.01746	0		0	0				-653	30542.27
05/16/11 08:26:38	60.01712	0		0	0				-653	30542.27
05/16/11 08:26:40	60.01648	0		0	0				-653	30542.27
05/16/11 08:26:42	60.01486	0		0	0				-653	30559.64
05/16/11 08:26:44	60.01227	0		0	0				-653	30559.64
05/16/11 08:26:46	60.01035	0		0	0				-653	30559.67
05/16/11 08:26:48	60.00937	0		0	0				-653	30559.67
05/16/11 08:26:50	60.00903	0		0	0				-653	30559.67

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.003	0.003	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:26:52	60.00937	0		0	0				-653	30559.67	1	1	1	0.000	0.000	
05/16/11 08:26:54	60.01065	0		0	0				-653	30552.02	1	1	1	0.001	0.001	
05/16/11 08:26:56	60.01163	0		0	0				-653	30552.02	1	1	1	0.001	0.001	
05/16/11 08:26:58	60.01227	0		0	0				-653	30552.02	1	1	1	0.001	0.001	
05/16/11 08:27:00	60.01163	0		0	0				-653	30552.02	1	1	1	-0.001	0.001	
05/16/11 08:27:02	60.00873	0		0	0				-653	30556.78	1	1	1	-0.003	0.003	
05/16/11 08:27:04	60.00647	0		0	0				-653	30556.78	1	1	1	-0.002	0.002	
05/16/11 08:27:06	60.00583	0		0	0				-653	30550.7	1	1	1	-0.001	0.001	
05/16/11 08:27:08	60.00613	0		0	0				-653	30550.7	1	1	1	0.000	0.000	
05/16/11 08:27:10	60.00613	0		0	0				-653	30550.7	1	1	1	0.000	0.000	
05/16/11 08:27:12	60.00711	0		0	0				-653	30550.7	1	1	1	0.001	0.001	
05/16/11 08:27:14	60.00903	0		0	0				-653	30559.76	1	1	1	0.002	0.002	
05/16/11 08:27:16	60.01099	0		0	0				-653	30559.76	1	1	1	0.002	0.002	
05/16/11 08:27:18	60.01099	0		0	0				-653	30559.76	1	1	1	0.000	0.000	
05/16/11 08:27:20	60.01035	0		0	0				-653	30559.76	1	1	1	-0.001	0.001	
05/16/11 08:27:22	60.0097	0		0	0				-653	30563.61	1	1	1	-0.001	0.001	
05/16/11 08:27:24	60.00873	0		0	0				-653	30563.61	1	1	1	-0.001	0.001	
05/16/11 08:27:26	60.00711	0		0	0				-653	30556.57	1	1	1	-0.002	0.002	
05/16/11 08:27:28	60.00613	0		0	0				-653	30556.57	1	1	1	-0.001	0.001	
05/16/11 08:27:30	60.00583	0		0	0				-653	30556.57	1	1	1	0.000	0.000	
05/16/11 08:27:32	60.00711	0		0	0				-653	30556.57	1	1	1	0.001	0.001	
05/16/11 08:27:34	60.00809	0		0	0				-653	30556.7	1	1	1	0.001	0.001	
05/16/11 08:27:36	60.00839	0		0	0				-653	30556.7	1	1	1	0.000	0.000	
05/16/11 08:27:38	60.00809	0		0	0				-653	30556.7	1	1	1	0.000	0.000	
05/16/11 08:27:40	60.00711	0		0	0				-653	30556.7	1	1	1	-0.001	0.001	
05/16/11 08:27:42	60.00677	0		0	0				-653	30544.52	1	1	1	0.000	0.000	
05/16/11 08:27:44	60.00775	0		0	0				-653	30544.52	1	1	1	0.001	0.001	
05/16/11 08:27:46	60.00711	0		0	0				-653	30543.34	1	1	1	-0.001	0.001	
05/16/11 08:27:48	60.00647	0		0	0				-653	30543.34	1	1	1	-0.001	0.001	
05/16/11 08:27:50	60.00388	0		0	0				-653	30543.34	1	1	1	-0.003	0.003	
05/16/11 08:27:52	60.00128	0		0	0				-653	30543.34	1	1	1	-0.003	0.003	
05/16/11 08:27:54	59.99936	0		0	0				-653	30554.42	1	1	1	-0.002	0.002	
05/16/11 08:27:56	59.99805	0		0	0				-653	30554.42	1	0	1	-0.001	0.001	
05/16/11 08:27:58	59.99741	0		0	0				-653	30554.42	1	0	1	-0.001	0.001	
05/16/11 08:28:00	59.9971	0		0	0				-653	30554.42	1	0	1	0.000	0.000	
05/16/11 08:28:02	59.99677	0		0	0				-653	30534.33	1	0	1	0.000	0.000	
05/16/11 08:28:04	59.9971	0		0	0				-653	30534.33	1	0	1	0.000	0.000	
05/16/11 08:28:06	59.99646	0		0	0				-653	30533.84	1	0	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:28:08	59.99579	0		0	0				-653	30533.84
05/16/11 08:28:10	59.99451	0		0	0				-653	30533.84
05/16/11 08:28:12	59.99353	0		0	0				-653	30533.84
05/16/11 08:28:14	59.99289	0		0	0				-653	30557.2
05/16/11 08:28:16	59.99191	0		0	0				-653	30557.2
05/16/11 08:28:18	59.98901	0		0	0				-653	30557.2
05/16/11 08:28:20	59.98611	0		0	0				-653	30557.2
05/16/11 08:28:22	59.9845	0		0	0				-653	30560.91
05/16/11 08:28:24	59.98318	0		0	0				-653	30560.91
05/16/11 08:28:26	59.9819	0		0	0				-653	30560.56
05/16/11 08:28:28	59.98093	0		0	0				-653	30560.56
05/16/11 08:28:30	59.97964	0		0	0				-653	30560.56
05/16/11 08:28:32	59.97867	0		0	0				-653	30560.56
05/16/11 08:28:34	59.97964	0		0	0				-653	30560.08
05/16/11 08:28:36	59.97998	0		0	0				-653	30560.08
05/16/11 08:28:38	59.98062	0		0	0				-653	30560.08
05/16/11 08:28:40	59.98029	0		0	0				-653	30560.08
05/16/11 08:28:42	59.979	0		0	0				-653	30558.72
05/16/11 08:28:44	59.97739	0		0	0				-653	30558.72
05/16/11 08:28:46	59.97513	0		0	0				-653	30553.46
05/16/11 08:28:48	59.97351	0		0	0				-653	30553.46
05/16/11 08:28:50	59.97253	0		0	0				-653	30553.46
05/16/11 08:28:52	59.97189	0		0	0				-653	30553.46
05/16/11 08:28:54	59.97318	0		0	0				-653	30562.63
05/16/11 08:28:56	59.97415	0		0	0				-653	30562.63
05/16/11 08:28:58	59.97449	0		0	0				-653	30562.63
05/16/11 08:29:00	59.97513	0		0	0				-653	30562.63
05/16/11 08:29:02	59.97577	0		0	0				-653	30578.05
05/16/11 08:29:04	59.97641	0		0	0				-653	30578.05
05/16/11 08:29:06	59.97705	0		0	0				-653	30570.97
05/16/11 08:29:08	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:10	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:12	59.97675	0		0	0				-653	30570.97
05/16/11 08:29:14	59.9761	0		0	0				-653	30593.17
05/16/11 08:29:16	59.9761	0		0	0				-653	30593.17
05/16/11 08:29:18	59.97641	0		0	0				-653	30593.17
05/16/11 08:29:20	59.97705	0		0	0				-653	30593.17
05/16/11 08:29:22	59.97803	0		0	0				-653	30575.07

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:29:24	59.98029	0		0	0				-653	30575.07
05/16/11 08:29:26	59.98318	0		0	0				-653	30575.07
05/16/11 08:29:28	59.98547	0		0	0				-653	30575.07
05/16/11 08:29:30	59.98709	0		0	0				-653	30575.07
05/16/11 08:29:32	59.98965	0		0	0				-653	30575.07
05/16/11 08:29:34	59.99225	0		0	0				-653	30575.72
05/16/11 08:29:36	59.99484	0		0	0				-653	30575.72
05/16/11 08:29:38	59.99646	0		0	0				-653	30575.72
05/16/11 08:29:40	59.99774	0		0	0				-653	30575.72
05/16/11 08:29:42	59.99966	0		0	0				-653	30583.84
05/16/11 08:29:44	60.00034	0		0	0				-653	30583.84
05/16/11 08:29:46	60.00128	0		0	0				-653	30586.4
05/16/11 08:29:48	60.00195	0		0	0				-653	30586.4
05/16/11 08:29:50	60.00226	0		0	0				-653	30586.4
05/16/11 08:29:52	60.0029	0		0	0				-653	30586.4
05/16/11 08:29:54	60.00354	0		0	0				-653	30589.72
05/16/11 08:29:56	60.00421	0		0	0				-653	30589.72
05/16/11 08:29:58	60.00452	0		0	0				-653	30589.72
05/16/11 08:30:00	60.00388	0		0	0				-653	30589.72
05/16/11 08:30:02	60.00388	0		0	0				-653	30590.3
05/16/11 08:30:04	60.00421	0		0	0				-653	30590.3
05/16/11 08:30:06	60.00421	0		0	0				-653	30590.22
05/16/11 08:30:08	60.00388	0		0	0				-653	30590.22
05/16/11 08:30:10	60.00195	0		0	0				-653	30590.22
05/16/11 08:30:12	59.99966	0		0	0				-653	30590.22
05/16/11 08:30:14	59.99387	0		0	0				-653	30600.12
05/16/11 08:30:16	59.99387	0		0	0				-653	30600.12
05/16/11 08:30:18	59.98999	0		0	0				-653	30600.12
05/16/11 08:30:20	59.98868	0		0	0				-653	30600.12
05/16/11 08:30:22	59.98709	0		0	0				-653	30603.38
05/16/11 08:30:24	59.98578	0		0	0				-653	30603.38
05/16/11 08:30:26	59.98578	0		0	0				-653	30597.09
05/16/11 08:30:28	59.98288	0		0	0				-653	30597.09
05/16/11 08:30:30	59.97964	0		0	0				-653	30597.09
05/16/11 08:30:32	59.97675	0		0	0				-653	30597.09
05/16/11 08:30:34	59.97479	0		0	0				-653	30603.96
05/16/11 08:30:36	59.97479	0		0	0				-653	30603.96
05/16/11 08:30:38	59.97641	0		0	0				-653	30603.96

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	-0.002	0.002	
1	0	1	-0.006	0.006	
1	0	1	0.000	0.000	
1	0	1	-0.004	0.004	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.003	0.003	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:30:40	59.97641	0		0	0				-653	30603.96
05/16/11 08:30:42	59.97543	0		0	0				-653	30607.96
05/16/11 08:30:44	59.97351	0		0	0				-653	30607.96
05/16/11 08:30:46	59.97318	0		0	0				-653	30601.98
05/16/11 08:30:48	59.97513	0		0	0				-653	30601.98
05/16/11 08:30:50	59.97641	0		0	0				-653	30597.09
05/16/11 08:30:52	59.97705	0		0	0				-653	30597.09
05/16/11 08:30:54	59.97867	0		0	0				-653	30607.96
05/16/11 08:30:56	59.97836	0		0	0				-653	30607.96
05/16/11 08:30:58	59.97803	0		0	0				-653	30607.96
05/16/11 08:31:00	59.97543	0		0	0				-653	30607.96
05/16/11 08:31:02	59.97415	0		0	0				-653	30607.96
05/16/11 08:31:04	59.97415	0		0	0				-653	30601.98
05/16/11 08:31:06	59.97479	0		0	0				-653	30601.98
05/16/11 08:31:08	59.97415	0		0	0				-653	30601.98
05/16/11 08:31:10	59.97351	0		0	0				-653	30601.98
05/16/11 08:31:12	59.97351	0		0	0				-653	30601.98
05/16/11 08:31:14	59.97543	0		0	0				-653	30632.79
05/16/11 08:31:16	59.97769	0		0	0				-653	30632.79
05/16/11 08:31:18	59.98062	0		0	0				-653	30632.79
05/16/11 08:31:20	59.98514	0		0	0				-653	30632.79
05/16/11 08:31:22	59.98773	0		0	0				-653	30632.79
05/16/11 08:31:24	59.98965	0		0	0				-653	30633.18
05/16/11 08:31:26	59.99097	0		0	0				-653	30633.18
05/16/11 08:31:28	59.99225	0		0	0				-653	30633.18
05/16/11 08:31:30	59.99323	0		0	0				-653	30633.18
05/16/11 08:31:32	59.99612	0		0	0				-653	30633.18
05/16/11 08:31:34	60.00034	0		0	0				-653	30620.6
05/16/11 08:31:36	60.00452	0		0	0				-653	30620.6
05/16/11 08:31:38	60.00809	0		0	0				-653	30620.6
05/16/11 08:31:40	60.01099	0		0	0				-653	30620.6
05/16/11 08:31:42	60.01389	0		0	0				-653	30620.6
05/16/11 08:31:44	60.01776	0		0	0				-653	30620.91
05/16/11 08:31:46	60.02069	0		0	0				-653	30620.91
05/16/11 08:31:48	60.02164	0		0	0				-653	30620.91
05/16/11 08:31:50	60.021	0		0	0				-653	30620.91
05/16/11 08:31:52	60.01907	0		0	0				-653	30620.91
05/16/11 08:31:54	60.0181	0		0	0				-653	30661.87

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
1	0	1	0.000	0.000	
1	0	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.002	0.002	
1	0	1	0.000	0.000	
1	0	1	0.000	0.000	
1	0	1	-0.003	0.003	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.000	0.000	
1	0	1	0.002	0.002	
1	0	1	0.002	0.002	
1	0	1	0.003	0.003	
1	0	1	0.005	0.005	
1	0	1	0.003	0.003	
1	0	1	0.002	0.002	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.004	0.004	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.003	0.003	
1	1	1	0.004	0.004	
1	1	1	0.003	0.003	
1	1	1	0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:31:56	60.0184	0		0	0				-653	30661.87
05/16/11 08:31:58	60.02069	0		0	0				-653	30661.87
05/16/11 08:32:00	60.0239	0		0	0				-653	30661.87
05/16/11 08:32:02	60.02618	0		0	0				-653	30661.87
05/16/11 08:32:04	60.02682	0		0	0				-653	30663.73
05/16/11 08:32:06	60.02649	0		0	0				-653	30663.73
05/16/11 08:32:08	60.02585	0		0	0				-653	30663.73
05/16/11 08:32:10	60.02359	0		0	0				-653	30663.73
05/16/11 08:32:12	60.02359	0		0	0				-653	30663.73
05/16/11 08:32:14	60.02164	0		0	0				-653	30659.84
05/16/11 08:32:16	60.02231	0		0	0				-653	30659.84
05/16/11 08:32:18	60.02325	0		0	0				-653	30659.84
05/16/11 08:32:20	60.02359	0		0	0				-653	30659.84
05/16/11 08:32:22	60.02295	0		0	0				-653	30659.84
05/16/11 08:32:24	60.02133	0		0	0				-653	30653.46
05/16/11 08:32:26	60.021	0		0	0				-653	30653.46
05/16/11 08:32:28	60.021	0		0	0				-653	30653.46
05/16/11 08:32:30	60.02133	0		0	0				-653	30653.46
05/16/11 08:32:32	60.021	0		0	0				-653	30653.46
05/16/11 08:32:34	60.02036	0		0	0				-653	30661.6
05/16/11 08:32:36	60.02002	0		0	0				-653	30661.6
05/16/11 08:32:38	60.01938	0		0	0				-653	30661.6
05/16/11 08:32:40	60.0184	0		0	0				-653	30661.6
05/16/11 08:32:42	60.01712	0		0	0				-653	30661.6
05/16/11 08:32:44	60.01584	0		0	0				-653	30655.51
05/16/11 08:32:46	60.01486	0		0	0				-653	30655.51
05/16/11 08:32:48	60.01453	0		0	0				-653	30655.51
05/16/11 08:32:50	60.01486	0		0	0				-653	30655.51
05/16/11 08:32:52	60.01453	0		0	0				-653	30655.51
05/16/11 08:32:54	60.01486	0		0	0				-653	30648.14
05/16/11 08:32:56	60.0152	0		0	0				-653	30648.14
05/16/11 08:32:58	60.01486	0		0	0				-653	30648.14
05/16/11 08:33:00	60.0152	0		0	0				-653	30648.14
05/16/11 08:33:02	60.0152	0		0	0				-653	30648.14
05/16/11 08:33:04	60.01648	0		0	0				-653	30648.29
05/16/11 08:33:06	60.01614	0		0	0				-653	30648.29
05/16/11 08:33:08	60.0152	0		0	0				-653	30648.29
05/16/11 08:33:10	60.01486	0		0	0				-653	30648.29

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)			
806	03:52	Event Length mm:ss	Delta Hz	Absolute Delta Hz	
1	1	1	0.000	0.000	
1	1	1	0.002	0.002	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:33:12	60.01453	0		0	0				-653	30648.29	1	1	1	0.000	0.000	
05/16/11 08:33:14	60.01291	0		0	0				-653	30652.04	1	1	1	-0.002	0.002	
05/16/11 08:33:16	60.01099	0		0	0				-653	30652.04	1	1	1	-0.002	0.002	
05/16/11 08:33:18	60.00775	0		0	0				-653	30652.04	1	1	1	-0.003	0.003	
05/16/11 08:33:20	60.00421	0		0	0				-653	30652.04	1	1	1	-0.004	0.004	
05/16/11 08:33:22	60.00162	0		0	0				-653	30652.04	1	1	1	-0.003	0.003	
05/16/11 08:33:24	60	0		0	0				-653	30651.84	1	1	1	-0.002	0.002	
05/16/11 08:33:26	59.99774	0		0	0				-653	30651.84	1	0	1	-0.002	0.002	
05/16/11 08:33:28	59.99515	0		0	0				-653	30651.84	1	0	1	-0.003	0.003	
05/16/11 08:33:30	59.99255	0		0	0				-653	30651.84	1	0	1	-0.003	0.003	
05/16/11 08:33:32	59.9903	0		0	0				-653	30651.84	1	0	1	-0.002	0.002	
05/16/11 08:33:34	59.98676	0		0	0				-653	30633.8	1	0	1	-0.004	0.004	
05/16/11 08:33:36	59.98352	0		0	0				-653	30633.8	1	0	1	-0.003	0.003	
05/16/11 08:33:38	59.98062	0		0	0				-653	30633.8	1	0	1	-0.003	0.003	
05/16/11 08:33:40	59.97964	0		0	0				-653	30633.8	1	0	1	-0.001	0.001	
05/16/11 08:33:42	59.97867	0		0	0				-653	30633.8	1	0	1	-0.001	0.001	
05/16/11 08:33:44	59.97705	0		0	0				-653	30627.71	1	0	1	-0.002	0.002	
05/16/11 08:33:46	59.97641	0		0	0				-653	30627.71	1	0	1	-0.001	0.001	
05/16/11 08:33:48	59.97675	0		0	0				-653	30627.71	1	0	1	0.000	0.000	
05/16/11 08:33:50	59.97641	0		0	0				-653	30627.71	1	0	1	0.000	0.000	
05/16/11 08:33:52	59.97577	0		0	0				-653	30627.71	1	0	1	-0.001	0.001	
05/16/11 08:33:54	59.97479	0		0	0				-653	30634.13	1	0	1	-0.001	0.001	
05/16/11 08:33:56	59.97415	0		0	0				-653	30634.13	1	0	1	-0.001	0.001	
05/16/11 08:33:58	59.97287	0		0	0				-653	30634.13	1	0	1	-0.001	0.001	
05/16/11 08:34:00	59.97125	0		0	0				-653	30634.13	1	0	1	-0.002	0.002	
05/16/11 08:34:02	59.97092	0		0	0				-653	30634.13	1	0	1	0.000	0.000	
05/16/11 08:34:04	59.97125	0		0	0				-653	30627.05	1	0	1	0.000	0.000	
05/16/11 08:34:06	59.97061	0		0	0				-653	30627.05	1	0	1	-0.001	0.001	
05/16/11 08:34:08	59.97092	0		0	0				-653	30627.05	1	0	1	0.000	0.000	
05/16/11 08:34:10	59.97125	0		0	0				-653	30627.05	1	0	1	0.000	0.000	
05/16/11 08:34:12	59.97156	0		0	0				-653	30627.05	1	0	1	0.000	0.000	
05/16/11 08:34:14	59.97253	0		0	0				-653	30662.72	1	0	1	0.001	0.001	
05/16/11 08:34:16	59.97449	0		0	0				-653	30662.72	1	0	1	0.002	0.002	
05/16/11 08:34:18	59.97577	0		0	0				-653	30662.72	1	0	1	0.001	0.001	
05/16/11 08:34:20	59.97641	0		0	0				-653	30662.72	1	0	1	0.001	0.001	
05/16/11 08:34:22	59.97641	0		0	0				-653	30662.72	1	0	1	0.000	0.000	
05/16/11 08:34:24	59.97513	0		0	0				-653	30656.52	1	0	1	-0.001	0.001	
05/16/11 08:34:26	59.9761	0		0	0				-653	30656.52	1	0	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 8:10:30 03:52	Max Absolute Delta Hz 0.078 t(0) t(Recovery) Event Length mm:ss	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:34:28	59.979	0		0	0				-653	30656.52	1	0	1	0.003	0.003	
05/16/11 08:34:30	59.98126	0		0	0				-653	30656.52	1	0	1	0.002	0.002	
05/16/11 08:34:32	59.98224	0		0	0				-653	30656.52	1	0	1	0.001	0.001	
05/16/11 08:34:34	59.98254	0		0	0				-653	30642.25	1	0	1	0.000	0.000	
05/16/11 08:34:36	59.98254	0		0	0				-653	30642.25	1	0	1	0.000	0.000	
05/16/11 08:34:38	59.9816	0		0	0				-653	30642.25	1	0	1	-0.001	0.001	
05/16/11 08:34:40	59.98029	0		0	0				-653	30642.25	1	0	1	-0.001	0.001	
05/16/11 08:34:42	59.97964	0		0	0				-653	30642.25	1	0	1	-0.001	0.001	
05/16/11 08:34:44	59.98062	0		0	0				-653	30642.49	1	0	1	0.001	0.001	
05/16/11 08:34:46	59.98093	0		0	0				-653	30642.49	1	0	1	0.000	0.000	
05/16/11 08:34:48	59.98029	0		0	0				-653	30642.49	1	0	1	-0.001	0.001	
05/16/11 08:34:50	59.97931	0		0	0				-653	30642.49	1	0	1	-0.001	0.001	
05/16/11 08:34:52	59.97836	0		0	0				-653	30642.49	1	0	1	-0.001	0.001	
05/16/11 08:34:54	59.97803	0		0	0				-653	30645.72	1	0	1	0.000	0.000	
05/16/11 08:34:56	59.97803	0		0	0				-653	30645.72	1	0	1	0.000	0.000	
05/16/11 08:34:58	59.97867	0		0	0				-653	30645.72	1	0	1	0.001	0.001	
05/16/11 08:35:00	59.97964	0		0	0				-653	30645.72	1	0	1	0.001	0.001	
05/16/11 08:35:02	59.98062	0		0	0				-653	30645.72	1	0	1	0.001	0.001	
05/16/11 08:35:04	59.98126	0		0	0				-653	30648.55	1	0	1	0.001	0.001	
05/16/11 08:35:06	59.98224	0		0	0				-653	30648.55	1	0	1	0.001	0.001	
05/16/11 08:35:08	59.98416	0		0	0				-653	30648.55	1	0	1	0.002	0.002	
05/16/11 08:35:10	59.98547	0		0	0				-653	30648.55	1	0	1	0.001	0.001	
05/16/11 08:35:12	59.98578	0		0	0				-653	30648.55	1	0	1	0.000	0.000	
05/16/11 08:35:14	59.98578	0		0	0				-653	30661.06	1	0	1	0.000	0.000	
05/16/11 08:35:16	59.98676	0		0	0				-653	30661.06	1	0	1	0.001	0.001	
05/16/11 08:35:18	59.99063	0		0	0				-653	30661.06	1	0	1	0.004	0.004	
05/16/11 08:35:20	59.99417	0		0	0				-653	30661.06	1	0	1	0.004	0.004	
05/16/11 08:35:22	59.99805	0		0	0				-653	30661.06	1	0	1	0.004	0.004	
05/16/11 08:35:24	59.99966	0		0	0				-653	30661.06	1	1	1	0.002	0.002	
05/16/11 08:35:26	60.00226	0		0	0				-653	30661.06	1	1	1	0.003	0.003	
05/16/11 08:35:28	60.00195	0		0	0				-653	30661.06	1	1	1	0.000	0.000	
05/16/11 08:35:30	60.00098	0		0	0				-653	30661.06	1	1	1	-0.001	0.001	
05/16/11 08:35:32	59.99936	0		0	0				-653	30661.06	1	1	1	-0.002	0.002	
05/16/11 08:35:34	59.99872	0		0	0				-653	30684.31	1	1	1	-0.001	0.001	
05/16/11 08:35:36	59.99774	0		0	0				-653	30684.31	1	0	1	-0.001	0.001	
05/16/11 08:35:38	59.99741	0		0	0				-653	30684.31	1	0	1	0.000	0.000	
05/16/11 08:35:40	59.99741	0		0	0				-653	30684.31	1	0	1	0.000	0.000	
05/16/11 08:35:42	59.99838	0		0	0				-653	30684.31	1	0	1	0.001	0.001	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW	Event Detection Row 805 921 806	Recovery Target Freq: 59.999 8:06:38 t(0) 8:10:30 t(Recovery) 03:52 Event Length mm:ss	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078 Delta Hz	Highest Delta Hz 0.009 Absolute Delta Hz	Rows of data to shift to align T(0) 1
05/16/11 08:35:44	59.99966	0		0	0				-653	30686.83	1	1	1	0.001	0.001	
05/16/11 08:35:46	60.00064	0		0	0				-653	30686.83	1	1	1	0.001	0.001	
05/16/11 08:35:48	60.00098	0		0	0				-653	30686.83	1	1	1	0.000	0.000	
05/16/11 08:35:50	60.00064	0		0	0				-653	30686.83	1	1	1	0.000	0.000	
05/16/11 08:35:52	60	0		0	0				-653	30686.83	1	1	1	-0.001	0.001	
05/16/11 08:35:54	59.99936	0		0	0				-653	30678.05	1	1	1	-0.001	0.001	
05/16/11 08:35:56	59.99741	0		0	0				-653	30678.05	1	0	1	-0.002	0.002	
05/16/11 08:35:58	59.99484	0		0	0					30678.05	1	0	1	-0.003	0.003	
05/16/11 08:36:00	59.99289	0		0	0					30678.05	1	0	1	-0.002	0.002	
05/16/11 08:36:02	59.99097	0		0	0					30678.05	1	0	1	-0.002	0.002	
05/16/11 08:36:04	59.98965	0		0	0					30679.19	1	0	1	-0.001	0.001	
05/16/11 08:36:06	59.98804	0		0	0					30679.19	1	0	1	-0.002	0.002	
05/16/11 08:36:08	59.98773	0		0	0					30679.19	1	0	1	0.000	0.000	
05/16/11 08:36:10	59.98804	0		0	0					30679.19	1	0	1	0.000	0.000	
05/16/11 08:36:12	59.98901	0		0	0					30679.19	1	0	1	0.001	0.001	
05/16/11 08:36:14	59.99063	0		0	0					30684.85	1	0	1	0.002	0.002	
05/16/11 08:36:16	59.99255	0		0	0					30684.85	1	0	1	0.002	0.002	
05/16/11 08:36:18	59.99484	0		0	0					30684.85	1	0	1	0.002	0.002	
05/16/11 08:36:20	59.99677	0		0	0					30684.85	1	0	1	0.002	0.002	
05/16/11 08:36:22	59.99838	0		0	0					30684.85	1	0	1	0.002	0.002	
05/16/11 08:36:24	59.99872	0		0	0					30684.99	1	1	1	0.000	0.000	
05/16/11 08:36:26	59.99872	0		0	0					30684.99	1	1	1	0.000	0.000	
05/16/11 08:36:28	59.99936	0		0	0					30684.99	1	1	1	0.001	0.001	
05/16/11 08:36:30	60.00195	0		0	0					30684.99	1	1	1	0.003	0.003	
05/16/11 08:36:32	60.00485	0		0	0					30684.99	1	1	1	0.003	0.003	
05/16/11 08:36:34	60.00809	0		0	0					30687.29	1	1	1	0.003	0.003	
05/16/11 08:36:36	60.01099	0		0	0					30687.29	1	1	1	0.003	0.003	
05/16/11 08:36:38	60.01324	0		0	0					30687.29	1	1	1	0.002	0.002	
05/16/11 08:36:40	60.01422	0		0	0					30687.29	1	1	1	0.001	0.001	
05/16/11 08:36:42	60.01486	0		0	0					30687.29	1	1	1	0.001	0.001	
05/16/11 08:36:44	60.01453	0		0	0					30687.59	1	1	1	0.000	0.000	
05/16/11 08:36:46	60.01227	0		0	0					30687.59	1	1	1	-0.002	0.002	
05/16/11 08:36:48	60.01099	0		0	0					30687.59	1	1	1	-0.001	0.001	
05/16/11 08:36:50	60.01099	0		0	0					30687.59	1	1	1	0.000	0.000	
05/16/11 08:36:52	60.01227	0		0	0					30687.59	1	1	1	0.001	0.001	
05/16/11 08:36:54	60.01227	0		0	0					30726.76	1	1	1	0.000	0.000	
05/16/11 08:36:56	60.01163	0		0	0					30726.76	1	1	1	-0.001	0.001	
05/16/11 08:36:58	60.01132	0		0	0					30726.76	1	1	1	0.000	0.000	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:37:00	60.01132	0		0	0					30726.76
05/16/11 08:37:02	60.01065	0		0	0					30726.76
05/16/11 08:37:04	60.00903	0		0	0					30726.82
05/16/11 08:37:06	60.00839	0		0	0					30726.82
05/16/11 08:37:08	60.00809	0		0	0					30726.82
05/16/11 08:37:10	60.00809	0		0	0					30726.82
05/16/11 08:37:12	60.00937	0		0	0					30726.82
05/16/11 08:37:14	60.01099	0		0	0					30720.93
05/16/11 08:37:16	60.01227	0		0	0					30720.93
05/16/11 08:37:18	60.01291	0		0	0					30720.93
05/16/11 08:37:20	60.0126	0		0	0					30720.93
05/16/11 08:37:22	60.01132	0		0	0					30720.93
05/16/11 08:37:24	60.0097	0		0	0					30720.53
05/16/11 08:37:26	60.00613	0		0	0					30720.53
05/16/11 08:37:28	60.00259	0		0	0					30720.53
05/16/11 08:37:30	59.99936	0		0	0					30720.53
05/16/11 08:37:32	59.99902	0		0	0					30720.53
05/16/11 08:37:34	60.00034	0		0	0					30720.62
05/16/11 08:37:36	60.00064	0		0	0					30720.62
05/16/11 08:37:38	59.99936	0		0	0					30720.62
05/16/11 08:37:40	59.99741	0		0	0					30720.62
05/16/11 08:37:42	59.99579	0		0	0					30720.62
05/16/11 08:37:44	59.99387	0		0	0					30721.15
05/16/11 08:37:46	59.99255	0		0	0					30721.15
05/16/11 08:37:48	59.99191	0		0	0					30721.15
05/16/11 08:37:50	59.99255	0		0	0					30721.15
05/16/11 08:37:52	59.99548	0		0	0					30721.15
05/16/11 08:37:54	60	0		0	0					30726.87
05/16/11 08:37:56	60.00323	0		0	0					30726.87
05/16/11 08:37:58	60.00516	0		0	0					30726.87
05/16/11 08:38:00	60.00485	0		0	0					30726.87
05/16/11 08:38:02	60.00354	0		0	0					30726.87
05/16/11 08:38:04	60.00226	0		0	0					30734.84
05/16/11 08:38:06	60.00098	0		0	0					30734.84
05/16/11 08:38:08	60	0		0	0					30734.84
05/16/11 08:38:10	59.99966	0		0	0					30734.84
05/16/11 08:38:12	59.99966	0		0	0					30734.84
05/16/11 08:38:14	59.99774	0		0	0					30757.45

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.002	0.002	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.002	0.002	
1	1	1	-0.004	0.004	
1	1	1	-0.004	0.004	
1	1	1	-0.003	0.003	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.002	0.002	
1	0	1	-0.001	0.001	
1	0	1	-0.001	0.001	
1	0	1	0.001	0.001	
1	0	1	0.003	0.003	
1	1	1	0.005	0.005	
1	1	1	0.003	0.003	
1	1	1	0.002	0.002	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	0	1	-0.002	0.002	

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:38:16	59.9971	0		0	0					30757.45
05/16/11 08:38:18	59.99741	0		0	0					30757.45
05/16/11 08:38:20	59.99805	0		0	0					30757.45
05/16/11 08:38:22	59.99872	0		0	0					30757.45
05/16/11 08:38:24	59.99936	0		0	0					30757.92
05/16/11 08:38:26	60	0		0	0					30757.92
05/16/11 08:38:28	60.00162	0		0	0					30757.92
05/16/11 08:38:30	60.00323	0		0	0					30757.92
05/16/11 08:38:32	60.00388	0		0	0					30757.92
05/16/11 08:38:34	60.00485	0		0	0					30752.27
05/16/11 08:38:36	60.00549	0		0	0					30752.27
05/16/11 08:38:38	60.00613	0		0	0					30752.27
05/16/11 08:38:40	60.00647	0		0	0					30752.27
05/16/11 08:38:42	60.00677	0		0	0					30752.27
05/16/11 08:38:44	60.00677	0		0	0					30752.33
05/16/11 08:38:46	60.00613	0		0	0					30752.33
05/16/11 08:38:48	60.00549	0		0	0					30752.33
05/16/11 08:38:50	60.00485	0		0	0					30752.33
05/16/11 08:38:52	60.00485	0		0	0					30752.33
05/16/11 08:38:54	60.00613	0		0	0					30755.63
05/16/11 08:38:56	60.01001	0		0	0					30755.63
05/16/11 08:38:58	60.01324	0		0	0					30755.63
05/16/11 08:39:00	60.01614	0		0	0					30755.63
05/16/11 08:39:02	60.0184	0		0	0					30755.63
05/16/11 08:39:04	60.01971	0		0	0					30755.66
05/16/11 08:39:06	60.021	0		0	0					30755.66
05/16/11 08:39:08	60.02133	0		0	0					30755.66
05/16/11 08:39:10	60.02197	0		0	0					30755.66
05/16/11 08:39:12	60.02359	0		0	0					30755.66
05/16/11 08:39:14	60.02682	0		0	0					30784.89
05/16/11 08:39:16	60.0307	0		0	0					30784.89
05/16/11 08:39:18	60.0336	0		0	0					30784.89
05/16/11 08:39:20	60.03424	0		0	0					30784.89
05/16/11 08:39:22	60.03326	0		0	0					30784.89
05/16/11 08:39:24	60.0307	0		0	0					30786.98
05/16/11 08:39:26	60.02875	0		0	0					30786.98
05/16/11 08:39:28	60.02875	0		0	0					30786.98
05/16/11 08:39:30	60.02939	0		0	0					30786.98

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1	
805	8:06:38	t(0)				
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz		
806	03:52	Event Length mm:ss				
1	0	1	-0.001	0.001		
1	0	1	0.000	0.000		
1	0	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.002	0.002		
1	1	1	0.002	0.002		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	0.000	0.000		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		
1	1	1	0.004	0.004		
1	1	1	0.003	0.003		
1	1	1	0.003	0.003		
1	1	1	0.002	0.002		
1	1	1	0.001	0.001		
1	1	1	0.001	0.001		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		
1	1	1	0.002	0.002		
1	1	1	0.003	0.003		
1	1	1	0.004	0.004		
1	1	1	0.003	0.003		
1	1	1	0.001	0.001		
1	1	1	-0.001	0.001		
1	1	1	-0.003	0.003		
1	1	1	-0.002	0.002		
1	1	1	0.000	0.000		
1	1	1	0.001	0.001		

Time (T)	Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used	Not Used	Not Used	Not Used	BA Bias Setting MW/0.1 Hz	BA Load MW
05/16/11 08:39:32	60.02908	0		0	0					30786.98
05/16/11 08:39:34	60.02844	0		0	0					30796.28
05/16/11 08:39:36	60.02777	0		0	0					30796.28
05/16/11 08:39:38	60.02811	0		0	0					30796.28
05/16/11 08:39:40	60.02777	0		0	0					30796.28
05/16/11 08:39:42	60.02777	0		0	0					30796.28
05/16/11 08:39:44	60.02777	0		0	0					30792.94
05/16/11 08:39:46	60.02747	0		0	0					30792.94
05/16/11 08:39:48	60.02713	0		0	0					30792.94
05/16/11 08:39:50	60.02618	0		0	0					30792.94
05/16/11 08:39:52	60.02521	0		0	0					30792.94
05/16/11 08:39:54	60.02457	0		0	0					30803.58
05/16/11 08:39:56	60.02487	0		0	0					30803.58
05/16/11 08:39:58	60.02551	0		0	0					30803.58
05/16/11 08:40:00	60.02618	0		0	0					30803.58

Event Detection Row	Recovery Target Freq: 59.999	Max Absolute Delta Hz 0.078	Lowest Delta Hz -0.078	Highest Delta Hz 0.009	Rows of data to shift to align T(0) 1
805	8:06:38	t(0)			
921	8:10:30	t(Recovery)	Delta Hz	Absolute Delta Hz	
806	03:52	Event Length mm:ss			
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	0.000	0.000	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	-0.001	0.001	
1	1	1	0.000	0.000	
1	1	1	0.001	0.001	
1	1	1	0.001	0.001	

Balancing Authority Name: MyBA

MyBA_110516_0806_FRS_Form2.9.xlsm

004650

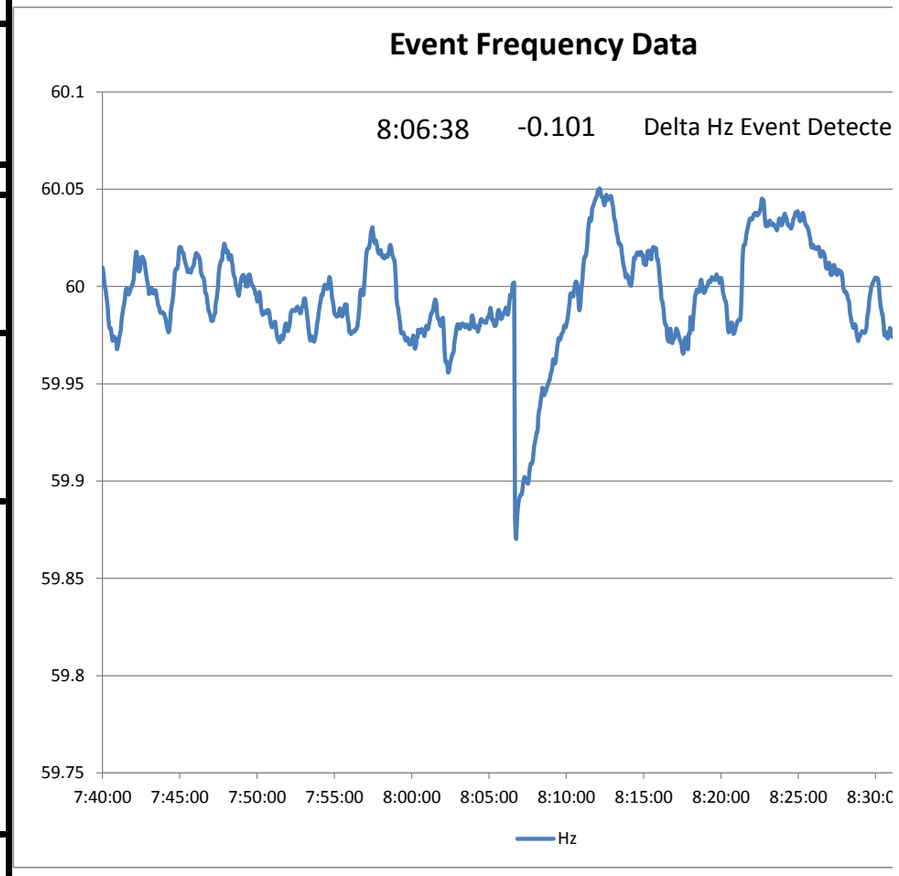
Interconnection Prevailing UFLS First Step Relay trip point 58.500 Hz

Interconnection High Relay trip point 61.500 Hz

Note: See "Instruction" tab for more detailed instructions.

	Auto	**Event Detection**
8:06:38	1245	Manually selected row number of the Event Starting Time.
8:10:30	1442	Manually selected row number of the Event Ending Time.

Step 1.	Copy and Paste Event Data into the appropriate cells of the "Data" worksheet. Maintain date and time format of mm/dd/yy hh:mm:ss.
Step 2.	**Data must start at least 2 full minutes before the beginning of the event.** Collect the same amount of data for each event. Suggest 2 to 3 minutes before to 15 minutes after (up to 60 minutes total). Delete unused rows of data in the Data worksheet below your data, columns A through R. You must also delete any un-used event detection formulas in columns N through R as well.
Step 3.	Enter your BA name in cell B1 of this worksheet.
Step 4.	Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on graph to the right to that on Form 1 for this event. If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.
Step 5.	Verify that the "Auto" selection of T(0) is correct by observing "Graph 20 to 52s". The very first frequency data point of the event on the graph must not be included in the "A Value" average. This is accomplished when the first frequency data point of the event is dead center of the graph on the center vertical grid line. The Auto event detection will select the single largest event in the data provided. An adjustment for T(0) alignment is provided in Cell Q3 on the Graph 20 to 52s.
Step 6.	When T(0) is properly aligned. Hit the big blue button to copy your data for pasting into FRS Form 1 "BA Event Data" worksheet. Copy Form 2 data for Pasting into Form 1
Step 7.	Paste data into "FRS Form 1" in the appropriate row on the "BA Event Data" worksheet. Be sure to use the latest version of Form 1. This is Form 2.9 so use Form 1.9.
Step 8.	Save this workbook using the following file name in bold below:



11/05/16 Date yymmdd

8:06 Time hh:ss of T(0)

Where "MyBA" = your BA mnemonic

MyBA_110516_0806_FRS_Form2.9.xlsm

Date:	Monday, May 16, 2011
Time of T(0)	8:06:38
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999 Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897 Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101 Hz
Value A Pre-Perturbation Average Contingent MW [T(-2) to T(-16)]	471.09 MW
Value B Post-Perturbation Average Contingent MW [T(+20 to T(+52)]	0.00 MW
Pre to Post Perturbation Contingent Delta MW Actual	-471.09 MW
Initial Performance Ramp Magnitude Adjustment	-0.06 MW
EPFR Pre-Perturbation Average	8.97 MW
EPFR Post-Perturbation Average	671.54 MW
EPFR Delta	662.57 MW

Balancing Authority	MyBA
Grid Nominal Frequency	60.000 Hz
Droop Setting	5.00% 3.00000 Hz
Deadband Setting	0.000 Hz
Hz Span	3.00000 Hz
TC (frequency response filter constant)	0.350 Time Constant for delayed delivery of PFR during Sustained Measure

A Point	8:06:36	
FPointA	60.0019531	8:06:36
A Value	59.9986267	
C Value	59.8701134	
Delta FC		

Low Hz Delta Hz Event
0.00 Actual Interchange MW Average during frequency recovery period
617.52 Target Interchange MW Average during frequency recovery period
226.52 Interchange Average Ramp MW during frequency recovery period
470.90 Actual MW @ T(-4)
-494.59 Starting and Ending Difference in Interchange MW during frequency recovery period (indicates ramp direction during recovery period)
0:03:52 Event Duration (h:mm:ss)
No Target MW Average minus MW @ T(-4) less than zero
641.21 Interchange Target Relative Average Change - MW (Low Frequency Event)
23.69 Interchange Actual Relative Average Change - MW (Low Frequency Event)
Yes Interchange Actual Average minus MW @ T(-4) less than zero
No Interchange Average MW minus MW @ T(-4) greater than zero
Yes Interchange Target MW Average minus MW @ T(-4) greater than zero
146.62 Interchange Target Relative Average Change - MW (High Frequency Event)
-470.90 Interchange Actual Relative Average Change - MW (High Frequency Event)
Down Ramp Direction during frequency recovery period

EPFR = Expected Primary Frequency Response — EPFR(Final) 662.51 MW
MW Response in right direction for frequency delta — Yes

Initial Response P.U. Performance 0.711 P.U.

0.738 P.U. Sustianed Response P.U. Performance

	T	Frequency Hz	Contingent Resource Lost MW	Value B 20 to 52 sec Average Frequency	Average MW		Bias (EPFR) Expected Primary Frequency Response	(TC) Delayed Delivery Frequency Response	Initial Measure Final Expected Primary Frequency Response	Average Ramp MW/scan	Recovery Period Target MW	Average Output During Recovery Period MW	Average Target During Recovery Period MW	Recovery Period Ramp MW	Average Ramp During Recovery Period MW
T-72 sec	8:05:26	59.98029	471.000			19590	128.735	45.057							
T-70 sec	8:05:28	59.98224	471.000			19590	115.981	69.880							
T-68 sec	8:05:30	59.98352	471.000			19590	107.611	83.086							
T-66 sec	8:05:32	59.98578	471.000			19590	92.864	86.509							
T-64 sec	8:05:34	59.9874	471.000			19590	82.303	85.036							
T-62 sec	8:05:36	59.98804	471.000			19590	78.118	82.615							
T-60 sec	8:05:38	59.9874	471.000			19590	82.303	82.506		2.947	471.000				
T-58 sec	8:05:40	59.98611	471.000			19590	90.672	85.364		2.947	476.805				
T-56 sec	8:05:42	59.9848	471.000			19590	99.241	90.221		2.947	484.609				
T-54 sec	8:05:44	59.98352	471.000			19590	107.611	96.308		2.947	493.643				
T-52 sec	8:05:46	59.98318	471.000			19590	109.803	101.031		2.947	501.313				
T-50 sec	8:05:48	59.98352	471.000			19590	107.611	103.334		2.947	506.563				
T-48 sec	8:05:50	59.98416	471.300			19590	103.426	103.366		2.947	509.542				
T-46 sec	8:05:52	59.98514	471.300			19590	97.049	101.155		2.947	510.278				
T-44 sec	8:05:54	59.98547	471.300			19590	94.857	98.951		2.947	511.020				
T-42 sec	8:05:56	59.98642	471.300			19590	88.680	95.356		2.947	510.372				
T-40 sec	8:05:58	59.98676	471.900			19590	86.487	92.252		2.947	510.215				
T-38 sec	8:06:00	59.9874	471.900			19590	82.303	88.770		2.947	509.680				
T-36 sec	8:06:02	59.98773	471.900			19590	80.110	85.739		2.947	509.596				
T-34 sec	8:06:04	59.98901	471.900			19590	71.741	80.840		2.947	507.643				
T-32 sec	8:06:06	59.98901	471.900			19590	71.741	77.655		2.947	507.406				
T-30 sec	8:06:08	59.98804	471.400			19590	78.118	77.817		2.947	510.515				
T-28 sec	8:06:10	59.98642	471.400			19590	88.680	81.619		2.947	517.263				
T-26 sec	8:06:12	59.98547	471.400			19590	94.857	86.252		2.947	524.844				
T-24 sec	8:06:14	59.98642	471.400			19590	88.680	87.102		2.947	528.640				
T-22 sec	8:06:16	59.98935	471.400			19590	69.549	80.958		2.947	525.443				
T-20 sec	8:06:18	59.99225	471.400			19590	50.617	70.339		2.947	517.771				
T-18 sec	8:06:20	59.99515	471.400			19590	31.685	56.810		2.947	507.189				
T-16 sec	8:06:22	59.99579	471.400	59.999	471.09	19590	27.501	46.552		2.947	499.878				
T-14 sec	8:06:24	59.99515	471.400	59.999	471.09	19590	31.685	41.349		2.947	497.621				
T-12 sec	8:06:26	59.99548	471.400	59.999	471.09	19590	29.493	37.199		2.947	496.419				
T-10 sec	8:06:28	59.99741	470.900	59.999	471.09	19590	16.939	30.108		2.947	492.275				
T-08 sec	8:06:30	60	470.900	59.999	471.09	19590	0.000	19.570		2.947	484.684				
T-06 sec	8:06:32	60.00162	470.900	59.999	471.09	19590	-10.562	9.024		2.947	477.084				
T-04 sec	8:06:34	60.00162	470.900	59.999	471.09	19590	-10.562	2.169		2.947	473.176				
T-02 sec	8:06:36	60.00195	470.900	59.999	471.09	19590	-12.754	-3.054		2.947	470.900				
T+0 sec	8:06:38	59.95963	0.000			19590	263.647	90.291		0.000	564.245				
T+02 sec	8:06:40	59.88144	0.000			19590	774.227	329.669		-4.264	799.359	0.000	681.802	471.678	471.678
T+04 sec	8:06:42	59.87237	0.000			19590	833.413	505.979		-4.264	971.406	0.000	778.337	467.414	469.546
T+06 sec	8:06:44	59.87011	0.000			19590	848.160	625.742		-4.264	1086.905	0.000	855.479	463.151	467.414
T+08 sec	8:06:46	59.87011	0.000			19590	848.160	703.588		-4.264	1160.488	0.000	916.481	458.887	465.282
T+10 sec	8:06:48	59.87432	0.000			19590	820.659	744.563		-4.264	1197.199	0.000	963.267	454.623	463.151
T+12 sec	8:06:50	59.88076	0.000			19590	778.611	756.480		-4.264	1204.852	0.000	997.779	450.360	461.019
T+14 sec	8:06:52	59.88531	0.000			19590	748.918	753.833		-4.264	1197.942	0.000	1022.800	446.096	458.887
T+16 sec	8:06:54	59.88787	0.000			19590	732.179	746.254		-4.264	1186.099	0.000	1040.944	441.832	456.755
T+18 sec	8:06:56	59.88949	0.000			19590	721.617	737.631		-4.264	1173.212	0.000	1054.171	437.568	454.623
T+20 sec	8:06:58	59.8908	0.000	59.897	0.00	19590	713.048	729.027	653.00	-4.264	1160.344	0.000	1063.823	433.305	452.491
T+22 sec	8:07:00	59.89175	0.000	59.897	0.00	19590	706.870	721.272	653.00	-4.264	1148.326	0.000	1070.865	429.041	450.360
T+24 sec	8:07:02	59.89242	0.000	59.897	0.00	19590	702.486	714.697	653.00	-4.264	1137.487	0.000	1075.990	424.777	448.228
T+26 sec	8:07:04	59.89306	0.000	59.897	0.00	19590	698.301	708.959	653.00	-4.264	1127.485	0.000	1079.668	420.514	446.096
T+28 sec	8:07:06	59.89306	0.000	59.897	0.00	19590	698.301	705.229	653.00	-4.264	1119.491	0.000	1082.323	416.250	443.964
T+30 sec	8:07:08	59.89306	0.000	59.897	0.00	19590	698.301	702.804	653.00	-4.264	1112.803	0.000	1084.228	411.986	441.832
T+32 sec	8:07:10	59.89532	0.000	59.897	0.00	19590	683.555	696.067	653.00	-4.264	1101.802	0.000	1085.261	407.723	439.700
T+34 sec	8:07:12	59.89788	0.000	59.897	0.00	19590	666.815	685.829	653.00	-4.264	1087.300	0.000	1085.375	403.459	437.568
T+36 sec	8:07:14	59.8995	0.000	59.897	0.00	19590	656.253	675.477	653.00	-4.264	1072.685	0.000	1084.707	399.195	435.437
T+38 sec	8:07:16	59.90081	0.000	59.897	0.00	19590	647.684	665.750	653.00	-4.264	1058.694	0.000	1083.406	394.932	433.305
T+40 sec	8:07:18	59.9021	0.000	59.897	0.00	19590	639.314	656.497	653.00	-4.264	1045.178	0.000	1081.586	390.668	431.173
T+42 sec	8:07:20	59.90179	0.000	59.897	0.00	19590	641.307	651.181	653.00	-4.264	1035.598	0.000	1079.495	386.404	429.041
T+44 sec	8:07:22	59.90081	0.000	59.897	0.00	19590	647.684	649.957	653.00	-4.264	1030.110	0.000	1077.348	382.141	426.909
T+46 sec	8:07:24	59.90081	0.000	59.897	0.00	19590	647.684	649.162	653.00	-4.264	1025.051	0.000	1075.169	377.877	424.777
T+48 sec	8:07:26	59.90048	0.000	59.897	0.00	19590	649.876	649.412	653.00	-4.264	1021.037	0.000	1073.004	373.613	422.646
T+50 sec	8:07:28	59.8992	0.000	59.897	0.00	19590	658.246	652.504	653.00	-4.264	1019.866	0.000	1070.960	369.350	420.514
T+52 sec	8:07:30	59.89886	0.000	59.897	0.00	19590	660.438	655.281	653.00	-4.264	1018.379	0.000	1069.013	365.086	418.382
T+54 sec	8:07:32	59.89856	0.000			19590	662.431	657.783		-4.264	1016.618	0.000	1067.141	360.822	416.250
T+56 sec	8:07:34	59.90017	0.000			19590	651.869	655.713		-4.264	1010.284	0.000	1065.181	356.559	414.118
T+58 sec	8:07:36	59.90243	0.000			19590	637.122	649.207		-4.264	999.514	0.000	1062.992	352.295	411.986
T+60 sec	8:07:38	59.90469	0.000			19590	622.376	639.816		-4.264	985.859	0.000	1060.504	348.031	409.855
T+62 sec	8:07:40	59.90695	0.000			19590	607.629	628.550		-4.264	970.330	0.000	1057.686	343.768	407.723
T+64 sec	8:07:42	59.90887	0.000			19590	595.074	616.834		-4.264	954.350	0.000	1054.555	339.504	405.591
T+66 sec	8:07:44	59.90921	0.000			19590	592.882	608.451		-4.264	941.703	0.000	1051.235	335.240	403.459
T+68 sec	8:07:46	59.90857	0.000			19590	597.067	604.466		-4.264	933.456	0.000	1047.870	330.977	401.327
T+70 sec	8:07:48	59.90887	0.000			19590	595.074	601.179		-4.264	925.905	0.000	1044.482	326.713	399.195
T+72 sec	8:07:50	59.91018	0.000			19590	586.505	596.043		-4.264	916.505	0.000	1041.023	322.449	397.064
T+74 sec	8:07:52	59.91244	0.000			19590	571.759	587.544		-4.264	903.742	0.000	1037.411	318.186	394.932
T+76 sec	8:07:54	59.9147	0.000			19590	557.012	576.858		-4.264	888.792	0.000	1033.600	313.922	392.800
T+78 sec	8:07:56	59.9176	0.000			19590	538.080	563.286		-4.264	870.956	0.000	1029.534	309.658	390.668
T+80 sec	8:07:58	59.91922	0.000			19590	527.519	550.767		-4.264	854.174	0.000	1025.257	305.395	388.536
T+82 sec	8:08:00	59.92083	0.000			19590	516.957	538.933		-4.264	838.077	0.000	1020.800	301.131	386.404
T+84 sec	8:08:02	59.92215	0.000			19590	508.388	528.242		-4.264	823.122	0.000	1016.203	296.867	384.273
T+86 sec	8:08:04	59.92309	0.000			19590	502.210	519.131		-4.264	809.747	0.000	1011.511	292.603	382.141
T+88 sec	8:08:06	59.92505	0.000			19590	489.456	508.745		-4.264	795.097	0.000	1006.702	288.340	380.009
T+90 sec	8:08:08	59.92505	0.000			19590	489.456	501.994		-4.264	784.082	0.000	1001.862	284.076	377.877
T+92 sec	8:08:10	59.9273	0.000			19590	474.709	492.444		-4.264	770.269	0.000	996.935	279.812	375.745
T+94 sec	8:08:12	59.93246	0.000			19590	441.031	474.450		-4.264	748.011	0.000	991.749	275.549	373.613
T+96 sec	8:08:14	59.93505	0.000			19590	424.092	456.825		-4.264	726.122	0.000	986.328	271.285	371.481
T+98 sec	8:08:16	59.93701	0.000			19590	411.338	440.904		-4.264	705.938	0.000	980.720	267.021	369.350
T+100 sec	8:08:18	59.93765	0.000			19590	407.129	429.083		-4.264	689.853	0.000	975.017	262.758	367.218
T+102 sec	8:08:20	59.93927	0.000			19590	396.567	417.702		-4.264	674.209	0.000	969.232	258.494	365.086
T+104 sec	8:08:22	59.94183	0.000			19590	379.827	404.446		-4.264	656.689	0.000	963.335	254.230	362.954
T+106 sec	8:08:24	59.94409	0.000			19590	365.081	390.668		-4.264	638.647	0.000	957.322	249.967	360.822
T+108 sec	8:08:26	59.94571	0.000			19590	354.519	378.016		-4.264	621.731	0.000	951.220	245.703	358.690
T+110 sec	8:08:28	59.94797	0.000			19590	339.772	364.630		-4.264	604.082	0.000	945.022	241.439	356.559
T+112 sec	8:08:30	59.94766	0.000			19590	341.765	356.628		-4.264	591.816	0.000	938.825	237.176	354.427
T+114 sec	8:08:32	59.9454	0.000			19590	356.512	356.587		-4.264	587.511	0.000	932.768	232.912	352.295
T+116 sec	8:08:34	59.94443	0.000			19590	362.888	358.792		-4.264	585.453	0.000	926.881	228.648	350.163
T+118 sec	8:08:36	59.94409	0.000			19590	365.081	360.993		-4.264	583.390	0.000	921.156	224.385	348.031
T+120 sec	8:08:38	59.94507	0.000			19590	358.704	360.192		-4.264	578.325	0.000	915.536	220.121	345.899
T+122 sec	8:08:40	59.94604	0.000			19590	352.327	357.439		-4.264	571.309	0.000	909.984	215.857	343.768
T+124 sec	8:08:42	59.94638	0.000			19590	350.135	354.883		-4.264	564.489	0.000	904.500	211.594	341.636
T+126 sec	8:08:44	59.94733	0.000			19590	343.957	351.059		-4.264	556.401	0.000	899.061	207.330	339.504
T+128 sec	8:08:46	59.9483	0.000			19590	337.580	346.341		-4.264	547.420	0.000	893.651	203.066	337.372
T+130 sec	8:08:48	59.94894	0.000			19590	333.395	341.810		-4.264	538.625	0.000	888.272	198.803	335.240
T+132 sec	8:08:50	59.94992	0.000			19590	327.018	336.633		-4.264	529.184	0.000	882.912	194.539	333.108
T+134 sec	8:08:52	59.9509	0.000			19590	320.641	331.036		-4.264	519.323	0.000	877.566	190.275	330.977
T+136 sec	8:08:54	59.95154	0.000			19590	316.456	325.933		-4.264	509.957	0.000	872.238	186.012	328.845
T+138 sec	8:08:56	59.95187	0.000			19590	314.264	321.849		-4.264	501.609	0.000	866.943	181.748	326.713

Non-Conforming Load sign convention + (Data is positive for Load then enter "+" else "-")

Frequency, Actual Interchange, Adjustment Data, Bias and Load used in the evaluation

	T	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Expected Primary Freq Response Based on Bias Setting MW
T-72 sec	8:05:26	59.980	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	128.735
T-70 sec	8:05:28	59.982	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	115.981
T-68 sec	8:05:30	59.984	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	107.611
T-66 sec	8:05:32	59.986	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30155.67	92.864
T-64 sec	8:05:34	59.987	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30142.79	82.303
T-62 sec	8:05:36	59.988	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30142.79	78.118
T-60 sec	8:05:38	59.987	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30142.79	82.303
T-58 sec	8:05:40	59.986	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30142.79	90.672
T-56 sec	8:05:42	59.985	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30142.79	99.241
T-54 sec	8:05:44	59.984	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30154.67	107.611
T-52 sec	8:05:46	59.983	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30154.67	109.803
T-50 sec	8:05:48	59.984	471.00	0.00	0.00	0.00		0.00	0.00	-653.00	30154.67	107.611
T-48 sec	8:05:50	59.984	471.30	0.00	0.00	0.00		0.00	0.00	-653.00	30150.35	103.426
T-46 sec	8:05:52	59.985	471.30	0.00	0.00	0.00		0.00	0.00	-653.00	30150.35	97.049
T-44 sec	8:05:54	59.985	471.30	0.00	0.00	0.00		0.00	0.00	-653.00	30159.63	94.857
T-42 sec	8:05:56	59.986	471.30	0.00	0.00	0.00		0.00	0.00	-653.00	30159.63	88.680
T-40 sec	8:05:58	59.987	471.90	0.00	0.00	0.00		0.00	0.00	-653.00	30159.63	86.487
T-38 sec	8:06:00	59.987	471.90	0.00	0.00	0.00		0.00	0.00	-653.00	30159.63	82.303
T-36 sec	8:06:02	59.988	471.90	0.00	0.00	0.00		0.00	0.00	-653.00	30151.42	80.110
T-34 sec	8:06:04	59.989	471.90	0.00	0.00	0.00		0.00	0.00	-653.00	30151.42	71.741
T-32 sec	8:06:06	59.989	471.90	0.00	0.00	0.00		0.00	0.00	-653.00	30156.16	71.741
T-30 sec	8:06:08	59.988	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30156.16	78.118
T-28 sec	8:06:10	59.986	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30156.16	88.680
T-26 sec	8:06:12	59.985	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30156.16	94.857
T-24 sec	8:06:14	59.986	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30164.15	88.680
T-22 sec	8:06:16	59.989	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30164.15	69.549
T-20 sec	8:06:18	59.992	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30164.15	50.617
T-18 sec	8:06:20	59.995	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30164.15	31.685
T-16 sec	8:06:22	59.996	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30203.91	27.501
T-14 sec	8:06:24	59.995	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30203.91	31.685
T-12 sec	8:06:26	59.995	471.40	0.00	0.00	0.00		0.00	0.00	-653.00	30203.73	29.493
T-10 sec	8:06:28	59.997	470.90	0.00	0.00	0.00		0.00	0.00	-653.00	30203.73	16.939
T-08 sec	8:06:30	60.000	470.90	0.00	0.00	0.00		0.00	0.00	-653.00	30203.73	0.000
T-06 sec	8:06:32	60.002	470.90	0.00	0.00	0.00		0.00	0.00	-653.00	30203.73	-10.562
T-04 sec	8:06:34	60.002	470.90	0.00	0.00	0.00		0.00	0.00	-653.00	30199.61	-10.562
T-02 sec	8:06:36	60.002	470.90	0.00	0.00	0.00		0.00	0.00	-653.00	30199.61	-12.754
T+0 sec	8:06:38	59.960	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30199.61	263.647
T+02 sec	8:06:40	59.881	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30199.61	774.227
T+04 sec	8:06:42	59.872	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30086.11	833.413
T+06 sec	8:06:44	59.870	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30086.11	848.160
T+08 sec	8:06:46	59.870	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30086.11	848.160
T+10 sec	8:06:48	59.874	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30086.14	820.659
T+12 sec	8:06:50	59.881	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30086.14	778.611
T+14 sec	8:06:52	59.885	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30086.14	748.918
T+16 sec	8:06:54	59.888	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30086.14	732.179
T+18 sec	8:06:56	59.889	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30094.43	721.617
T+20 sec	8:06:58	59.891	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30094.43	713.048
T+22 sec	8:07:00	59.892	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30094.43	706.870
T+24 sec	8:07:02	59.892	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30094.43	702.486
T+26 sec	8:07:04	59.893	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30139.49	698.301
T+28 sec	8:07:06	59.893	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30139.49	698.301
T+30 sec	8:07:08	59.893	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30133.38	698.301
T+32 sec	8:07:10	59.895	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30133.38	683.555
T+34 sec	8:07:12	59.898	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30133.38	666.815
T+36 sec	8:07:14	59.900	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30133.38	656.253
T+38 sec	8:07:16	59.901	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30137.26	647.684
T+40 sec	8:07:18	59.902	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30137.26	639.314
T+42 sec	8:07:20	59.902	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30137.26	641.307
T+44 sec	8:07:22	59.901	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30137.26	647.684
T+46 sec	8:07:24	59.901	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30171.38	647.684
T+48 sec	8:07:26	59.900	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30171.38	649.876
T+50 sec	8:07:28	59.899	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30168.76	658.246
T+52 sec	8:07:30	59.899	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30168.76	660.438
T+54 sec	8:07:32	59.899	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30168.76	662.431
T+56 sec	8:07:34	59.900	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30168.76	651.869
T+58 sec	8:07:36	59.902	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30208.99	637.122
T+60 sec	8:07:38	59.905	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30208.99	622.376
T+62 sec	8:07:40	59.907	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30208.99	607.629
T+64 sec	8:07:42	59.909	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30208.99	595.074
T+66 sec	8:07:44	59.909	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30205.66	592.882
T+68 sec	8:07:46	59.909	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30205.66	597.067
T+70 sec	8:07:48	59.909	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30205.66	595.074
T+72 sec	8:07:50	59.910	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30205.66	586.505
T+74 sec	8:07:52	59.912	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30205.66	571.759
T+76 sec	8:07:54	59.915	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30205.66	557.012
T+78 sec	8:07:56	59.918	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30211.75	538.080
T+80 sec	8:07:58	59.919	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30211.75	527.519
T+82 sec	8:08:00	59.921	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30211.75	516.957
T+84 sec	8:08:02	59.922	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30211.75	508.388
T+86 sec	8:08:04	59.923	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.55	502.210
T+88 sec	8:08:06	59.925	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.55	489.456
T+90 sec	8:08:08	59.925	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.57	489.456
T+92 sec	8:08:10	59.927	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.57	474.709
T+94 sec	8:08:12	59.932	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.57	441.031
T+96 sec	8:08:14	59.935	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.57	424.092
T+98 sec	8:08:16	59.937	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.59	411.338
T+100 sec	8:08:18	59.938	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.59	407.129
T+102 sec	8:08:20	59.939	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.59	396.567
T+104 sec	8:08:22	59.942	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30217.59	379.827
T+106 sec	8:08:24	59.944	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30210.49	365.081
T+108 sec	8:08:26	59.946	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30210.49	354.519
T+110 sec	8:08:28	59.948	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30210.26	339.772
T+112 sec	8:08:30	59.948	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30210.26	341.765
T+114 sec	8:08:32	59.945	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30210.26	356.512
T+116 sec	8:08:34	59.944	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30210.26	362.888
T+118 sec	8:08:36	59.944	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30234.59	365.081
T+120 sec	8:08:38	59.945	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30234.59	358.704
T+122 sec	8:08:40	59.946	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30234.59	352.327
T+124 sec	8:08:42	59.946	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30234.59	350.135
T+126 sec	8:08:44	59.947	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30223.60	343.957
T+128 sec	8:08:46	59.948	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30223.60	337.580
T+130 sec	8:08:48	59.949	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30223.73	333.395
T+132 sec	8:08:50	59.950	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30223.73	327.018
T+134 sec	8:08:52	59.951	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30223.73	320.641
T+136 sec	8:08:54	59.952	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30223.73	316.456
T+138 sec	8:08:56	59.952	0.00	0.00	0.00	0.00		0.00	0.00	-653.00	30224.39	314.264

Date:	Monday, May 16, 2011
Time of T(0)	8:06:38
Time of Frequency Recovery to 60 Hz or Pre-Perturbation Hz	8:10:30
Value A Pre-Perturbation Average Frequency [T(-2) to T(-16)]	59.999 Hz
Value B Post-Perturbation Average Frequency [T(+20 to T(+52)]	59.897 Hz
Pre to Post Perturbation Delta Frequency Actual	-0.101 Hz
Value A Pre-Perturbation Contingency MW [T(-2) to T(-16)]	471.09 MW
Value B Post-Perturbation Average Contingency MW [T(+20 to T(+52)]	0.00 MW
Pre to Post Perturbation Contingency Delta MW Actual	471.09 MW
EPFR Pre-Perturbation Average	8.97 MW
EPFR Post-Perturbation Average	671.54 MW
EPFR Unadjusted	662.57 MW
EPFR Adjusted	662.57 MW
Pre Load Resources MW	0.00 MW
Pre Non-Conforming Load MW	0.00 MW
Spare	0.00 MW
Spare	0.00 MW
Spare	0.00 MW
Sum of Pre Perturbation Adjustments	0.00 MW
Post Load Resources MW	0.00 MW
Post Non-Conforming Load MW	0.00 MW
Spare	0.00 MW
Spare	0.00 MW
Spare	0.00 MW
Sum of Post Perturbation Adjustments	0.00 MW
Net Total Adjustments MW	0.00 MW

T(20) to T(52) Evaluation

Pre-Perturbation Bias Setting	-653.00 MW/0.1 Hz
Post-Perturbation Bias Setting	-653.00 MW/0.1 Hz
EPFR for Bias Setting Pre-Perturbation Average	8.97 MW
EPFR for Bias Setting Post-Perturbation Average	671.54 MW
EPFR for Bias Setting Delta	662.57 MW
Primary Frequency Response Delivery % of Bias	71.10%
Pre-Perturbation BA Load	30202.7 MW
Post-Perturbation BA Load	30136.8 MW
Pre to Post Perturbation BA Load Change	-65.973 MW
Load Dampening Frequency Response	-65.020 MW/0.1 Hz
Load Dampening % of Total BA Frequency Response	14.00%
Average Bias Setting when Hz is greater than +/-0.036 Hz	-653.00 MW/0.1 Hz

Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points

Frequency @ T(+46)	59.901 Hz		
Frequency @ T(+76)	59.915 Hz		
Frequency @ T(+106)	59.944 Hz		
Frequency @ T(+136)	59.952 Hz		
Frequency @ T(+166)	59.967 Hz		

		Actual Primary Freq Response MW/0.1 Hz	Un-adjusted P.U. Performance	Load Resources Tripped Adjustment	Non-Conforming Load Adjustment	Spare Adjustment	Spare Adjustment	Spare Adjustment	Adjusted P.U. Performance
EPFR @ T(+46)	-653.00 MW/0.1 Hz	-481.62	0.738	0.00	0.00	0.00	0.00	0.00	0.738
EPFR @ T(+76)	-653.00 MW/0.1 Hz	-561.31	0.860	0.00	0.00	0.00	0.00	0.00	0.860
EPFR @ T(+106)	-653.00 MW/0.1 Hz	-863.83	1.323	0.00	0.00	0.00	0.00	0.00	1.323
EPFR @ T(+136)	-653.00 MW/0.1 Hz	-1000.43	1.532	0.00	0.00	0.00	0.00	0.00	1.532
EPFR @ T(+166)	-653.00 MW/0.1 Hz	-1507.48	2.309	0.00	0.00	0.00	0.00	0.00	2.309

20 to 52 second Average Period Evaluation

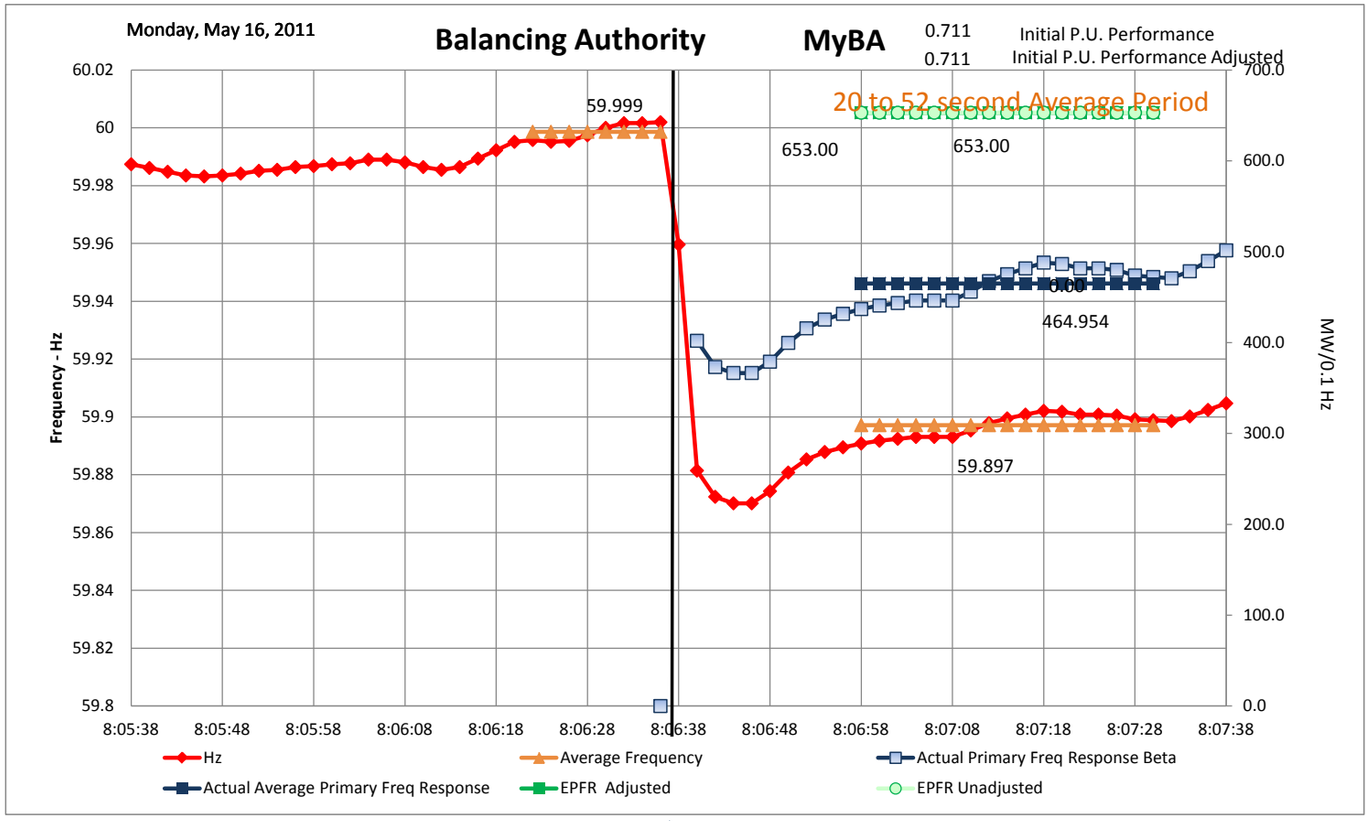
Initial P.U. Performance for FRO 0.711 P.U.
Initial P.U. Performance Adjusted for FRO 0.711 P.U.

	T	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Not Used MW	Not Used	Not Used MW/0.1 Hz	Not Used MW	BA Bias Setting MW/0.1 Hz	BA Load MW	EPFR MW	Expected MW/0.1 Hz Response MW/0.1 Hz	Actual Average Primary Freq Response MW/0.1 Hz	Actual Primary Freq Response Beta MW/0.1 Hz		
T-72 sec	8:05:26															0.0197	
T-70 sec	8:05:28															0.0178	
T-68 sec	8:05:30															0.0165	
T-66 sec	8:05:32															0.0142	
T-64 sec	8:05:34															0.0126	
T-62 sec	8:05:36															0.0120	
T-60 sec	8:05:38															0.0126	
T-58 sec	8:05:40															0.0139	
T-56 sec	8:05:42															0.0152	
T-54 sec	8:05:44															0.0165	
T-52 sec	8:05:46															0.0168	
T-50 sec	8:05:48															0.0165	
T-48 sec	8:05:50															0.0158	
T-46 sec	8:05:52															0.0149	
T-44 sec	8:05:54															0.0145	
T-42 sec	8:05:56															0.0136	
T-40 sec	8:05:58															0.0132	
T-38 sec	8:06:00															0.0126	
T-36 sec	8:06:02															0.0123	
T-34 sec	8:06:04															0.0110	
T-32 sec	8:06:06															0.0110	
T-30 sec	8:06:08															0.0120	
T-28 sec	8:06:10															0.0136	
T-26 sec	8:06:12															0.0145	
T-24 sec	8:06:14															0.0136	
T-22 sec	8:06:16															0.0107	
T-20 sec	8:06:18															0.0078	
T-18 sec	8:06:20															0.0049	
T-16 sec	8:06:22	59.999	471.09	0.000	0.000	0.000		0.000	0.000	-653.00	30202.74	8.968				0.0042	
T-14 sec	8:06:24	59.999	471.09	0.000	0.000	0.000		0.000	0.000	-653.00	30202.74	8.968				0.0049	
T-12 sec	8:06:26	59.999	471.09	0.000	0.000	0.000		0.000	0.000	-653.00	30202.74	8.968				0.0045	
T-10 sec	8:06:28	59.999	471.09	0.000	0.000	0.000		0.000	0.000	-653.00	30202.74	8.968				0.0026	
T-08 sec	8:06:30	59.999	471.09	0.000	0.000	0.000		0.000	0.000	-653.00	30202.74	8.968				0.0000	
T-06 sec	8:06:32	59.999	471.09	0.000	0.000	0.000		0.000	0.000	-653.00	30202.74	8.968				0.0016	
T-04 sec	8:06:34	59.999	471.09	0.000	0.000	0.000		0.000	0.000	-653.00	30202.74	8.968				0.0016	
T-02 sec	8:06:36	59.999	471.09	0.000	0.000	0.000		0.000	0.000	-653.00	30202.74	8.968				0.0020	
T+0 sec	8:06:38															0.0404	-653
T+02 sec	8:06:40														401.98	0.1186	-653
T+04 sec	8:06:42														373.12	0.1276	-653
T+06 sec	8:06:44														366.57	0.1299	-653
T+08 sec	8:06:46														366.57	0.1299	-653
T+10 sec	8:06:48														378.99	0.1257	-653
T+12 sec	8:06:50														399.69	0.1192	-653
T+14 sec	8:06:52														415.73	0.1147	-653
T+16 sec	8:06:54														425.35	0.1121	-653
T+18 sec	8:06:56														431.66	0.1105	-653
T+20 sec	8:06:58	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	436.91	0.1092	-653
T+22 sec	8:07:00	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	440.78	0.1082	-653
T+24 sec	8:07:02	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	443.56	0.1076	-653
T+26 sec	8:07:04	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069	-653
T+28 sec	8:07:06	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069	-653
T+30 sec	8:07:08	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	446.26	0.1069	-653
T+32 sec	8:07:10	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	456.01	0.1047	-653
T+34 sec	8:07:12	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	467.62	0.1021	-653
T+36 sec	8:07:14	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	475.25	0.1005	-653
T+38 sec	8:07:16	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992	-653
T+40 sec	8:07:18	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	488.02	0.0979	-653
T+42 sec	8:07:20	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	486.48	0.0982	-653
T+44 sec	8:07:22	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992	-653
T+46 sec	8:07:24	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	481.62	0.0992	-653
T+48 sec	8:07:26	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	479.97	0.0995	-653
T+50 sec	8:07:28	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	473.79	0.1008	-653
T+52 sec	8:07:30	59.897	0.00	0.000	0.000	0.000		0.000	0.000	-653.00	30136.77	671.539	653.00	464.954	472.19	0.1011	-653
T+54 sec	8:07:32														470.75	0.1014	-653
T+56 sec	8:07:34														478.49	0.0998	-653
T+58 sec	8:07:36														489.72	0.0976	-653
T+60 sec	8:07:38														501.49	0.0953	-653
T+62 sec	8:07:40														513.85	0.0931	-653
T+64 sec	8:07:42														524.85	0.0911	-653
T+66 sec	8:07:44														526.82	0.0908	-653
T+68 sec	8:07:46														523.07	0.0914	-653
T+70 sec	8:07:48														524.85	0.0911	-653
T+72 sec	8:07:50														532.64	0.0898	-653
T+74 sec	8:07:52														546.60	0.0876	-653
T+76 sec	8:07:54														561.31	0.0853	-653
T+78 sec	8:07:56														581.39	0.0824	-653
T+80 sec	8:07:58														593.23	0.0808	-653
T+82 sec	8:08:00														605.56	0.0792	-653
T+84 sec	8:08:02														615.95	0.0779	-653
T+86 sec	8:08:04														623.67	0.0769	-653
T+88 sec	8:08:06														640.22	0.0750	-653
T+90 sec	8:08:08														640.22	0.0750	-653
T+92 sec	8:08:10														660.50	0.0727	-653
T+94 sec	8:08:12														711.98	0.0675	-653
T+96 sec	8:08:14														741.03	0.0649	-653
T+98 sec	8:08:16														764.52	0.0630	-653
T+100 sec	8:08:18														772.60	0.0623	-653
T+102 sec	8:08:20														793.66	0.0607	-653
T+104 sec	8:08:22														829.48	0.0582	-653
T+106 sec	8:08:24														863.83	0.0559	-653
T+108 sec	8:08:26														890.23	0.0543	-653
T+110 sec	8:08:28														929.92	0.0520	-653
T+112 sec	8:08:30														924.35	0.0523	-653
T+114 sec	8:08:32														885.13	0.0546	-653
T+116 sec	8:08:34														869.18	0.0556	-653
T+118 sec	8:08:36														863.83	0.0559	-653
T+120 sec	8:08:38														879.58	0.0549	-653
T+122 sec	8:08:40														895.91	0.0540	-653
T+124 sec	8:08:42														901.67	0.0536	-653
T+126 sec	8:08:44														918.30	0.0527	-653
T+128 sec	8:08:46														936.12	0.0517	-653
T+130 sec	8:08:48														948.19	0.0511	-653
T+132 sec	8:08:50														967.21	0.0501	-653
T+134 sec	8:08:52														986.99	0.0491	-653
T+136 sec	8:08:54														1000.43	0.0485	-653
T+138 sec	8:08:56														1007.61	0.0481	-653

T+140 sec	8:08:58	59.95346	0.000	19590	303.902	315.567	-4.264	491.064	0.000	861.649	177.484	324.581	T+140 sec	8:08:58	59.953	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	303.902	T+140 sec	8:08:58	1043.01	0.0465	-653
T+142 sec	8:09:00	59.95508	0.000	19590	293.340	307.788	-4.264	479.021	0.000	856.335	173.221	322.449	T+142 sec	8:09:00	59.955	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	293.340	T+142 sec	8:09:00	1081.75	0.0449	-653
T+144 sec	8:09:02	59.95575	0.000	19590	288.956	301.197	-4.264	468.166	0.000	851.017	168.957	320.317	T+144 sec	8:09:02	59.956	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30224.39	288.956	T+144 sec	8:09:02	1098.69	0.0443	-653
T+146 sec	8:09:04	59.95639	0.000	19590	284.771	295.448	-4.264	458.153	0.000	845.708	164.693	318.186	T+146 sec	8:09:04	59.956	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.53	284.771	T+146 sec	8:09:04	1115.36	0.0436	-653
T+148 sec	8:09:06	59.95801	0.000	19590	274.209	288.014	-4.264	446.456	0.000	840.385	160.430	316.054	T+148 sec	8:09:06	59.958	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.53	274.209	T+148 sec	8:09:06	1159.77	0.0420	-653
T+150 sec	8:09:08	59.96124	0.000	19590	253.085	275.789	-4.264	429.967	0.000	834.985	156.166	313.922	T+150 sec	8:09:08	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	253.085	T+150 sec	8:09:08	1260.13	0.0388	-653
T+152 sec	8:09:10	59.96252	0.000	19590	244.716	264.913	-4.264	414.828	0.000	829.528	151.902	311.790	T+152 sec	8:09:10	59.963	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	244.716	T+152 sec	8:09:10	1304.87	0.0375	-653
T+154 sec	8:09:12	59.96188	0.000	19590	248.900	259.309	-4.264	404.960	0.000	824.085	147.638	309.658	T+154 sec	8:09:12	59.962	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	248.900	T+154 sec	8:09:12	1282.11	0.0381	-653
T+156 sec	8:09:14	59.96124	0.000	19590	253.085	257.131	-4.264	398.518	0.000	818.698	143.375	307.526	T+156 sec	8:09:14	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30252.87	253.085	T+156 sec	8:09:14	1260.13	0.0388	-653
T+158 sec	8:09:16	59.96027	0.000	19590	259.462	257.947	-4.264	395.070	0.000	813.403	139.111	305.395	T+158 sec	8:09:16	59.960	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	259.462	T+158 sec	8:09:16	1228.05	0.0397	-653
T+160 sec	8:09:18	59.96057	0.000	19590	257.469	257.780	-4.264	390.640	0.000	808.184	134.847	303.263	T+160 sec	8:09:18	59.961	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	257.469	T+160 sec	8:09:18	1237.90	0.0394	-653
T+162 sec	8:09:20	59.96219	0.000	19590	246.908	253.974	-4.264	382.571	0.000	802.993	130.584	301.131	T+162 sec	8:09:20	59.962	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	246.908	T+162 sec	8:09:20	1292.85	0.0378	-653
T+164 sec	8:09:22	59.96512	0.000	19590	227.777	244.805	-4.264	369.138	0.000	797.766	126.320	298.999	T+164 sec	8:09:22	59.965	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30232.45	227.777	T+164 sec	8:09:22	1405.88	0.0349	
T+166 sec	8:09:24	59.96738	0.000	19590	213.030	233.684	-4.264	353.753	0.000	792.480	122.056	296.867	T+166 sec	8:09:24	59.967	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.99	213.030	T+166 sec	8:09:24	1507.48	0.0326	
T+168 sec	8:09:26	59.96899	0.000	19590	202.468	222.758	-4.264	338.564	0.000	787.140	117.793	294.735	T+168 sec	8:09:26	59.969	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.99	202.468	T+168 sec	8:09:26	1589.76	0.0310	
T+170 sec	8:09:28	59.97061	0.000	19590	191.906	211.960	-4.264	323.502	0.000	781.749	113.529	292.603	T+170 sec	8:09:28	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	191.906	T+170 sec	8:09:28	1681.55	0.0294	
T+172 sec	8:09:30	59.97318	0.000	19590	175.167	199.083	-4.264	306.360	0.000	776.284	109.265	290.472	T+172 sec	8:09:30	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	175.167	T+172 sec	8:09:30	1850.91	0.0268	
T+174 sec	8:09:32	59.97351	0.000	19590	172.975	189.945	-4.264	292.959	0.000	770.792	105.002	288.340	T+174 sec	8:09:32	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	172.975	T+174 sec	8:09:32	1875.65	0.0265	
T+176 sec	8:09:34	59.97287	0.000	19590	177.160	185.470	-4.264	284.221	0.000	765.325	100.738	286.208	T+176 sec	8:09:34	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.68	177.160	T+176 sec	8:09:34	1828.98	0.0271	
T+178 sec	8:09:36	59.97253	0.000	19590	179.352	183.329	-4.264	277.815	0.000	759.908	96.474	284.076	T+178 sec	8:09:36	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	179.352	T+178 sec	8:09:36	1805.45	0.0275	
T+180 sec	8:09:38	59.97318	0.000	19590	175.167	180.472	-4.264	270.695	0.000	754.532	92.211	281.944	T+180 sec	8:09:38	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	175.167	T+180 sec	8:09:38	1850.91	0.0268	
	8:09:40	59.97415	0.000	19590	168.790	176.383	-4.264	262.343	0.000	749.182	87.947	279.812		8:09:40	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	168.790			1924.76	0.0258	
	8:09:42	59.97543	0.000	19590	160.420	170.796	-4.264	252.492	0.000	743.842	83.683	277.681		8:09:42	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30264.96	160.420			2031.13	0.0246	
	8:09:44	59.97577	0.000	19590	158.228	166.397	-4.264	243.830	0.000	738.522	79.420	275.549		8:09:44	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.63	158.228			2060.96	0.0242	
	8:09:46	59.9761	0.000	19590	156.036	162.771	-4.264	235.939	0.000	733.232	75.156	273.417		8:09:46	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30263.63	156.036			2091.68	0.0239	
	8:09:48	59.97675	0.000	19590	151.851	158.949	-4.264	227.854	0.000	727.968	70.892	271.285		8:09:48	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	151.851			2152.94	0.0233	
	8:09:50	59.97803	0.000	19590	143.481	153.535	-4.264	218.176	0.000	722.712	66.629	269.153		8:09:50	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	143.481			2286.90	0.0220	
	8:09:52	59.97931	0.000	19590	135.112	147.087	-4.264	207.464	0.000	717.454	62.365	267.021		8:09:52	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	135.112			2438.64	0.0207	
	8:09:54	59.97998	0.000	19590	130.728	141.361	-4.264	197.475	0.000	712.202	58.101	264.890		8:09:54	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30279.39	130.728			2526.45	0.0200	
	8:09:56	59.97964	0.000	19590	132.920	138.407	-4.264	190.257	0.000	706.983	53.838	262.758		8:09:56	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	132.920			2481.77	0.0204	
	8:09:58	59.979	0.000	19590	137.104	137.951	-4.264	185.537	0.000	701.820	49.574	260.626		8:09:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	137.104			2400.71	0.0210	
	8:10:00	59.97964	0.000	19590	132.920	136.190	-4.264	179.513	0.000	696.699	45.310	258.494		8:10:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	132.920			2481.77	0.0204	
	8:10:02	59.98093	0.000	19590	124.550	132.116	-4.264	171.175	0.000	691.597	41.047	256.362		8:10:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30255.32	124.550			2661.48	0.0191	
	8:10:04	59.98224	0.000	19590	115.981	126.469	-4.264	161.264	0.000	686.498	36.783	254.230		8:10:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30260.67	115.981			2874.60	0.0178	
	8:10:06	59.98386	0.000	19590	105.419	119.101	-4.264	149.633	0.000	681.385	32.519	252.099		8:10:06	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30260.67	105.419			3189.38	0.0161	
	8:10:08	59.98514	0.000	19590	97.049	111.383	-4.264	137.651	0.000	676.255	28.256	249.967		8:10:08	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	97.049			3492.44	0.0149	
	8:10:10	59.98773	0.000	19590	80.110	100.438	-4.264	122.442	0.000	671.079	23.992	247.835		8:10:10	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	80.110			4323.98	0.0123	
	8:10:12	59.9903	0.000	19590	63.371	87.464	-4.264	105.205	0.000	665.840	19.728	245.703		8:10:12	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	63.371			5654.43	0.0097	
	8:10:14	59.99289	0.000	19590	46.432	73.103	-4.264	86.580	0.000	660.525	15.465	243.571		8:10:14	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30259.99	46.432			8210.95	0.0071	
	8:10:16	59.99579	0.000	19590	27.501	57.142	-4.264	66.355	0.000	655.124	11.201	241.439		8:10:16	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	27.501			16598.49	0.0042	
	8:10:18	59.99646	0.000	19590	23.116	45.233	-4.264	50.183	0.000	649.674	6.937	239.308		8:10:18	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	23.116			21741.68	0.0035	
	8:10:20	59.99579	0.000	19590	27.501	39.027	-4.264	39.713	0.000	644.228	2.673	237.176		8:10:20	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	27.501			16598.49	0.0042	
	8:10:22	59.99612	0.000	19590	25.309	34.225	-4.264	30.648	0.000	638.798	-1.590	235.044		8:10:22	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30274.08	25.309			18825.12	0.0039	
	8:10:24	59.99579	0.000	19590	27.501	31.872	-4.264	24.030	0.000	633.405	-5.854	232.912		8:10:24	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.68	27.501			16598.49	0.0042	
	8:10:26	59.99484	0.000	19590	33.678	32.504	-4.264	20.399	0.000	628.075	-10.118	230.780		8:10:26	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.68	33.678			12448.87	0.0052	
	8:10:28	59.99484	0.000	19590	33.678	32.915	-4.264	16.546	0.000	622.803	-14.381	228.648		8:10:28	59.995	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	33.678			12448.87	0.0052	
	8:10:30	59.99805	0.000	19590	12.754	25.859	-4.264	5.226	0.000	617.525	-18.645	226.516		8:10:30	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	12.754			81245.24	0.0020	
	8:10:32	59.99872	0.000	19590	8.370	19.738	0.000	-0.895	0.000	612.284	-18.645	224.421		8:10:32	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	8.370				0.0013	
	8:10:34	60.00034	0.000	19590	-2.192	12.062	0.000	-8.570	0.000	607.066	-18.645	222.361		8:10:34	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30297.65	-2.192				0.0003	
	8:10:36	60.00195	0.000	19590	-12.754	3.377	0.000	-17.256	0.000	601.864	-18.645	220.336		8:10:36	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-12.754				0.0020	
	8:10:38	60.00259	0.000	19590	-16.939	-3.734	0.000	-24.366	0.000	596.688	-18.645	218.344		8:10:38	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-16.939				0.0026	
	8:10:40	60.00226	0.000	19590	-14.747	-7.588	0.000	-28.221	0.000	591.566	-18.645	216.386		8:10:40	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-14.747				0.0023	
	8:10:42	60.00195	0.000	19590	-12.754	-9.396	0.000	-30.029	0.000	586.512	-18.645	214.459		8:10:42	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30300.10	-12.754				0.0020	
	8:10:44	60.00064	0.000	19590	-4.185	-7.572	0.000	-28.205	0.000	581.555	-18.645	212.564		8:10:44	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30314.84	-4.185				0.0006	
	8:10:46	59.99646	0.000	19590	23.116	3.169	0.000	-17.464	0.000	576.763	-18.645	210.700		8:10:46	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30314.84	23.116			21741.68	0.0035	
	8:10:48	59.99191	0.000	19590	52.809	20.543	0.000	-0.090	0.000	572.185	-18.645	208.865		8:10:48	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	52.809			7016.63	0.0081	
	8:10:50	59.98901	0.000	19590	71.741	38.462	0.000	17.830	0.000	567.820	-18.645	207.059		8:10:50	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	71.741			4900.51	0.0110	
	8:10:52	59.98773	0.000	19590	80.110	53.039	0.000	32.407	0.000	563.637	-18.645	205.282		8:10:52	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	80.110			4323.98	0.0123	
	8:10:54	59.98901	0.000	19590	71.741	59.585	0.000	38.952	0.000	559.570	-18.645	203.533		8:10:54	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30309.71	71.741			4900.51	0.0110	
	8:10:56	59.99255	0.000	19590	48.624	55.749	0.000	35.116	0.000	555.535	-18.645	201.810		8:10:56	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	48.624			7757.08	0.0074	
	8:10:58	59.99579	0.000	19590	27.501	45.862	0.000	25.229	0.000	551.487	-18.645	200.114		8:10:58	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	27.501			16598.49	0.0042	
	8:11:00	59.99902	0.000	19590	6.377	32.042	0.000	11.410	0.000	547.396	-18.645	198.445		8:11:00	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	6.377				0.0010	
	8:11:02	60.00195	0.000	19590	-12.754	16.363	0.000	-4.269	0.000	543.248	-18.645	196.800		8:11:02	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30319.50	-12.754				0.0020	
	8:11:04	60.00485	0.000	19590	-31.685	-0.454	0.000	-21.086	0.000	539.036	-18.645	195.180		8:11:04	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.21	-31.685				0.0049	
	8:11:06	60.00809	0.000	19590	-52.809	-18.778	0.000	-39.411	0.000	534.752	-18.645	193.584		8:11:06	60.008	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.21	-52.809				0.0081	
	8:11:08	60.01163	0.000	19590	-75.926	-38.780	0.000	-59.412	0.000	530.383	-18.645	192.012		8:11:08	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-75.926				0.0116	
	8:11:10	60.01422	0.000	19590	-92.864	-57.709	0.000	-78.342	0.000	525.939	-18.645	190.463		8:11:10	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-92.864				0.0142	
	8:11:12	60.0152	0.000	19590	-99.241	-72.246	0.000	-92.878	0.000	521.455	-18.645	188.937		8:11:12	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-99.241				0.0152	
	8:11:14	60.0155	0.000	19590	-101.234	-82.392	0.000	-103.024	0.000	516.963	-18.645	187.433		8:11:14	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30357.18	-101.234				0.0155	
	8:11:16	60.0155	0.000	19590	-101.234	-88.986	0.000	-109.619	0.000	512.487	-18.645	185.950		8:11:16	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-101.234				0.0155	
	8:11:18	60.01682	0.000	19590	-109.803	-96.272	0.000	-116.905	0.000	508.023	-18.645	184.489		8:11:18	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-109.803				0.0168	
	8:11:20	60.01907	0.000	19590	-124.550	-106.169	0.000	-126.802	0.000	503.553	-18.645	183.048		8:11:20	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-124.550				0.0191	
	8:11:22	60.02295	0.000	19590	-149.858	-121.461	0.000	-142.093	0.000	499.038	-18.645	181.628		8:11:22	60.023	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.26	-149.858				0.0229	
	8:11:24	60.02618	0.000	19590	-170.982	-138.793	0.000	-159.426	0.000	494.465	-18.645	180.227		8:11:24	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.48	-170.982				0.0262	
	8:11:26	60.02972	0.000	19590	-194.099	-158.150	0.000	-178.782	0.000	489.822	-18.645	178.846		8:11:26	60.030	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.48	-194.099				0.0297	
	8:11:28	60.03262	0.000	19590	-213.030	-177.358	0.000	-197.990	0.000	485.111	-18.645	177.484		8:11:28	60.033	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-213.030				0.0326	
	8:11:30	60.03458	0.000	19590	-225.784	-194.307	0.000	-214.940	0.000	480.349	-18.645	176.141		8:11:30	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-225.784				0.0346	
	8:11:32	60.03522	0.000	19590	-229.969	-206.789	0.000	-227.421	0.000	475.566	-18.645	174.816		8:11:32	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-229.969				0.0352	
	8:11:34	60.03424	0.000	19590	-223.592	-212.670	0.000	-233.302	0.000	470.809	-18.645	173.509		8:11:34	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30353.83	-223.592				0.0342	
	8:11:36	60.0336	0.000	19590	-219.407	-215.028	0.000	-235.660	0.000	466.099	-18.645	172.219		8:11:36	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-219.407				0.0336	
	8:11:38	60.03522	0.000	19590	-229.969	-220.257	0.000	-240.890	0.000	461.417	-18.645	170.947		8:11:38	60.035	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-229.969				0.0352	
	8:11:40	60.03812	0.000	19590	-248.900	-230.282	0.000	-250.915	0.000	456.731	-18.645	169.691		8:11:40	60.038	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-248.900				0.0381	-653
	8:11:42	60.04037	0.000	19590	-263.647	-241.960	0.000	-262.592	0.000	452.029	-18.645	168.452		8:11:42	60.040	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30370.41	-263.647				0.0404	-653
	8:11:44	60.04105	0.000	19590	-268.031	-251.085	0.000	-271.717	0.000	447.330	-18.645	167.229		8:11:44	60.041	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.79	-268.031				0.0410	-653
	8:11:46	60.04199	0.000	19590	-274.209	-259.178	0.000	-279.811	0.000	442.638	-18.645	166.022		8:11:46	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.79	-274.209				0.0420	-653
	8:11:48	60.04233	0.000	19590	-276.401	-265.206	0.000	-285.839	0.000	437.969	-18.645	164.831		8:11:48	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-276.401				0.0423	-653
	8:11:50	60.0433	0.000	19590	-282.778	-271.356	0.000	-291.989	0.000	433.319	-18.645	163.655		8:11:50	60.043	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-282.778				0.0433	-653
	8:11:52	60.04425	0.000	19590	-288.956	-277.516	0.000	-298.149	0.000	428.690	-18.645	162.493		8:11:52	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-288.956				0.0443	-653
	8:11:54	60.04492	0.000	19590	-293.340	-283.054	0.000	-303.687	0.000	424.083	-18.645	161.347		8:11:54	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.14	-293.340				0.0449	-653
	8:11:56	60.04556	0.000	19590	-297.525	-288.119	0.000	-308.751	0.000	419.503	-18.645	160.215		8:11:56	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-297.525				0.0456	-653
	8:11:58	60.04587	0.000	19590	-299.518	-292.109	0.000	-312.741	0.000	414.955	-18.645	159.097		8:11:58	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-299.518				0.0459	-653
	8:12:00	60.04654	0.000	19590	-303.902	-296.236	0.000	-316.869	0.000	410.438	-18.645	157.993		8:12:00	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-303.902				0.0465	-653
	8:12:02	60.0488	0.000	19590	-318.648	-304.080	0.000	-324.713	0.000	405.928	-18.645	156.903		8:12:02	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.53	-318.648				0.0488	-653
	8:12:04	60.04974	0.000	19590	-324.826	-311.341	0.000	-331.974	0.000	401.428	-18.645	155.826		8:12:04	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30343.46	-324.826				0.0497	-653
	8:12:06	60.0491	0.000	19590	-320.641	-314.596	0.000	-335.229	0.000	396.964	-18.645	154.762		8:12:06	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30343.46	-320.641				0.0491	-653
	8:12:08	60.0491	0.000	19590	-320.641	-316.712	0.000	-337.344	0.000	392.540	-18.645	153.711		8:12:08	60.049	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-320.641				0.0491	-653
	8:12:10	60.05042	0.000	19590	-329.210	-321.086	0.000	-341.719	0.000	388.143	-18.645	152.673		8:12:10	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-329.210				0.0504	-653
	8:12:12	60.04974	0.000	19590	-324.826	-322.395	0.000	-343.028	0.000	383.791	-18.645	151.647		8:12:12	60.050	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-324.826				0.0497	-653
	8:12:14	60.04846	0.000	19590	-316.456	-320.317	0.000	-340.949	0.000	379.503	-18.645	150.633		8:12:14	60.048	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30335.12	-316.456				0.0485	-653
	8:12:16	60.04718	0.000	19590	-308.087	-316.036	0.000	-336.669	0.000	375.290	-18.645	149.632		8:12:16	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-308.087				0.0472	-653
	8:12:18	60.04587	0.000	19590	-299.518	-310.255	0.000	-330.887	0.000	371.160	-18.645	148.642		8:12:18	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-299.518				0.0459	-653
	8:12:20	60.04587	0.000	19590	-299.518	-306.497	0.000	-327.129	0.000	367.100	-18.645	147.663		8:12:20	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-299.518				0.0459	-653
	8:12:22	60.04556	0.000	19590	-297.525	-303.356	0.000	-323.989	0.000	363.106	-18.645	146.697		8:12:22	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30337.29	-297.525				0.0456	-653
	8:12:24	60.04425	0.000	19590	-288.956	-298.316	0.000	-318.949	0.000	359.186	-18.645	145.741		8:12:24	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.20	-288.956				0.0443	-653
	8:12:26	60.04297	0.000	19590	-280.586	-292.111	0.000	-312.743	0.000	355.346	-18.645	144.796		8:12:26	60.043	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.20	-280.586				0.0430	-653
	8:12:28	60.04169	0.000	19590	-272.216	-285.148	0.000	-305.780	0.000	351.590	-18.645	143.862		8:12:28	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-272.216				0.0417	-653
	8:12:30	60.04233	0.000	19590	-276.401	-282.086	0.000	-302.719	0.000	347.893	-18.645	142.939		8:12:30	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-276.401				0.0423	-653
	8:12:32	60.04459	0.000	19590	-291.148	-285.258	0.000	-305.890	0.000	344.220	-18.645	142.026		8:12:32	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-291.148				0.0446	-653
	8:12:34	60.04654	0.000	19590	-303.902	-291.783	0.000	-312.416	0.000	340.552	-18.645	141.123		8:12:34	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.07	-303.902				0.0465	-653
	8:12:36	60.04718	0.000	19590	-308.087	-297.489	0.000	-318.122	0.000	336.893	-18.645	140.231		8:12:36	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-308.087				0.0472	-653
	8:12:38	60.0462	0.000	19590	-301.710	-298.966	0.000	-319.599	0.000	333.266	-18.645	139.348		8:12:38	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-301.710				0.0462	-653
	8:12:40	60.04425	0.000	19590	-288.956	-295.463	0.000	-316.095	0.000	329.698	-18.645	138.475		8:12:40	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-288.956				0.0443	-653
	8:12:42	60.04492	0.000	19590	-293.340	-294.720	0.000	-315.352	0.000	326.173	-18.645	137.612		8:12:42	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.77	-293.340				0.0449	-653
	8:12:44	60.04523	0.000	19590	-295.333	-294.934	0.000	-315.567	0.000	322.685	-18.645	136.758		8:12:44	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-295.333				0.0452	-653
	8:12:46	60.04523	0.000	19590	-295.333	-295.074	0.000	-315.706	0.000	319.234	-18.645	135.913		8:12:46	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-295.333				0.0452	-653
	8:12:48	60.04556	0.000	19590	-297.525	-295.932	0.000	-316.564	0.000	315.816	-18.645	135.078		8:12:48	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-297.525				0.0456	-653
	8:12:50	60.0462	0.000	19590	-301.710	-297.954	0.000	-318.586	0.000	312.423	-18.645	134.251		8:12:50	60.046	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-301.710				0.0462	-653
	8:12:52	60.04654	0.000	19590	-303.902	-300.036	0.000	-320.668	0.000	309.056	-18.645	133.434		8:12:52	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-303.902				0.0465	-653
	8:12:54	60.04654	0.000	19590	-303.902	-301.389	0.000	-322.021	0.000	305.717	-18.645	132.625		8:12:54	60.047	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30372.38	-303.902				0.0465	-653
	8:12:56	60.04523	0.000	19590	-295.333	-299.269	0.000	-319.902	0.000	302.424	-18.645	131.825		8:12:56	60.045	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-295.333				0.0452	-653
	8:12:58	60.04361	0.000	19590	-284.771	-294.195	0.000	-314.827	0.000	299.193	-18.645	131.033		8:12:58	60.044	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-284.771				0.0436	-653
	8:13:00	60.04199	0.000	19590	-274.209	-287.200	0.000	-307.832	0.000	296.031	-18.645	130.249		8:13:00	60.042	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-274.209				0.0420	-653
	8:13:02	60.04071	0.000	19590	-265.839	-279.724	0.000	-300.356	0.000	292.941	-18.645	129.473		8:13:02	60.041	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30349.10	-265.839				0.0407	-653
	8:13:04	60.03876	0.000	19590	-253.085	-270.400	0.000	-291.033	0.000	289.931	-18.645	128.706		8:13:04	60.039	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.65	-253.085				0.0388	-653
	8:13:06	60.03586	0.000	19590	-234.154	-257.714	0.000	-278.346	0.000	287.016	-18.645	127.946		8:13:06	60.036	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.65	-234.154				0.0359	
	8:13:08	60.03394	0.000	19590	-221.599	-245.074	0.000	-265.706	0.000	284.196	-18.645	127.195		8:13:08	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-221.599				0.0339	
	8:13:10	60.0336	0.000	19590	-219.407	-236.090	0.000	-256.723	0.000	281.451	-18.645	126.451		8:13:10	60.034	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-219.407				0.0336	
	8:13:12	60.03262	0.000	19590	-213.030	-228.019	0.000	-248.652	0.000	278.773	-18.645	125.714		8:13:12	60.033	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-213.030				0.0326	
	8:13:14	60.03006	0.000	19590	-196.291	-216.914	0.000	-237.547	0.000	276.179	-18.645	124.985		8:13:14	60.030	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30363.88	-196.291				0.0301	
	8:13:16	60.02747	0.000	19590	-179.352	-203.767	0.000	-224.400	0.000	273.676	-18.645	124.263		8:13:16	60.027	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-179.352				0.0275	
	8:13:18	60.02682	0.000	19590	-175.167	-193.757	0.000	-214.390	0.000	271.248	-18.645	123.549		8:13:18	60.027	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-175.167				0.0268	
	8:13:20	60.02585	0.000	19590	-168.790	-185.019	0.000	-205.651	0.000	268.887	-18.645	122.841		8:13:20	60.026	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-168.790				0.0258	
	8:13:22	60.02359	0.000	19590	-154.043	-174.177	0.000	-194.810	0.000	266.603	-18.645	122.141		8:13:22	60.024	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.77	-154.043				0.0236	
	8:13:24	60.02197	0.000	19590	-143.481	-163.434	0.000	-184.066	0.000	264.393	-18.645	121.447		8:13:24	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.33	-143.481				0.0220	
	8:13:26	60.02164	0.000	19590	-141.289	-155.683	0.000	-176.316	0.000	262.244	-18.645	120.761		8:13:26	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30374.33	-141.289				0.0216	
	8:13:28	60.02231	0.000	19590	-145.674	-152.180	0.000	-172.812	0.000	260.132	-18.645	120.081		8:13:28	60.022	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-145.674				0.0223	
	8:13:30	60.02133	0.000	19590	-139.297	-147.671	0.000	-168.303	0.000	258.062	-18.645	119.407		8:13:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-139.297				0.0213	
	8:13:32	60.02133	0.000	19590	-139.297	-144.740	0.000	-165.372	0.000	256.026	-18.645	118.740		8:13:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-139.297				0.0213	
	8:13:34	60.02002	0.000	19590	-130.728	-139.835	0.000	-160.468	0.000	254.033	-18.645	118.080		8:13:34	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30364.67	-130.728				0.0200	
	8:13:36	60.01776	0.000	19590	-115.981	-131.486	0.000	-152.119	0.000	252.099	-18.645	117.426		8:13:36	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-115.981				0.0178	
	8:13:38	60.01584	0.000	19590	-103.426	-121.665	0.000	-142.298	0.000	250.230	-18.645	116.778		8:13:38	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-103.426				0.0158	
	8:13:40	60.01291	0.000	19590	-84.295	-108.586	0.000	-129.218	0.000	248.440	-18.645	116.136		8:13:40	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-84.295				0.0129	
	8:13:42	60.01132	0.000	19590	-73.933	-96.457	0.000	-117.090	0.000	246.724	-18.645	115.500		8:13:42	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.56	-73.933				0.0113	
	8:13:44	60.01001	0.000	19590	-65.364	-85.575	0.000	-106.207	0.000	245.075	-18.645	114.870		8:13:44	60.010	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.69	-65.364				0.0100	
	8:13:46	60.00937	0.000	19590	-61.179	-77.036	0.000	-97.669	0.000	243.481	-18.645	114.246		8:13:46	60.009	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30350.69	-61.179				0.0094	
	8:13:48	60.00775	0.000	19590	-50.617	-67.789	0.000	-88.422	0.000	241.944	-18.645	113.628		8:13:48	60.008	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-50.617				0.0078	
	8:13:50	60.00516	0.000	19590	-33.678	-55.851	0.000	-76.483	0.000	240.477	-18.645	113.016		8:13:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-33.678				0.0052	
	8:13:52	60.00452	0.000	19590	-29.493	-46.626	0.000	-67.258	0.000	239.065	-18.645	112.409		8:13:52	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-29.493				0.0045	
	8:13:54	60.00613	0.000	19590	-40.055	-44.326	0.000	-64.958	0.000	237.677	-18.645	111.808		8:13:54	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30344.52	-40.055				0.0061	

8:13:56	60.00613	0.000	19590	-40.055	-42.831	0.000	-63.464	0.000	236.308	-18.645	111.212	8:13:56	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-40.055		0.0061
8:13:58	60.00549	0.000	19590	-35.870	-40.395	0.000	-61.027	0.000	234.963	-18.645	110.622	8:13:58	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-35.870		0.0055
8:14:00	60.00516	0.000	19590	-33.678	-38.044	0.000	-58.677	0.000	233.640	-18.645	110.037	8:14:00	60.005	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-33.678		0.0052
8:14:02	60.00388	0.000	19590	-25.309	-33.587	0.000	-54.219	0.000	232.349	-18.645	109.457	8:14:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30354.37	-25.309		0.0039
8:14:04	60.00259	0.000	19590	-16.939	-27.760	0.000	-48.392	0.000	231.096	-18.645	108.883	8:14:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.31	-16.939		0.0026
8:14:06	60.00128	0.000	19590	-8.370	-20.973	0.000	-41.606	0.000	229.884	-18.645	108.314	8:14:06	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.31	-8.370		0.0013
8:14:08	60.00128	0.000	19590	-8.370	-16.562	0.000	-37.195	0.000	228.702	-18.645	107.749	8:14:08	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-8.370		0.0013
8:14:10	60.00064	0.000	19590	-4.185	-12.230	0.000	-32.863	0.000	227.550	-18.645	107.190	8:14:10	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-4.185		0.0006
8:14:12	60.00034	0.000	19590	-2.192	-8.717	0.000	-29.349	0.000	226.423	-18.645	106.636	8:14:12	60.000	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-2.192		0.0003
8:14:14	60.00226	0.000	19590	-14.747	-10.827	0.000	-31.460	0.000	225.297	-18.645	106.086	8:14:14	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.78	-14.747		0.0023
8:14:16	60.00421	0.000	19590	-27.501	-16.663	0.000	-37.295	0.000	224.155	-18.645	105.542	8:14:16	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-27.501		0.0042
8:14:18	60.00677	0.000	19590	-44.240	-26.315	0.000	-46.947	0.000	222.982	-18.645	105.002	8:14:18	60.007	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-44.240		0.0068
8:14:20	60.00903	0.000	19590	-58.987	-37.750	0.000	-58.383	0.000	221.769	-18.645	104.466	8:14:20	60.009	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-58.987		0.0090
8:14:22	60.01291	0.000	19590	-84.295	-54.041	0.000	-74.673	0.000	220.497	-18.645	103.936	8:14:22	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30366.33	-84.295		0.0129
8:14:24	60.01486	0.000	19590	-97.049	-69.094	0.000	-89.726	0.000	219.171	-18.645	103.410	8:14:24	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.85	-97.049		0.0149
8:14:26	60.01453	0.000	19590	-94.857	-78.111	0.000	-98.743	0.000	217.818	-18.645	102.888	8:14:26	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.85	-94.857		0.0145
8:14:28	60.01422	0.000	19590	-92.864	-83.275	0.000	-103.907	0.000	216.455	-18.645	102.371	8:14:28	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-92.864		0.0142
8:14:30	60.0152	0.000	19590	-99.241	-88.863	0.000	-109.495	0.000	215.080	-18.645	101.858	8:14:30	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-99.241		0.0152
8:14:32	60.01614	0.000	19590	-105.419	-94.658	0.000	-115.290	0.000	213.691	-18.645	101.350	8:14:32	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-105.419		0.0161
8:14:34	60.01682	0.000	19590	-109.803	-99.959	0.000	-120.591	0.000	212.293	-18.645	100.846	8:14:34	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30373.05	-109.803		0.0168
8:14:36	60.01746	0.000	19590	-113.988	-104.869	0.000	-125.501	0.000	210.885	-18.645	100.346	8:14:36	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-113.988		0.0175
8:14:38	60.01712	0.000	19590	-111.796	-107.293	0.000	-127.926	0.000	209.479	-18.645	99.850	8:14:38	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-111.796		0.0171
8:14:40	60.01682	0.000	19590	-109.803	-108.172	0.000	-128.804	0.000	208.082	-18.645	99.358	8:14:40	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-109.803		0.0168
8:14:42	60.01648	0.000	19590	-107.611	-107.976	0.000	-128.608	0.000	206.696	-18.645	98.870	8:14:42	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30369.77	-107.611		0.0165
8:14:44	60.01614	0.000	19590	-105.419	-107.081	0.000	-127.713	0.000	205.325	-18.645	98.387	8:14:44	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.99	-105.419		0.0161
8:14:46	60.01746	0.000	19590	-113.988	-109.498	0.000	-130.131	0.000	203.956	-18.645	97.907	8:14:46	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.99	-113.988		0.0175
8:14:48	60.01776	0.000	19590	-115.981	-111.767	0.000	-132.400	0.000	202.589	-18.645	97.432	8:14:48	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-115.981		0.0178
8:14:50	60.01776	0.000	19590	-115.981	-113.242	0.000	-133.874	0.000	201.227	-18.645	96.960	8:14:50	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-115.981		0.0178
8:14:52	60.01648	0.000	19590	-107.611	-111.271	0.000	-131.904	0.000	199.883	-18.645	96.492	8:14:52	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-107.611		0.0165
8:14:54	60.01584	0.000	19590	-103.426	-108.525	0.000	-129.158	0.000	198.562	-18.645	96.027	8:14:54	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.16	-103.426		0.0158
8:14:56	60.01648	0.000	19590	-107.611	-108.205	0.000	-128.838	0.000	197.252	-18.645	95.567	8:14:56	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-107.611		0.0165
8:14:58	60.01584	0.000	19590	-103.426	-106.533	0.000	-127.165	0.000	195.960	-18.645	95.110	8:14:58	60.016	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-103.426		0.0158
8:15:00	60.01358	0.000	19590	-88.680	-100.284	0.000	-120.917	0.000	194.703	-18.645	94.657	8:15:00	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-88.680		0.0136
8:15:02	60.01163	0.000	19590	-75.926	-91.759	0.000	-112.391	0.000	193.489	-18.645	94.207	8:15:02	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.94	-75.926		0.0116
8:15:04	60.01132	0.000	19590	-73.933	-85.520	0.000	-106.152	0.000	192.309	-18.645	93.761	8:15:04	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30371.85	-73.933		0.0113
8:15:06	60.01132	0.000	19590	-73.933	-81.464	0.000	-102.097	0.000	191.154	-18.645	93.319	8:15:06	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30371.85	-73.933		0.0113
8:15:08	60.01099	0.000	19590	-71.741	-78.061	0.000	-98.693	0.000	190.022	-18.645	92.879	8:15:08	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-71.741		0.0110
8:15:10	60.01099	0.000	19590	-71.741	-75.849	0.000	-96.481	0.000	188.907	-18.645	92.444	8:15:10	60.011	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-71.741		0.0110
8:15:12	60.01291	0.000	19590	-84.295	-78.805	0.000	-99.438	0.000	187.790	-18.645	92.012	8:15:12	60.013	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-84.295		0.0129
8:15:14	60.01486	0.000	19590	-97.049	-85.191	0.000	-105.823	0.000	186.656	-18.645	91.583	8:15:14	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30362.65	-97.049		0.0149
8:15:16	60.01776	0.000	19590	-115.981	-95.967	0.000	-116.600	0.000	185.490	-18.645	91.157	8:15:16	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-115.981		0.0178
8:15:18	60.01776	0.000	19590	-115.981	-102.972	0.000	-123.604	0.000	184.306	-18.645	90.735	8:15:18	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-115.981		0.0178
8:15:20	60.0184	0.000	19590	-120.166	-108.990	0.000	-129.622	0.000	183.107	-18.645	90.316	8:15:20	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-120.166		0.0184
8:15:22	60.0181	0.000	19590	-118.173	-112.204	0.000	-132.836	0.000	181.906	-18.645	89.900	8:15:22	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30395.46	-118.173		0.0181
8:15:24	60.01746	0.000	19590	-113.988	-112.828	0.000	-133.461	0.000	180.711	-18.645	89.487	8:15:24	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30397.03	-113.988		0.0175
8:15:26	60.0152	0.000	19590	-99.241	-108.073	0.000	-128.705	0.000	179.544	-18.645	89.078	8:15:26	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30397.03	-99.241		0.0152
8:15:28	60.0152	0.000	19590	-99.241	-104.982	0.000	-125.614	0.000	178.397	-18.645	88.671	8:15:28	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-99.241		0.0152
8:15:30	60.01389	0.000	19590	-90.672	-99.974	0.000	-120.606	0.000	177.277	-18.645	88.268	8:15:30	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-90.672		0.0139
8:15:32	60.01746	0.000	19590	-113.988	-104.879	0.000	-125.511	0.000	176.147	-18.645	87.867	8:15:32	60.017	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-113.988		0.0175
8:15:34	60.01907	0.000	19590	-124.550	-111.764	0.000	-132.396	0.000	175.000	-18.645	87.470	8:15:34	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30396.67	-124.550		0.0191
8:15:36	60.01907	0.000	19590	-124.550	-116.239	0.000	-136.871	0.000	173.845	-18.645	87.075	8:15:36	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-124.550		0.0191
8:15:38	60.02036	0.000	19590	-132.920	-122.077	0.000	-142.710	0.000	172.677	-18.645	86.684	8:15:38	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-132.920		0.0204
8:15:40	60.01874	0.000	19590	-122.358	-122.175	0.000	-142.808	0.000	171.517	-18.645	86.295	8:15:40	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-122.358		0.0187
8:15:42	60.01874	0.000	19590	-122.358	-122.239	0.000	-142.872	0.000	170.365	-18.645	85.909	8:15:42	60.019	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30388.62	-122.358		0.0187
8:15:44	60.01971	0.000	19590	-128.735	-124.513	0.000	-145.145	0.000	169.214	-18.645	85.526	8:15:44	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.78	-128.735		0.0197
8:15:46	60.01971	0.000	19590	-128.735	-125.990	0.000	-146.623	0.000	168.065	-18.645	85.146	8:15:46	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.78	-128.735		0.0197
8:15:48	60.01971	0.000	19590	-128.735	-126.951	0.000	-147.583	0.000	166.922	-18.645	84.769	8:15:48	60.020	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-128.735		0.0197
8:15:50	60.0184	0.000	19590	-120.166	-124.576	0.000	-145.209	0.000	165.795	-18.645	84.394	8:15:50	60.018	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-120.166		0.0184
8:15:52	60.01486	0.000	19590	-97.049	-114.942	0.000	-135.574	0.000	164.711	-18.645	84.022	8:15:52	60.015	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-97.049		0.0149
8:15:54	60.01358	0.000	19590	-88.680	-105.750	0.000	-126.382	0.000	163.667	-18.645	83.653	8:15:54	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30382.96	-88.680		0.0136
8:15:56	60.01389	0.000	19590	-90.672	-100.473	0.000	-121.105	0.000	162.650	-18.645	83.286	8:15:56	60.014	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-90.672		0.0139
8:15:58	60.01227	0.000	19590	-80.110	-93.346	0.000	-113.978	0.000	161.666	-18.645	82.922	8:15:58	60.012	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-80.110		0.0123
8:16:00	60.01001	0.000	19590	-65.364	-83.552	0.000	-104.185	0.000	160.723	-18.645	82.561	8:16:00	60.010	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-65.364		0.0100
8:16:02	60.00583	0.000	19590	-38.062	-67.631	0.000	-88.263	0.000	159.843	-18.645	82.202	8:16:02	60.006	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30381.48	-38.062		0.0058
8:16:04	60.00162	0.000	19590	-10.562	-47.657	0.000	-68.289	0.000	159.040	-18.645	81.845	8:16:04	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.03	-10.562		0.0016
8:16:06	60.00162	0.000	19590	-10.562	-34.673	0.000	-55.306	0.000	158.288	-18.645	81.491	8:16:06	60.002	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.03	-10.562		0.0016
8:16:08	59.99805	0.000	19590	12.754	-18.074	0.000	-38.706	0.000	157.599	-18.645	81.140	8:16:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	12.754	81245.24	0.0020
8:16:10	59.99353	0.000	19590	42.247	3.039	0.000	-17.594	0.000	156.989	-18.645	80.791	8:16:10	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	42.247	9243.47	0.0065
8:16:12	59.99255	0.000	19590	48.624	18.994	0.000	-1.639	0.000	156.438	-18.645	80.445	8:16:12	59.993	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	48.624	7757.08	0.0074
8:16:14	59.99225	0.000	19590	50.617	30.062	0.000	9.429	0.000	155.929	-18.645	80.101	8:16:14	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30394.07	50.617	7385.93	0.0078
8:16:16	59.98999	0.000	19590	65.364	42.417	0.000	21.785	0.000	155.467	-18.645	79.759	8:16:16	59.990	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	65.364	5454.63	0.0100
8:16:18	59.98837	0.000	19590	75.926	54.145	0.000	33.513	0.000	155.048	-18.645	79.420	8:16:18	59.988	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	75.926	4594.22	0.0116
8:16:20	59.98416	0.000	19590	103.426	71.394	0.000	50.761	0.000	154.691	-18.645	79.083	8:16:20	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	103.426	3256.67	0.0158
8:16:22	59.9816	0.000	19590	120.166	88.464	0.000	67.831	0.000	154.394	-18.645	78.748	8:16:22	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30376.91	120.166	2766.41	0.0184
8:16:24	59.98093	0.000	19590	124.550	101.094	0.000	80.462	0.000	154.143	-18.645	78.416	8:16:24	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.96	124.550	2661.48	0.0191
8:16:26	59.98029	0.000	19590	128.735	110.768	0.000	90.136	0.000	153.926	-18.645	78.085	8:16:26	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.96	128.735	2568.49	0.0197
8:16:28	59.97998	0.000	19590	130.728	117.754	0.000	97.122	0.000	153.734	-18.645	77.758	8:16:28	59.980	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	130.728	2526.45	0.0200
8:16:30	59.97836	0.000	19590	141.289	125.991	0.000	105.359	0.000	153.571	-18.645	77.432	8:16:30	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	141.289	2324.79	0.0216
8:16:32	59.97513	0.000	19590	162.413	138.739	0.000	118.107	0.000	153.452	-18.645	77.108	8:16:32	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	162.413	2004.75	0.0249
8:16:34	59.97287	0.000	19590	177.160	152.186	0.000	131.554	0.000	153.379	-18.645	76.787	8:16:34	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.46	177.160	1828.98	0.0271
8:16:36	59.97189	0.000	19590	183.537	163.159	0.000	142.526	0.000	153.342	-18.645	76.468	8:16:36	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	183.537	1762.17	0.0281
8:16:38	59.97156	0.000	19590	185.729	171.058	0.000	150.426	0.000	153.333	-18.645	76.151	8:16:38	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	185.729	1740.32	0.0284
8:16:40	59.97382	0.000	19590	170.982	171.032	0.000	150.399	0.000	153.323	-18.645	75.836	8:16:40	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	170.982	1898.72	0.0262
8:16:42	59.97641	0.000	19590	154.043	165.086	0.000	144.453	0.000	153.294	-18.645	75.523	8:16:42	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30361.18	154.043	2120.41	0.0236
8:16:44	59.97836	0.000	19590	141.289	156.757	0.000	136.125	0.000	153.237	-18.645	75.212	8:16:44	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.59	141.289	2324.79	0.0216
8:16:46	59.97705	0.000	19590	149.858	154.342	0.000	133.710	0.000	153.173	-18.645	74.904	8:16:46	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.59	149.858	2183.39	0.0229
8:16:48	59.97449	0.000	19590	166.598	158.632	0.000	137.999	0.000	153.124	-18.645	74.597	8:16:48	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	166.598	1951.53	0.0255
8:16:50	59.97125	0.000	19590	187.722	168.813	0.000	148.181	0.000	153.108	-18.645	74.292	8:16:50	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	187.722	1720.91	0.0287
8:16:52	59.97092	0.000	19590	189.914	176.198	0.000	155.566	0.000	153.116	-18.645	73.989	8:16:52	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	189.914	1700.07	0.0291
8:16:54	59.97287	0.000	19590	177.160	176.535	0.000	155.902	0.000	153.125	-18.645	73.689	8:16:54	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30365.19	177.160	1828.98	0.0271
8:16:56	59.97449	0.000	19590	166.598	173.057	0.000	152.424	0.000	153.122	-18.645	73.390	8:16:56	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	166.598	1951.53	0.0255
8:16:58	59.97382	0.000	19590	170.982	172.331	0.000	151.698	0.000	153.118	-18.645	73.093	8:16:58	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	170.982	1898.72	0.0262
8:17:00	59.97318	0.000	19590	175.167	173.323	0.000	152.691	0.000	153.116	-18.645	72.798	8:17:00	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	175.167	1850.91	0.0268
8:17:02	59.97449	0.000	19590	166.598	170.969	0.000	150.337	0.000	153.108	-18.645	72.505	8:17:02	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30375.91	166.598	1951.53	0.0255
8:17:04	59.9761	0.000	19590	156.036	165.743	0.000	145.110	0.000	153.082	-18.645	72.214	8:17:04	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.40	156.036	2091.68	0.0239
8:17:06	59.97739	0.000	19590	147.666	159.416	0.000	138.784	0.000	153.037	-18.645	71.924	8:17:06	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.40	147.666	2217.90	0.0226
8:17:08	59.97836	0.000	19590	141.289	153.072	0.000	132.439	0.000	152.971	-18.645	71.637	8:17:08	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	141.289	2324.79	0.0216
8:17:10	59.97769	0.000	19590	145.674	150.482	0.000	129.850	0.000	152.899	-18.645	71.351	8:17:10	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	145.674	2250.23	0.0223
8:17:12	59.97705	0.000	19590	149.858	150.264	0.000	129.632	0.000	152.825	-18.645	71.067	8:17:12	59.977	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	149.858	2183.39	0.0229
8:17:14	59.97641	0.000	19590	154.043	151.587	0.000	130.954	0.000	152.757	-18.645	70.785	8:17:14	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30367.72	154.043	2120.41	0.0236
8:17:16	59.97543	0.000	19590	160.420	154.678	0.000	134.046	0.000	152.698	-18.645	70.505	8:17:16	59.975	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	160.420	2031.13	0.0246
8:17:18	59.97382	0.000	19590	170.982	160.385	0.000	139.752	0.000	152.658	-18.645	70.226	8:17:18	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	170.982	1898.72	0.0262
8:17:20	59.97318	0.000	19590	175.167	165.558	0.000	144.926	0.000	152.634	-18.645	69.949	8:17:20	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	175.167	1850.91	0.0268
8:17:22	59.97223	0.000	19590	181.345	171.084	0.000	150.451	0.000	152.627	-18.645	69.674	8:17:22	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30416.87	181.345	1784.58	0.0278
8:17:24	59.97189	0.000	19590	183.537	175.442	0.000	154.810	0.000	152.634	-18.645	69.401	8:17:24	59.972	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30413.65	183.537	1762.17	0.0281
8:17:26	59.97092	0.000	19590	189.914	180.507	0.000	159.875	0.000	152.656	-18.645	69.129	8:17:26	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30413.65	189.914	1700.07	0.0291
8:17:28	59.96994	0.000	19590	196.291	186.031	0.000	165.399	0.000	152.695	-18.645	68.859	8:17:28	59.970	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	196.291	1642.19	0.0301
8:17:30	59.96832	0.000	19590	206.852	193.319	0.000	172.686	0.000	152.756	-18.645	68.590	8:17:30	59.968	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	206.852	1554.54	0.0317
8:17:32	59.96606	0.000	19590	221.599	203.217	0.000	182.584	0.000	152.847	-18.645	68.324	8:17:32	59.966	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	221.599	1446.73	0.0339
8:17:34	59.96542	0.000	19590	225.784	211.115	0.000	190.483	0.000	152.962	-18.645	68.059	8:17:34	59.965	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30406.30	225.784	1418.80	0.0346
8:17:36	59.96606	0.000	19590	221.599	214.785	0.000	194.152	0.000	153.087	-18.645	67.795	8:17:36	59.966	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	221.599	1446.73	0.0339
8:17:38	59.9693	0.000	19590	200.475	209.776	0.000	189.144	0.000	153.196	-18.645	67.533	8:17:38	59.969	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	200.475	1606.31	0.0307
8:17:40	59.97253	0.000	19590	179.352	199.128	0.000	178.495	0.000	153.272	-18.645	67.273	8:17:40	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	179.352	1805.45	0.0275
8:17:42	59.97351	0.000	19590	172.975	189.974	0.000	169.342	0.000	153.320	-18.645	67.014	8:17:42	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30418.59	172.975	1875.65	0.0265
8:17:44	59.97382	0.000	19590	170.982	183.327	0.000	162.695	0.000	153.348	-18.645	66.757	8:17:44	59.974	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	170.982	1898.72	0.0262
8:17:46	59.97253	0.000	19590	179.352	181.936	0.000	161.303	0.000	153.372	-18.645	66.501	8:17:46	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352	1805.45	0.0275
8:17:48	59.97253	0.000	19590	179.352	181.031	0.000	160.399	0.000	153.393	-18.645	66.247	8:17:48	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352	1805.45	0.0275
8:17:50	59.97253	0.000	19590	179.352	180.443	0.000	159.811	0.000	153.412	-18.645	65.994	8:17:50	59.973	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	179.352	1805.45	0.0275
8:17:52	59.96768	0.000	19590	211.037	191.151	0.000	170.519	0.000	153.462	-18.645	65.743	8:17:52	59.968	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	211.037	1522.35	0.0323
8:17:54	59.97125	0.000	19590	187.722	189.951	0.000	169.318	0.000	153.509	-18.645	65.493	8:17:54	59.971	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30433.31	187.722	1720.91	0.0287
8:17:56	59.97577	0.000	19590	158.228	178.848	0.000	158.215	0.000	153.523	-18.645	65.245	8:17:56	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228	2060.96	0.0242
8:17:58	59.97577	0.000	19590	158.228	171.631	0.000	150.999	0.000	153.516	-18.645	64.998	8:17:58	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228	2060.96	0.0242
8:18:00	59.97577	0.000	19590	158.228	166.940	0.000	146.308	0.000	153.495	-18.645	64.753	8:18:00	59.976	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	158.228	2060.96	0.0242
8:18:02	59.98416	0.000	19590	103.426	144.710	0.000	124.078	0.000	153.409	-18.645	64.509	8:18:02	59.984	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30451.30	103.426	3256.67	0.0158
8:18:04	59.9819	0.000	19590	118.173	135.422	0.000	114.790	0.000	153.297	-18.645	64.267	8:18:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30425.74	118.173	2816.90	0.0181
8:18:06	59.979	0.000	19590	137.104	136.011	0.000	115.379	0.000	153.187	-18.645	64.026	8:18:06	59.979	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30425.74	137.104	2400.71	0.0210
8:18:08	59.97769	0.000	19590	145.674	139.393	0.000	118.760	0.000	153.087	-18.645	63.786	8:18:08	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	145.674	2250.23	0.0223
8:18:10	59.97769	0.000	19590	145.674	141.591	0.000	120.959	0.000	152.995	-18.645	63.548	8:18:10	59.978	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	145.674	2250.23	0.0223
8:18:12	59.98126	0.000	19590	122.358	134.859	0.000	114.227	0.000	152.883	-18.645	63.311	8:18:12	59.981	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	122.358	2712.93	0.0187
8:18:14	59.9848	0.000	19590	99.241	122.393	0.000	101.761	0.000	152.737	-18.645	63.076	8:18:14	59.985	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30419.18	99.241	3407.64	0.0152
8:18:16	59.98868	0.000	19590	73.933	105.432	0.000	84.800	0.000	152.543	-18.645	62.841	8:18:16	59.989	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	73.933	4735.15	0.0113
8:18:18	59.99161	0.000	19590	54.802	87.711	0.000	67.079	0.000	152.299	-18.645	62.609	8:18:18	59.992	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	54.802	6711.56	0.0084
8:18:20	59.99353	0.000	19590	42.247	71.799	0.000	51.167	0.000	152.012	-18.645	62.377	8:18:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	42.247	9243.47	0.0065
8:18:22	59.99579	0.000	19590	27.501	56.295	0.000	35.662	0.000	151.682	-18.645	62.147	8:18:22	59.996	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30424.29	27.501	16598.49	0.0042
8:18:24	59.99677	0.000	19590	21.124	43.985	0.000	23.352	0.000	151.320	-18.645	61.918	8:18:24	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30440.82	21.124	25305.89	0.0032
8:18:26	59.99774	0.000	19590	14.747	33.751	0.000	13.119	0.000	150.930	-18.645	61.690	8:18:26	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30440.82	14.747	53229.64	0.0023
8:18:28	59.99838	0.000	19590	10.562	25.635	0.000	5.003	0.000	150.520	-18.645	61.464	8:18:28	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	10.562	192957.44	0.0016
8:18:30	59.99774	0.000	19590	14.747	21.824	0.000	1.192	0.000	150.102	-18.645	61.239	8:18:30	59.998	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	14.747	53229.64	0.0023
8:18:32	59.9971	0.000	19590	18.932	20.812	0.000	0.179	0.000	149.683	-18.645	61.015	8:18:32	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	18.932	30873.19	0.0029
8:18:34	59.99741	0.000	19590	16.939	19.456	0.000	-1.176	0.000	149.263	-18.645	60.793	8:18:34	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30431.58	16.939	38591.49	0.0026
8:18:36	59.99741	0.000	19590	16.939	18.575	0.000	-2.057	0.000	148.843	-18.645	60.572	8:18:36	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	16.939	38591.49	0.0026
8:18:38	59.99741	0.000	19590	16.939	18.002	0.000	-2.630	0.000	148.423	-18.645	60.352	8:18:38	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	16.939	38591.49	0.0026
8:18:40	60.00064	0.000	19590	-4.185	10.237	0.000	-10.396	0.000	147.984	-18.645	60.133	8:18:40	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	-4.185		0.0006
8:18:42	60.00323	0.000	19590	-21.124	-0.739	0.000	-21.372	0.000	147.518	-18.645	59.915	8:18:42	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30444.25	-21.124		0.0032
8:18:44	60.00354	0.000	19590	-23.116	-8.571	0.000	-29.204	0.000	147.032	-18.645	59.699	8:18:44	60.004	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.11	-23.116		0.0035
8:18:46	60.00259	0.000	19590	-16.939	-11.500	0.000	-32.132	0.000	146.542	-18.645	59.483	8:18:46	60.003	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.11	-16.939		0.0026
8:18:48	60.00098	0.000	19590	-6.377	-9.707	0.000	-30.339	0.000	146.058	-18.645	59.269	8:18:48	60.001	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	-6.377		0.0010
8:18:50	59.99936	0.000	19590	4.185	-4.845	0.000	-25.477	0.000	145.591	-18.645	59.057	8:18:50	59.999	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	4.185		0.0006
8:18:52	59.99741	0.000	19590	16.939	2.779	0.000	-17.853	0.000	145.147	-18.645	58.845	8:18:52	59.997	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	16.939	38591.49	0.0026

8:18:54	59.99677	0.000	19590	21.124	9.200	0.000	-11.433	0.000	144.722	-18.645	58.634	8:18:54	59.997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30465.30	21.124	25305.89	0.0032
8:18:56	59.99677	0.000	19590	21.124	13.373	0.000	-7.259	0.000	144.312	-18.645	58.425	8:18:56	59.997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	21.124	25305.89	0.0032
8:18:58	59.9971	0.000	19590	18.932	15.319	0.000	-5.314	0.000	143.908	-18.645	58.217	8:18:58	59.997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	18.932	30873.19	0.0029
8:19:00	59.99774	0.000	19590	14.747	15.118	0.000	-5.514	0.000	143.507	-18.645	58.009	8:19:00	59.998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	14.747	53229.64	0.0023
8:19:02	59.99872	0.000	19590	8.370	12.756	0.000	-7.876	0.000	143.101	-18.645	57.803	8:19:02	59.999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30478.25	8.370		0.0013
8:19:04	59.99966	0.000	19590	2.192	9.059	0.000	-11.574	0.000	142.687	-18.645	57.598	8:19:04	60.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.86	2.192		0.0003
8:19:06	60	0.000	19590	0.000	5.888	0.000	-14.744	0.000	142.267	-18.645	57.394	8:19:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.86	0.000		0.0000
8:19:08	60.00034	0.000	19590	-2.192	3.060	0.000	-17.572	0.000	141.842	-18.645	57.192	8:19:08	60.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-2.192		0.0003
8:19:10	60.00098	0.000	19590	-6.377	-0.243	0.000	-20.875	0.000	141.411	-18.645	56.990	8:19:10	60.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-6.377		0.0010
8:19:12	60.00226	0.000	19590	-14.747	-5.319	0.000	-25.952	0.000	140.968	-18.645	56.789	8:19:12	60.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-14.747		0.0023
8:19:14	60.0029	0.000	19590	-18.932	-10.084	0.000	-30.716	0.000	140.515	-18.645	56.590	8:19:14	60.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30468.84	-18.932		0.0029
8:19:16	60.00259	0.000	19590	-16.939	-12.483	0.000	-33.115	0.000	140.058	-18.645	56.391	8:19:16	60.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-16.939		0.0026
8:19:18	60.00226	0.000	19590	-14.747	-13.275	0.000	-33.908	0.000	139.601	-18.645	56.194	8:19:18	60.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-14.747		0.0023
8:19:20	60.00226	0.000	19590	-14.747	-13.790	0.000	-34.423	0.000	139.146	-18.645	55.997	8:19:20	60.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-14.747		0.0023
8:19:22	60.00323	0.000	19590	-21.124	-16.357	0.000	-36.989	0.000	138.686	-18.645	55.802	8:19:22	60.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.63	-21.124		0.0032
8:19:24	60.00421	0.000	19590	-27.501	-20.257	0.000	-40.890	0.000	138.218	-18.645	55.608	8:19:24	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-27.501		0.0042
8:19:26	60.00485	0.000	19590	-31.685	-24.257	0.000	-44.890	0.000	137.743	-18.645	55.414	8:19:26	60.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30488.41	-31.685		0.0049
8:19:28	60.00452	0.000	19590	-29.493	-26.090	0.000	-46.722	0.000	137.265	-18.645	55.222	8:19:28	60.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-29.493		0.0045
8:19:30	60.00354	0.000	19590	-23.116	-25.049	0.000	-45.682	0.000	136.792	-18.645	55.031	8:19:30	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:32	60.00354	0.000	19590	-23.116	-24.373	0.000	-45.005	0.000	136.324	-18.645	54.840	8:19:32	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:34	60.00354	0.000	19590	-23.116	-23.933	0.000	-44.565	0.000	135.859	-18.645	54.651	8:19:34	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	-23.116		0.0035
8:19:36	60.00354	0.000	19590	-23.116	-23.647	0.000	-44.280	0.000	135.397	-18.645	54.462	8:19:36	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:38	60.00354	0.000	19590	-23.116	-23.461	0.000	-44.094	0.000	134.938	-18.645	54.275	8:19:38	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:40	60.00354	0.000	19590	-23.116	-23.341	0.000	-43.973	0.000	134.481	-18.645	54.088	8:19:40	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:42	60.00354	0.000	19590	-23.116	-23.262	0.000	-43.895	0.000	134.027	-18.645	53.903	8:19:42	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30477.13	-23.116		0.0035
8:19:44	60.00613	0.000	19590	-40.055	-29.140	0.000	-49.772	0.000	133.561	-18.645	53.718	8:19:44	60.006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-40.055		0.0061
8:19:46	60.00485	0.000	19590	-31.685	-30.031	0.000	-50.663	0.000	133.094	-18.645	53.535	8:19:46	60.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30487.82	-31.685		0.0049
8:19:48	60.00452	0.000	19590	-29.493	-29.843	0.000	-50.475	0.000	132.631	-18.645	53.352	8:19:48	60.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493		0.0045
8:19:50	60.00452	0.000	19590	-29.493	-29.720	0.000	-50.353	0.000	132.170	-18.645	53.170	8:19:50	60.005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-29.493		0.0045
8:19:52	60.00354	0.000	19590	-23.116	-27.409	0.000	-48.041	0.000	131.717	-18.645	52.989	8:19:52	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-23.116		0.0035
8:19:54	60.0029	0.000	19590	-18.932	-24.442	0.000	-45.074	0.000	131.274	-18.645	52.809	8:19:54	60.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30489.73	-18.932		0.0029
8:19:56	60.00162	0.000	19590	-10.562	-19.584	0.000	-40.216	0.000	130.845	-18.645	52.630	8:19:56	60.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562		0.0016
8:19:58	60.00162	0.000	19590	-10.562	-16.426	0.000	-37.059	0.000	130.427	-18.645	52.452	8:19:58	60.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-10.562		0.0016
8:20:00	60.00421	0.000	19590	-27.501	-20.302	0.000	-40.935	0.000	130.000	-18.645	52.275	8:20:00	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501		0.0042
8:20:02	60.00421	0.000	19590	-27.501	-22.822	0.000	-43.454	0.000	129.570	-18.645	52.098	8:20:02	60.004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.09	-27.501		0.0042
8:20:04	60.0029	0.000	19590	-18.932	-21.460	0.000	-42.093	0.000	129.145	-18.645	51.923	8:20:04	60.003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-18.932		0.0029
8:20:06	60.00034	0.000	19590	-2.192	-14.716	0.000	-35.349	0.000	128.739	-18.645	51.748	8:20:06	60.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.91	-2.192		0.0003
8:20:08	59.99805	0.000	19590	12.754	-5.102	0.000	-25.734	0.000	128.358	-18.645	51.574	8:20:08	59.998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	12.754	81245.24	0.0020
8:20:10	59.99646	0.000	19590	23.116	4.775	0.000	-15.858	0.000	128.004	-18.645	51.401	8:20:10	59.996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	23.116	21741.68	0.0035
8:20:12	59.99515	0.000	19590	31.685	14.193	0.000	-6.439	0.000	127.675	-18.645	51.229	8:20:12	59.995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	31.685	13540.87	0.0049
8:20:14	59.99387	0.000	19590	40.055	23.245	0.000	2.613	0.000	127.369	-18.645	51.058	8:20:14	59.994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.84	40.055	9895.25	0.0061
8:20:16	59.99289	0.000	19590	46.432	31.361	0.000	10.728	0.000	127.084	-18.645	50.887	8:20:16	59.993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	46.432	8210.95	0.0071
8:20:18	59.99255	0.000	19590	48.624	37.403	0.000	16.770	0.000	126.816	-18.645	50.718	8:20:18	59.993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	48.624	7757.08	0.0074
8:20:20	59.99225	0.000	19590	50.617	42.028	0.000	21.395	0.000	126.560	-18.645	50.549	8:20:20	59.992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	50.617	7385.93	0.0078
8:20:22	59.98965	0.000	19590	67.556	50.963	0.000	30.330	0.000	126.327	-18.645	50.381	8:20:22	59.990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30476.09	67.556	5250.54	0.0103
8:20:24	59.98514	0.000	19590	97.049	67.093	0.000	46.461	0.000	126.134	-18.645	50.214	8:20:24	59.985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	97.049	3492.44	0.0149
8:20:26	59.98254	0.000	19590	113.988	83.506	0.000	62.874	0.000	125.982	-18.645	50.048	8:20:26	59.983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30456.76	113.988	2929.15	0.0175
8:20:28	59.97836	0.000	19590	141.289	103.730	0.000	83.098	0.000	125.879	-18.645	49.882	8:20:28	59.978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	141.289	2324.79	0.0216
8:20:30	59.97641	0.000	19590	154.043	121.340	0.000	100.707	0.000	125.818	-18.645	49.717	8:20:30	59.976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	154.043	2120.41	0.0236
8:20:32	59.97705	0.000	19590	149.858	131.321	0.000	110.689	0.000	125.782	-18.645	49.553	8:20:32	59.977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858	2183.39	0.0229
8:20:34	59.97705	0.000	19590	149.858	137.809	0.000	117.177	0.000	125.762	-18.645	49.390	8:20:34	59.977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30457.12	149.858	2183.39	0.0229
8:20:36	59.97705	0.000	19590	149.858	142.026	0.000	121.394	0.000	125.751	-18.645	49.228	8:20:36	59.977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	149.858	2183.39	0.0229
8:20:38	59.97803	0.000	19590	143.481	142.536	0.000	121.903	0.000	125.742	-18.645	49.066	8:20:38	59.978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	143.481	2286.90	0.0220
8:20:40	59.97964	0.000	19590	132.920	139.170	0.000	118.538	0.000	125.725	-18.645	48.906	8:20:40	59.980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	132.920	2481.77	0.0204
8:20:42	59.9816	0.000	19590	120.166	132.519	0.000	111.886	0.000	125.692	-18.645	48.745	8:20:42	59.982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30446.98	120.166	2766.41	0.0184
8:20:44	59.98126	0.000	19590	122.358	128.962	0.000	108.330	0.000	125.651	-18.645	48.586	8:20:44	59.981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	122.358	2712.93	0.0187
8:20:46	59.97931	0.000	19590	135.112	131.115	0.000	110.482	0.000	125.616	-18.645	48.428	8:20:46	59.979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.02	135.112	2438.64	0.0207
8:20:48	59.9761	0.000	19590	156.036	139.837	0.000	119.205	0.000	125.600	-18.645	48.270	8:20:48	59.976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	156.036	2091.68	0.0239
8:20:50	59.97543	0.000	19590	160.420	147.041	0.000	126.409	0.000	125.602	-18.645	48.113	8:20:50	59.975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	160.420	2031.13	0.0246
8:20:52	59.97577	0.000	19590	158.228	150.957	0.000	130.324	0.000	125.613	-18.645	47.956	8:20:52	59.976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	158.228	2060.96	0.0242
8:20:54	59.97675	0.000	19590	151.851	151.270	0.000	130.637	0.000	125.625	-18.645	47.801	8:20:54	59.977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30460.94	151.851	2152.94	0.0233
8:20:56	59.97803	0.000	19590	143.481	148.544	0.000	127.911	0.000	125.630	-18.645	47.646	8:20:56	59.978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	143.481	2286.90	0.0220
8:20:58	59.979	0.000	19590	137.104	144.540	0.000	123.908	0.000	125.626	-18.645	47.492	8:20:58	59.979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	137.104	2400.71	0.0210
8:21:00	59.97964	0.000	19590	132.920	140.473	0.000	119.840	0.000	125.613	-18.645	47.338	8:21:00	59.980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	132.920	2481.77	0.0204
8:21:02	59.98062	0.000	19590	126.543	135.597	0.000	114.965	0.000	125.588	-18.645	47.185	8:21:02	59.981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30469.23	126.543	2616.37	0.0194
8:21:04	59.9819	0.000	19590	118.173	129.499	0.000	108.866	0.000	125.550	-18.645	47.033	8:21:04	59.982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	118.173	2816.90	0.0181
8:21:06	59.98224	0.000	19590	115.981	124.767	0.000	104.135	0.000	125.501	-18.645	46.882	8:21:06	59.982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30481.49	115.981	2874.60	0.0178
8:21:08	59.98254	0.000	19590	113.988	120.995	0.000	100.362	0.000	125.443	-18.645	46.731	8:21:08	59.983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:10	59.98288	0.000	19590	111.796	117.775	0.000	97.143	0.000	125.378	-18.645	46.582	8:21:10	59.983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	111.796	2991.59	0.0171
8:21:12	59.98254	0.000	19590	113.988	116.450	0.000	95.817	0.000	125.311	-18.645	46.432	8:21:12	59.983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:14	59.98254	0.000	19590	113.988	115.588	0.000	94.956	0.000	125.242	-18.645	46.284	8:21:14	59.983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30480.29	113.988	2929.15	0.0175
8:21:16	59.98288	0.000	19590	111.796	114.261	0.000	93.628	0.000	125.170	-18.645	46.136	8:21:16	59.983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	111.796	2991.59	0.0171
8:21:18	59.98611	0.000	19590	90.672	106.005	0.000	85.372	0.000	125.080	-18.645	45.989	8:21:18	59.986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	90.672	3765.02	0.0139
8:21:20	59.99387	0.000	19590	40.055	82.922	0.000	62.290	0.000	124.937	-18.645	45.842	8:21:20	59.994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	40.055	9895.25	0.0061
8:21:22	60.00226	0.000	19590	-14.747	48.738	0.000	28.106	0.000	124.719	-18.645	45.696	8:21:22	60.002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30473.15	-14.747		0.0023
8:21:24	60.01099	0.000	19590	-71.741	6.571	0.000	-14.062	0.000	124.406	-18.645	45.551	8:21:24	60.011	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-71.741		0.0110
8:21:26	60.01712	0.000	19590	-111.796	-34.858	0.000	-55.490	0.000	124.002	-18.645	45.406	8:21:26	60.017	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.66	-111.796		0.0171
8:21:28	60.02069	0.000	19590	-135.112	-69.947	0.000	-90.579	0.000	123.521	-18.645	45.262	8:21:28	60.021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-135.112		0.0207
8:21:30	60.02133	0.000	19590	-139.297	-94.219	0.000	-114.852	0.000	122.988	-18.645	45.119	8:21:30	60.021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:32	60.02133	0.000	19590	-139.297	-109.996	0.000	-130.629	0.000	122.422	-18.645	44.976	8:21:32	60.021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:34	60.02133	0.000	19590	-139.297	-120.251	0.000	-140.884	0.000	121.835	-18.645	44.834	8:21:34	60.021	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30470.60	-139.297		0.0213
8:21:36	60.02325	0.000	19590	-151.851	-131.311	0.000	-151.944	0.000	121.227	-18.645	44.693	8:21:36	60.023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-151.851		0.0233
8:21:38	60.02551	0.000	19590	-166.598	-143.662	0.000	-164.294	0.000	120.594	-18.645	44.552	8:21:38	60.026	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30461.28	-166.598		0.0255



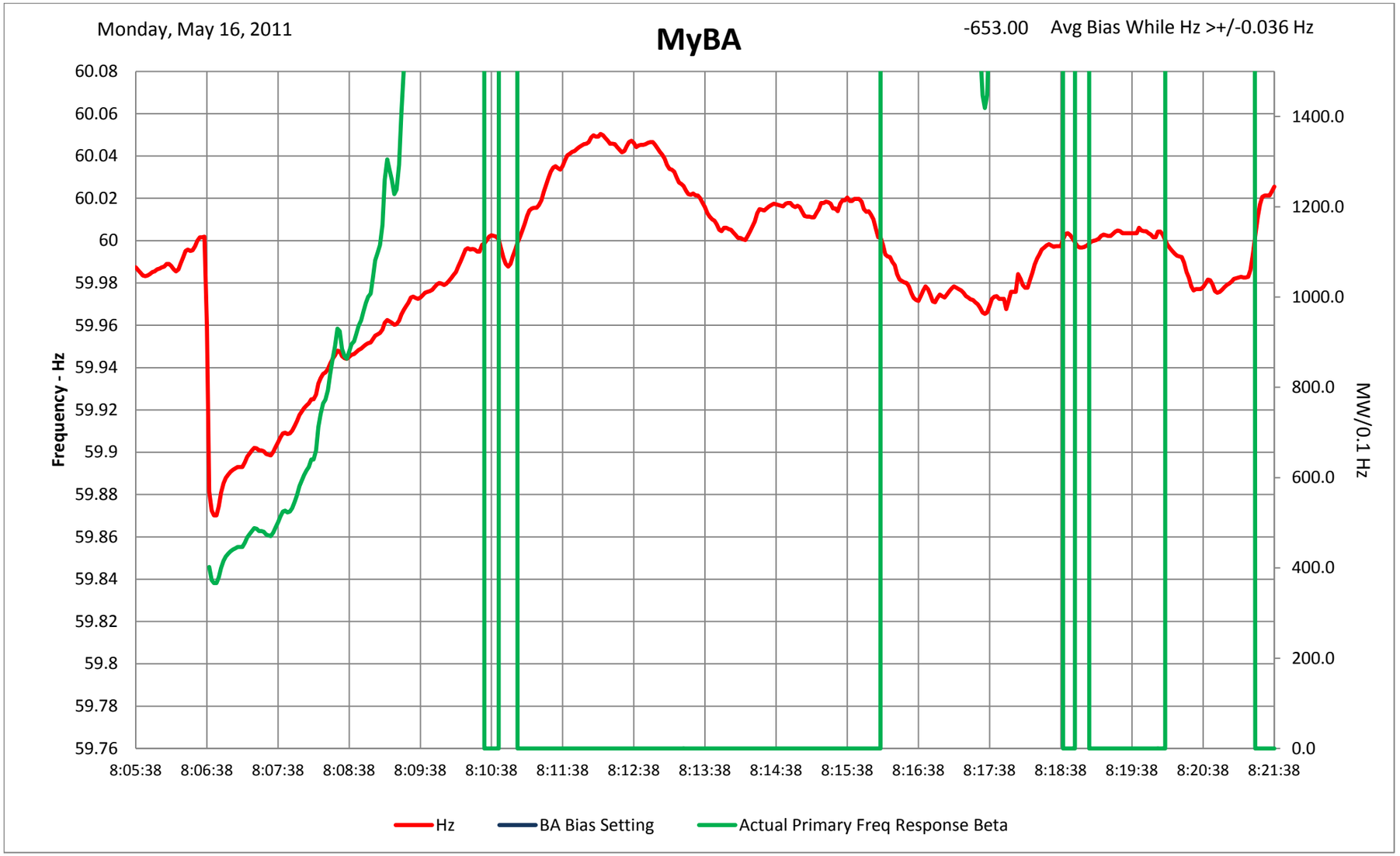
T(0)

First change in frequency of the event should occur here on the vertical grid line.
It is important that the pre-event frequency average to NOT contain frequency data of the event, "Average Frequency" trend to the left of center of the graph.
To shift the data on the graph left or right, adjust the value in cell Q3 highlighted in yellow above.

"Auto" Event Detection adjustment of T(0).
# of rows to shift T(0)
1
A zero value aligns the data to the hightest Frequency change value.
Usually the event begins one or two data scans earlier than this scan.

Increasing this value shifts graph data to the right.
Decreasing this value shifts graph data to the left.

Note: The P.U. Performance values indicate performance as a P.U. value of BA Bias setting.
For BAs that utilize a variable Bias, the Bias average during T(+20) to T(+52) is used.
P.U. values above 1.0 indicate that the Bias setting was below measured Frequency Response.
P.U. values below 1.0 indicate that the Bias setting was above measured Frequency Response.


Monday, May 16, 2011
MyBA
-653.00 Avg Bias While Hz >+/-0.036 Hz
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Bias Setting
Actual Primary Freq Response Beta

						Value A Data	BA Performance											Value B	20 to 52 second Average Period Evaluation															Frequency Response Initiative - Additional Primary Frequency Response Evaluation Points											
Date	A Value Time	FPointA Hz	A Value Hz	t(0) Time	C Value Hz	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Frequency Hz	Contingent Resource Lost MW	Load Resources Tripped MW	Non-Conforming Load Load (-) MW	Spare MW	Spare MW	Spare MW	Spare MW	Initial Performance Adjusted P.U.	Initial Performance Unadjusted P.U.	Sustained Performance P.U.	BA Bias Setting MW/0.1 Hz	BA Load MW	Bias Setting EPFR MW	Average Bias While Hz > +/-0.036 Hz MW/0.1 Hz	Unadjusted PFR Performance @ T(+46) P.U.	Unadjusted PFR Performance @ T(+76) P.U.	Unadjusted PFR Performance @ T(+106) P.U.	Unadjusted PFR Performance @ T(+136) P.U.	Unadjusted PFR Performance @ T(+166) P.U.	Adjusted PFR Performance @ T(+46) P.U.	Adjusted PFR Performance @ T(+76) P.U.	Adjusted PFR Performance @ T(+106) P.U.	Adjusted PFR Performance @ T(+136) P.U.	Adjusted PFR Performance @ T(+166) P.U.	Maximum Bias Setting MW/0.1 Hz	Minimum Bias Setting MW/0.1 Hz
Monday, May 16, 2011	8:06:38	60.002	59.999	8:06:38	59.870	59.999	471.09	0.00	0.00	0.00	0.00	0.00	0.00	-653.00	30202.74	8.97	59.897	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.711	0.711	0.738	-653.00	30136.77	671.54	-653.00	0.738	0.860	1.323	1.532	2.309	0.738	0.860	1.323	1.532	2.309	-653.00	-653.00

Steps **To be completed for each event evaluated.**

1 Set-up Data collection in exact same order as the "Data" sheet of this work book. Data should be in this order:
Column A: Date and Time in this format, mm/dd/yy HH:MM:SS
Column B: Frequency Hz
Column C: Contingent Resouce Lost MW or Lost Load
Column D: Load Resources tripped during the event.
Column E: Non Conforming Load
Column F: Spare
Column G: Not Used
Column H: Spare
Column I: Spare
Column J: BA Bias Setting
Column K: BA Load

2 Note: Columns D & E are optional data. If you choose not to use these, leave the columns blank. Do not delete the columns. Use the sign (+/-) convention defined in FRS Form 1.

3 Data compression must be turned off for each data point. Quality data will give you quality results in the evaluation.

4 Data must start a **minimum** of two (2) minutes before the event begins and includes a minimum of 15 minutes after the beginning of the event with up to 60 minutes of data.
Be sure the "Data" worksheet is clear of any old data. Collect the same total minutes of data for each event evaluated to minimize your effort and time.
If using PI historian as your data source, use "PasteSpecial/Values" to enter data into the spreadsheet. Do not include historian data collection formulas in the data.

5 Verify that the "Auto" Event Detection selected the correct event. Verify time and delta Hz by comparing time of event and delta Hz on the graph on the "Copy Results" worksheet.
If the wrong event was selected, in cell "E4" of this worksheet select "Manual" and manually select the beginning and ending row numbers of the desired event and enter these in cells "E5" and "E6". Only rarely should you have to use the "Manual" process.

6 Once data is in place in the "Data" worksheet, confirm the Auto selection of the beginning of the event by observing the "Graph 20 to 52s" worksheet. Adjust the selection if necessary.
To make an adjustment, change the value in cell "Q3" on the "Graph 20 to 52s" worksheet. Usually a 0, 1 or 2 will achive the correct alignment of T(0).

7 If the correct row is selected, the "Graph 20 to 52s" worksheet will indicate the first change in frequency (red trend) of the event on the center vertical grid line of the graph.

8 The end of the event will be Auto selected based on the frequency value in cell "N2" on the Data worksheet. This will be the frequency at the beginning of the event or 60 Hz, whichever is lower. (for low Hz events)
This value controls the end of the "Sustained Frequency Response" evaluation period.
Primary Frequency Response should be sustained during the event recovery period. This evaluation determines how well you achieved this goal.

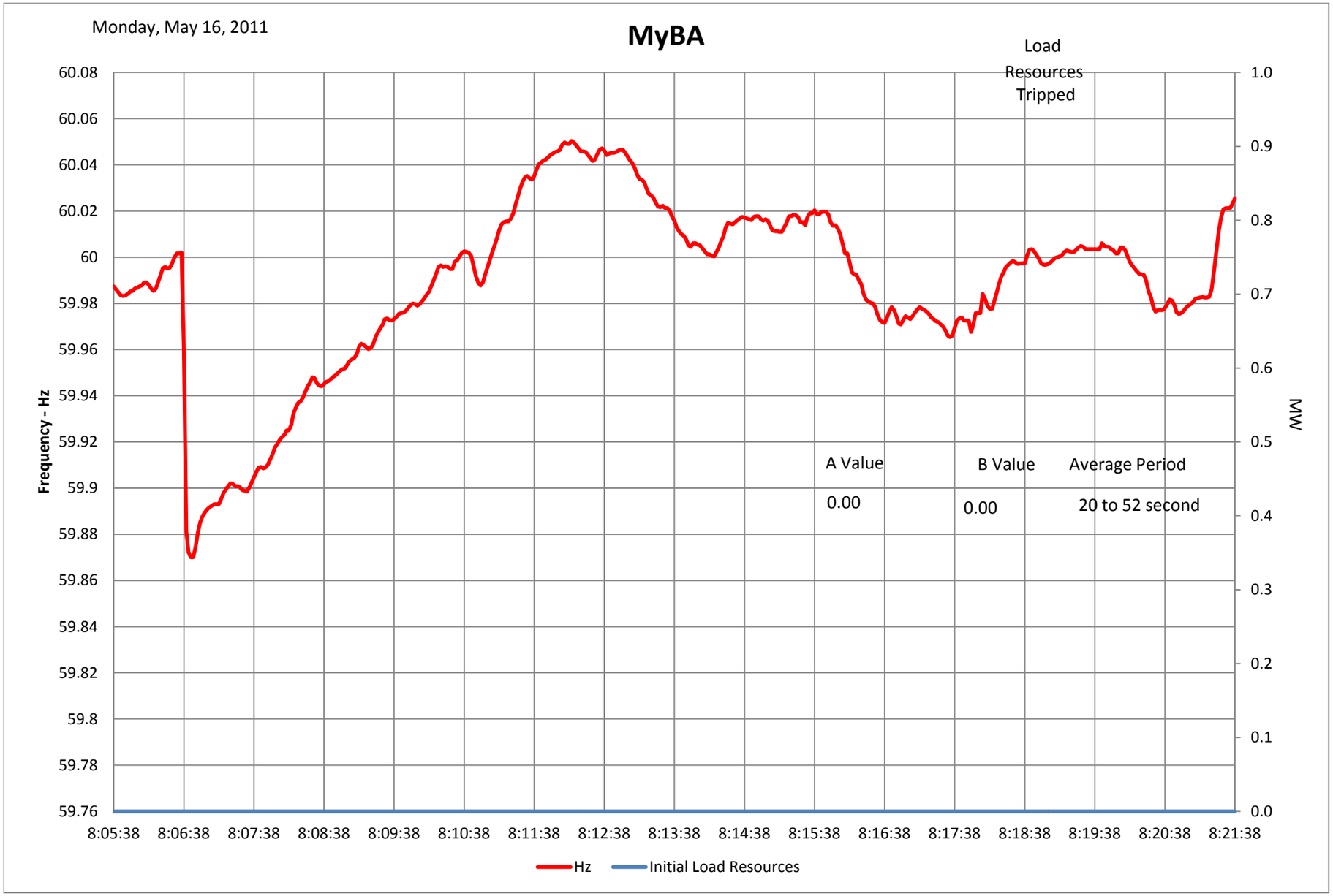
9 Use the "Copy Form 2 data for Pasting into Form 1" button provided on the "Copy Results" worksheet (Cells B21 through B28) to copy the evaluation and event specific data for the "FRS Form 1" of this field trial. This data is summarized in the correct order on worksheet "Form 1 Summary Data".

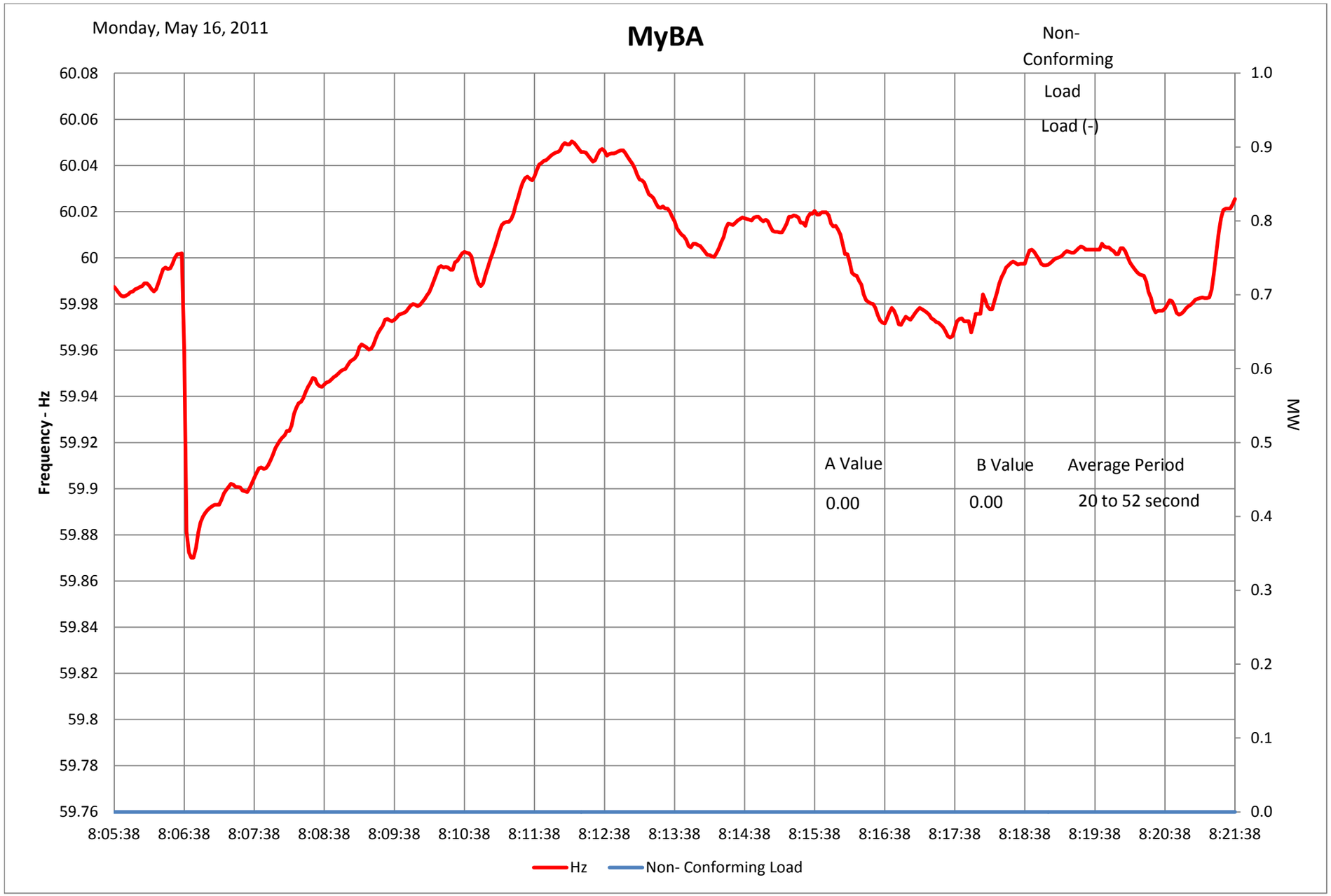
10 Use PasteSpecial/Values and paste the copied data into FRS Form 1 on the appropriate event row. Be sure to use the latest version of Form 1, currently Form 1.9.

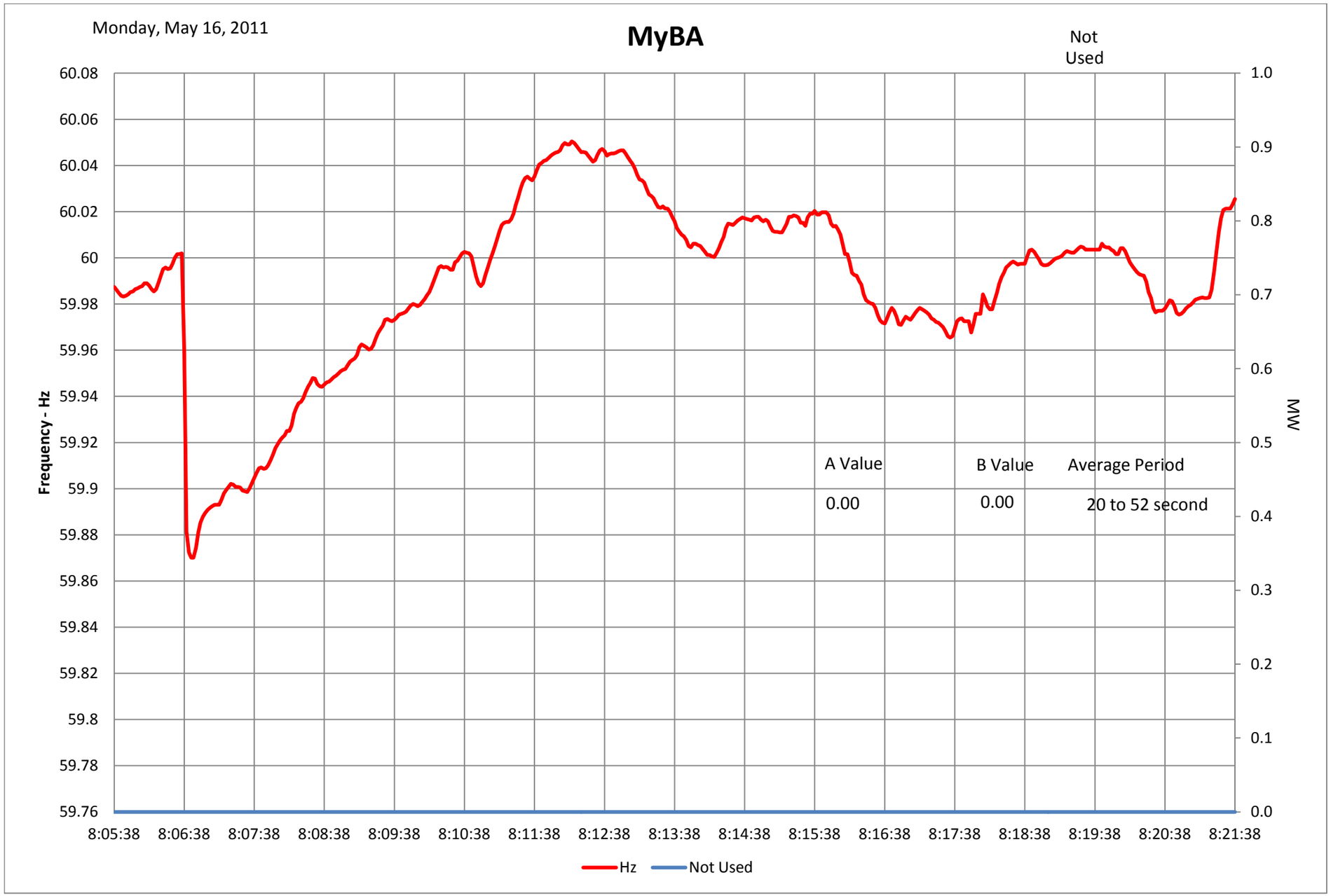
11 Save this Form 2 using the file name convention on the "Copy Results" worksheet. The complete file name is in bold in cell B38. Return all completed Form 2s with your Form 1 to NERC.

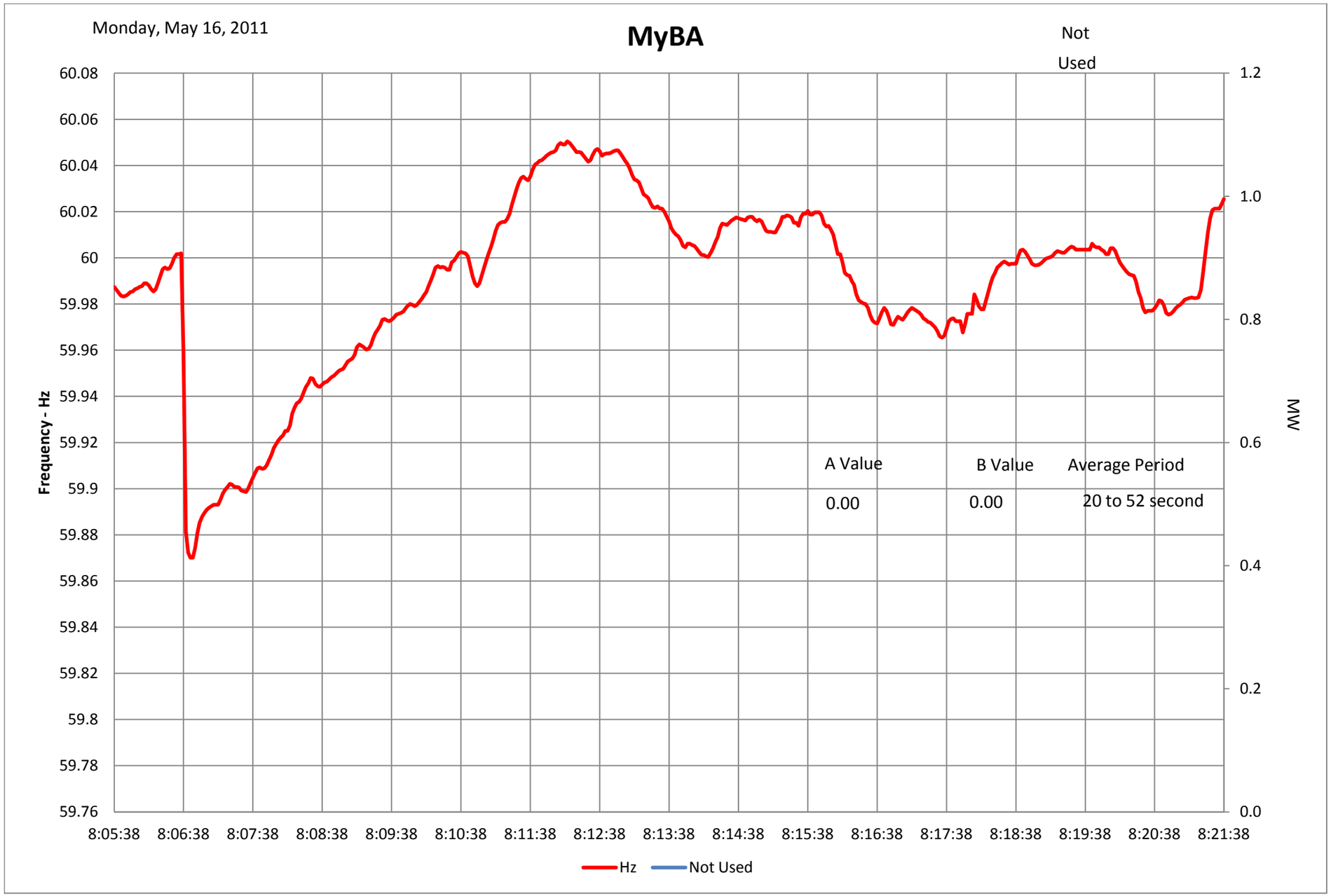
Steps **To be completed the first time you use Form 2 for your BA.**

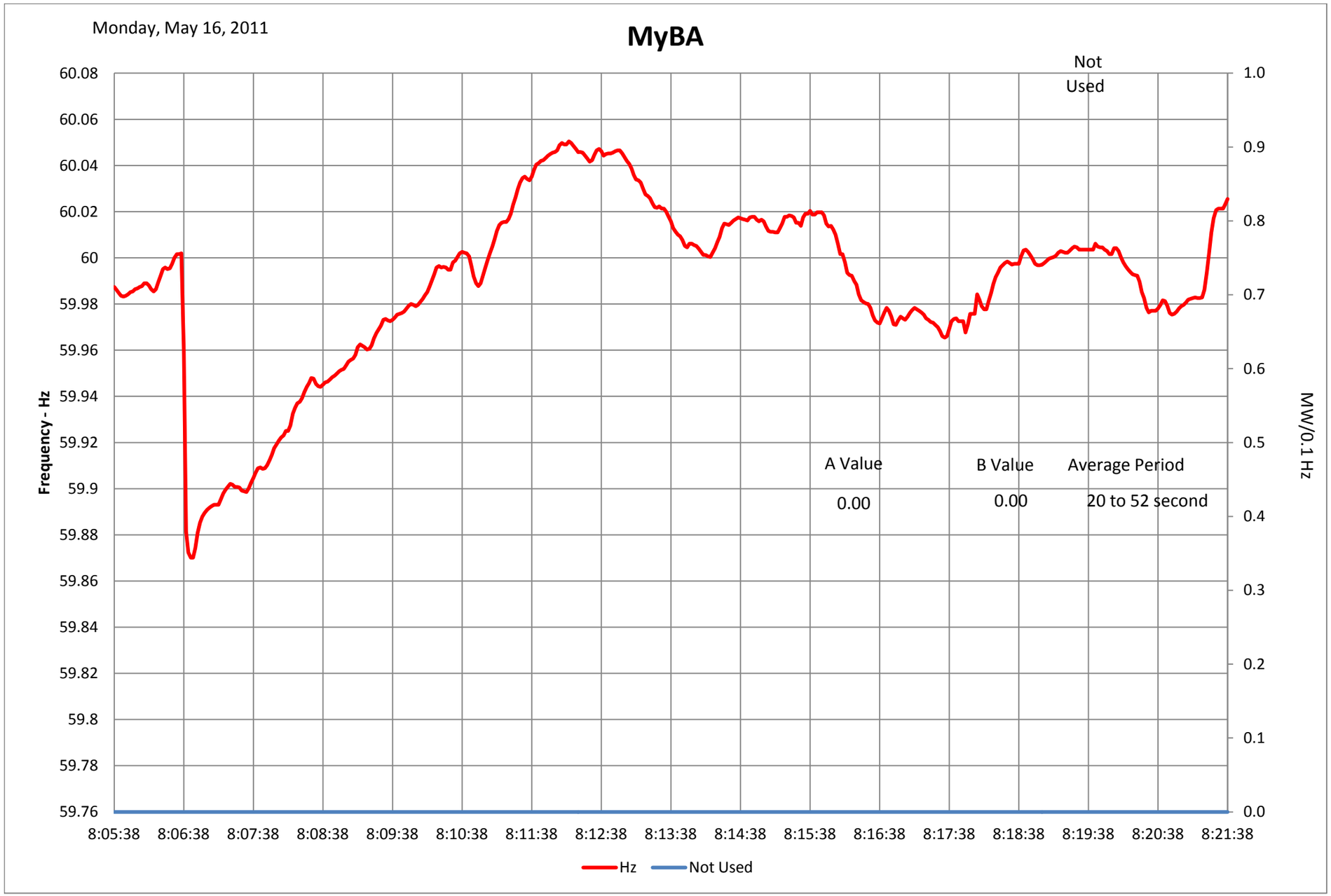
A Enter the Balancing Authority name as you want it to appear on the graphs in cell "B1" of the "Copy Results" worksheet. For example: "ERCOT".

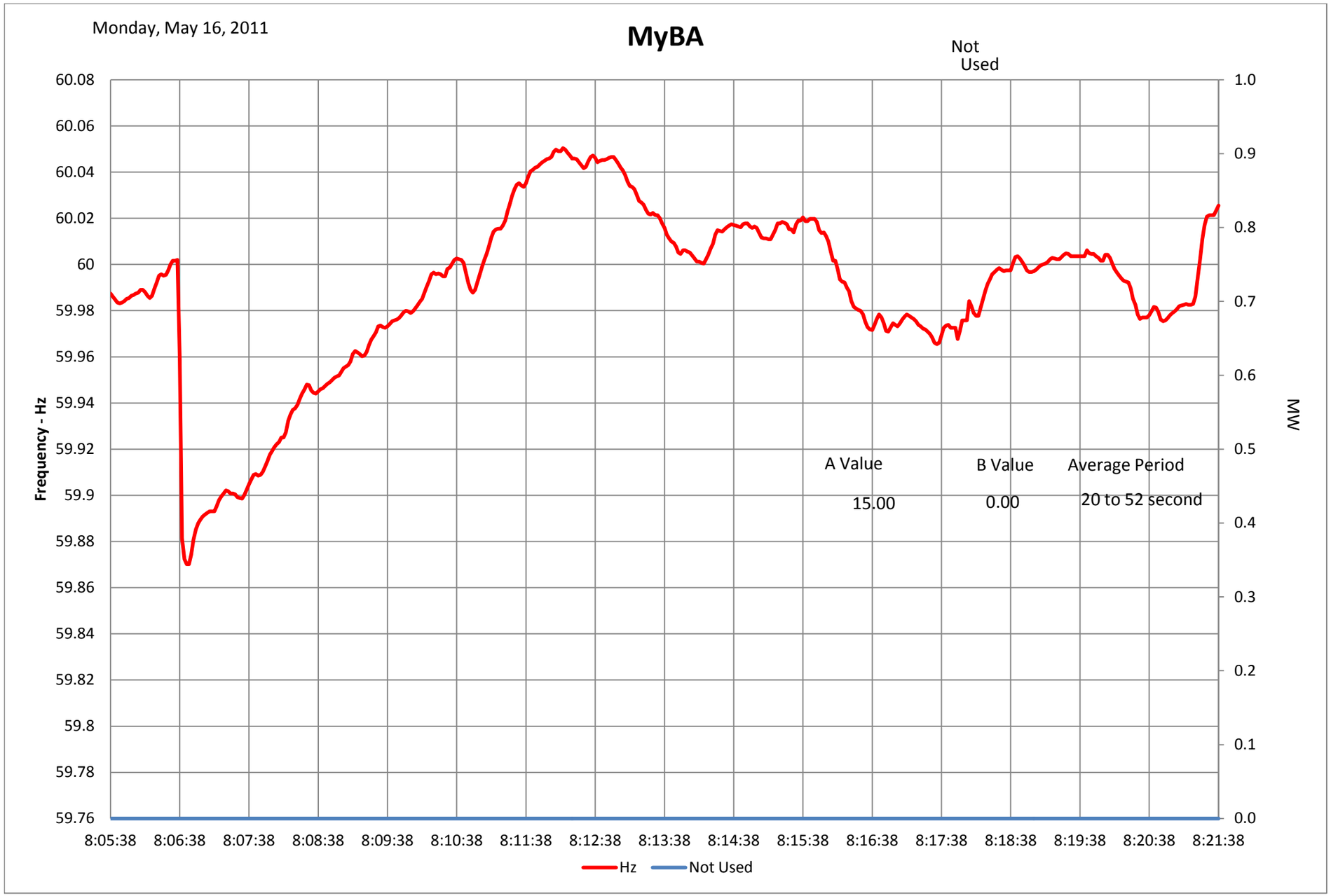

Monday, May 16, 2011
MyBA
Load Resources Tripped
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
Hz
Initial Load Resources

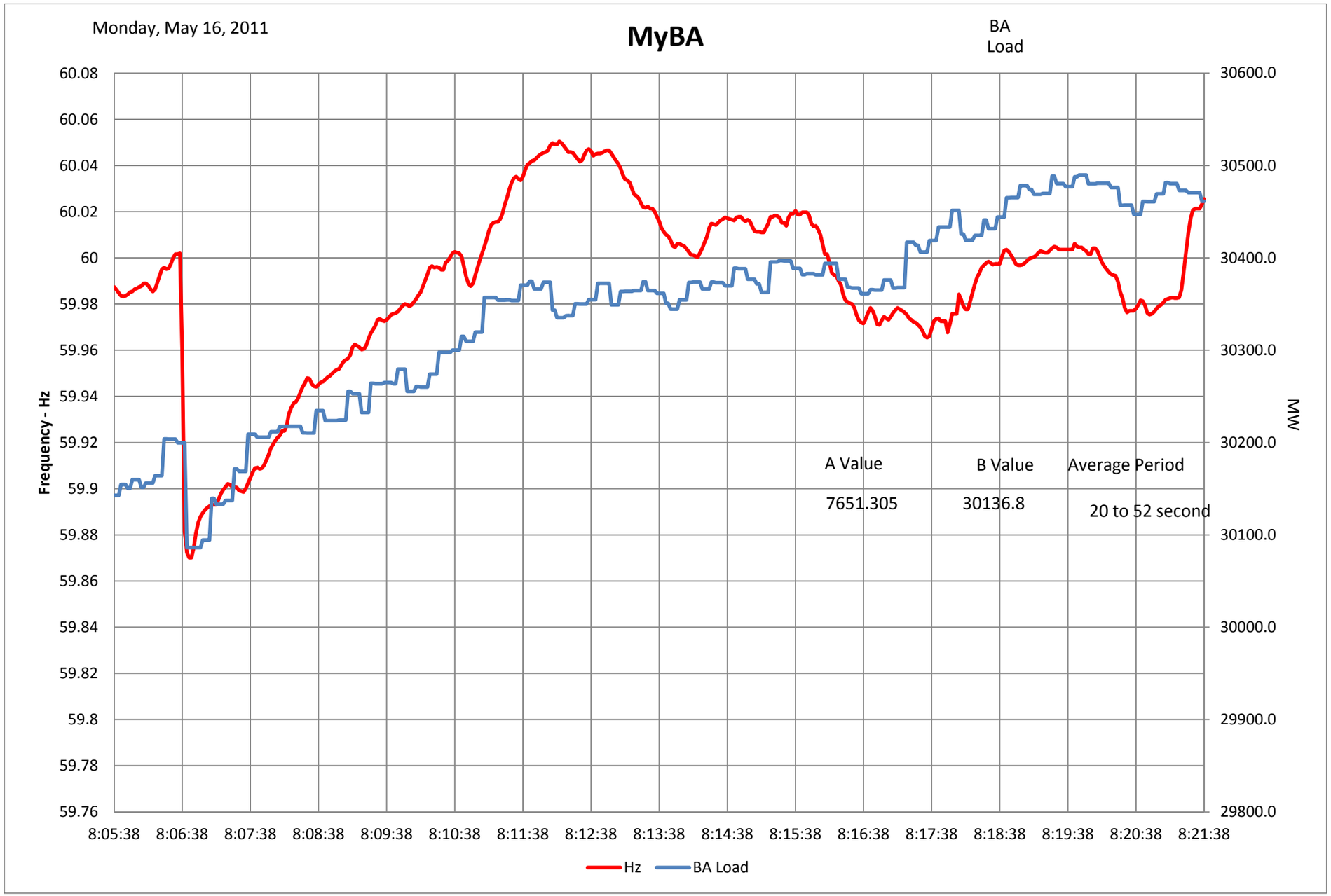

Monday, May 16, 2011
MyBA
Non-Conforming Load
Load (-)
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Non- Conforming Load

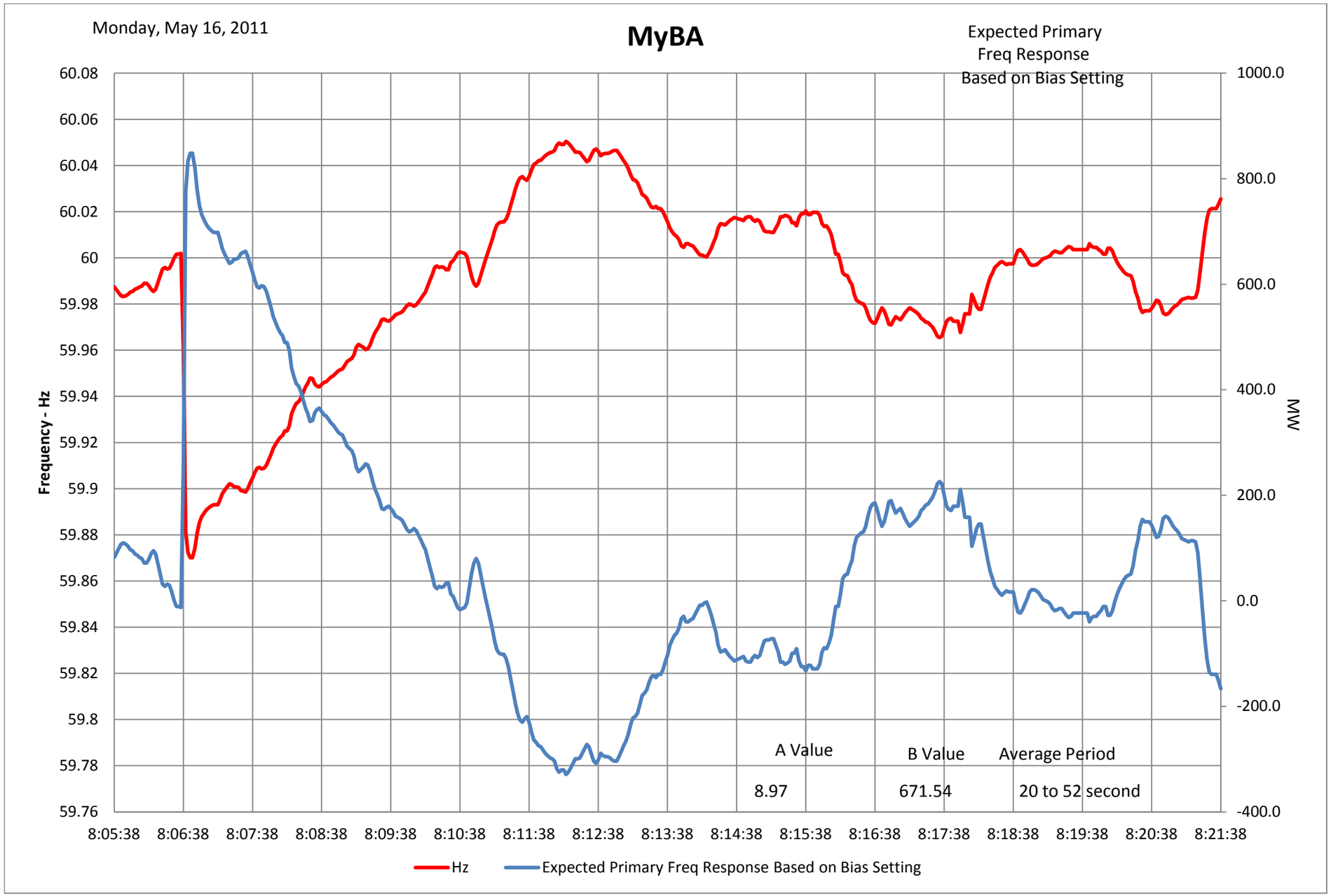

Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.2
1.0
0.8
0.6
0.4
0.2
0.0
MW
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
Frequency - Hz
MW/0.1 Hz
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
A Value
0.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
Not Used
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
MW
A Value
15.00
B Value
0.00
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
Not Used


Monday, May 16, 2011
MyBA
BA Load
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
Frequency - Hz
30600.0
30500.0
30400.0
30300.0
30200.0
30100.0
30000.0
29900.0
29800.0
MW
A Value
7651.305
B Value
30136.8
Average Period
20 to 52 second
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
Hz
BA Load


Monday, May 16, 2011
MyBA
Expected Primary Freq Response Based on Bias Setting
Frequency - Hz
MW
60.08
60.06
60.04
60.02
60
59.98
59.96
59.94
59.92
59.9
59.88
59.86
59.84
59.82
59.8
59.78
59.76
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
8:05:38
8:06:38
8:07:38
8:08:38
8:09:38
8:10:38
8:11:38
8:12:38
8:13:38
8:14:38
8:15:38
8:16:38
8:17:38
8:18:38
8:19:38
8:20:38
8:21:38
A Value
8.97
B Value
671.54
Average Period
20 to 52 second
Hz
Expected Primary Freq Response Based on Bias Setting

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2007-12 Frequency Response

Recirculation Ballot is now open through 8 p.m. Friday, December 21, 2012

Now Available

A recirculation ballot window for **BAL-003-1 – Frequency Response and Frequency Bias Setting** is now open through **8 p.m. Eastern on Friday, December 21, 2012.**

The Frequency Response Standard Drafting Team did not make any substantive changes to the documents, but did make the following minor changes based on stakeholder comments:

- Made clarifying changes to the proposed standard including replacing the term "…subject to…" with "…in accordance with…" in Requirement R2.
- Clarified the description of the calculation for the Interconnection IFRO in Attachment A.
- Modified Attachment A and the Procedure to provide consistency with the use of the term "resource contingency criteria."
- Corrected typographical errors in all documents.

Instructions

In the recirculation ballot, votes are counted by exception. Only members of the ballot pool may cast a ballot; all ballot pool members may change their previously cast votes. A ballot pool member who failed to cast a ballot during the last ballot window may cast a ballot in the recirculation ballot window. If a ballot pool member does not participate in the recirculation ballot, that member's vote cast in the previous ballot will be carried over as that member's vote in the recirculation ballot.

Members of the ballot pool associated with this project may log in and submit their vote for the standard by clicking here.

Next Steps

Voting results will be posted and announced after the ballot window closes. If approved, the standard will be submitted to the Board of Trustees for adoption and then filed with the appropriate regulatory authorities.

Background

Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. There is evidence of continuing

decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard would set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation.

Additional information is available on the project page.

Standards Process

The Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, at wendy.muller@nerc.net or at 404-446-2560.

North American Electric Reliability Corporation
3353 Peachtree Rd.NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2007-12 Frequency Response

Recirculation Ballot Results

Now Available

A recirculation ballot for **BAL-003-1 – Frequency Response and Frequency Bias Setting** concluded at **8 p.m. Eastern on Friday, December 21, 2012.**

Voting statistics are listed below, and the Ballot Results page provides a link to the detailed results.

Approval
Quorum: 86.19%
Approval: 76.53%

Next Steps
The standard will be presented to the Board of Trustees for adoption and then filed with the appropriate regulatory authorities.

Background
Frequency Response, a measure of an Interconnection's ability to stabilize frequency immediately following the sudden loss of generation or load, is a critical component to the reliable operation of the bulk power system, particularly during disturbances and restoration. There is evidence of continuing decline in Frequency Response over the past 10 years, but no confirmed reason for the apparent decline. The proposed standard would set a minimum Frequency Response obligation, provide a uniform calculation of Frequency Bias Settings that transition to values closer to Frequency Response, and encourage coordinated AGC operation.

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Atlanta, GA 30326
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Ballot Results

Ballot Name:	Project 2007-12 Frequency Response Recirculation Ballot December 2012_in
Ballot Period:	12/12/2012 - 12/21/2012
Ballot Type:	Recirculation
Total # Votes:	312
Total Ballot Pool:	362
Quorum:	**86.19 % The Quorum has been reached**
Weighted Segment Vote:	76.53 %
Ballot Results:	**The Standard has Passed**

Summary of Ballot Results

Segment	Ballot Pool	Segment Weight	Affirmative # Votes	Affirmative Fraction	Negative # Votes	Negative Fraction	Abstain # Votes	No Vote
1 - Segment 1.	92	1	41	0.661	21	0.339	20	10
2 - Segment 2.	11	1	5	0.5	5	0.5	1	0
3 - Segment 3.	79	1	40	0.769	12	0.231	16	11
4 - Segment 4.	28	1	16	0.889	2	0.111	5	5
5 - Segment 5.	80	1	42	0.75	14	0.25	10	14
6 - Segment 6.	48	1	28	0.824	6	0.176	6	8
7 - Segment 7.	0	0	0	0	0	0	0	0
8 - Segment 8.	9	0.7	7	0.7	0	0	2	0
9 - Segment 9.	6	0.3	1	0.1	2	0.2	1	2
10 - Segment 10.	9	0.7	7	0.7	0	0	2	0
Totals	**362**	**7.7**	**187**	**5.893**	**62**	**1.807**	**63**	**50**

Individual Ballot Pool Results

Segment	Organization	Member	Ballot	Comments
1	Ameren Services	Kirit Shah	Affirmative	
1	American Electric Power	Paul B. Johnson		
1	Arizona Public Service Co.	Robert Smith	Negative	
1	Associated Electric Cooperative, Inc.	John Bussman	Affirmative	
1	Austin Energy	James Armke		
1	Avista Corp.	Scott J Kinney	Negative	
1	Balancing Authority of Northern California	Kevin Smith	Affirmative	

1	Baltimore Gas & Electric Company	Gregory S Miller	Negative	004672
1	BC Hydro and Power Authority	Patricia Robertson	Abstain	
1	Beaches Energy Services	Joseph S Stonecipher		
1	Black Hills Corp	Eric Egge		
1	Bonneville Power Administration	Donald S. Watkins	Negative	
1	Brazos Electric Power Cooperative, Inc.	Tony Kroskey	Negative	
1	Central Maine Power Company	Joseph Turano Jr.	Affirmative	
1	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Chang G Choi	Affirmative	
1	Clark Public Utilities	Jack Stamper	Affirmative	
1	Colorado Springs Utilities	Paul Morland	Affirmative	
1	Consolidated Edison Co. of New York	Christopher L de Graffenried	Negative	
1	CPS Energy	Richard Castrejana	Abstain	
1	Dairyland Power Coop.	Robert W. Roddy	Abstain	
1	Dayton Power & Light Co.	Hertzel Shamash	Affirmative	
1	Dominion Virginia Power	Michael S Crowley	Abstain	
1	Duke Energy Carolina	Douglas E. Hils	Affirmative	
1	East Kentucky Power Coop.	George S. Carruba	Negative	
1	Empire District Electric Co.	Ralph F Meyer	Affirmative	
1	Entergy Services, Inc.	Edward J Davis	Abstain	
1	FirstEnergy Corp.	William J Smith	Abstain	
1	Florida Keys Electric Cooperative Assoc.	Dennis Minton	Abstain	
1	Florida Power & Light Co.	Mike O'Neil	Negative	
1	Gainesville Regional Utilities	Luther E. Fair		
1	Great River Energy	Gordon Pietsch	Affirmative	
1	Hoosier Energy Rural Electric Cooperative, Inc.	Bob Solomon	Negative	
1	Hydro One Networks, Inc.	Ajay Garg	Affirmative	
1	Hydro-Quebec TransEnergie	Bernard Pelletier	Affirmative	
1	Idaho Power Company	Ronald D Schellberg	Affirmative	
1	Imperial Irrigation District	Tino Zaragoza	Abstain	
1	International Transmission Company Holdings Corp	Michael Moltane	Abstain	
1	JEA	Ted Hobson	Negative	
1	Kansas City Power & Light Co.	Michael Gammon	Negative	
1	Keys Energy Services	Stanley T Rzad	Affirmative	
1	Lakeland Electric	Larry E Watt	Affirmative	
1	Lee County Electric Cooperative	John W Delucca	Abstain	
1	Lincoln Electric System	Doug Bantam	Affirmative	
1	Manitoba Hydro	Joe D Petaski	Affirmative	
1	MEAG Power	Danny Dees	Affirmative	
1	MidAmerican Energy Co.	Terry Harbour	Affirmative	
1	National Grid	Saurabh Saksena	Abstain	
1	Nebraska Public Power District	Cole C Brodine	Affirmative	
1	New Brunswick Power Transmission Corporation	Randy MacDonald	Negative	
1	New York State Electric & Gas Corp.	Raymond P Kinney	Affirmative	
1	Northeast Utilities	David Boguslawski		
1	Northern Indiana Public Service Co.	Kevin M Largura	Affirmative	
1	NorthWestern Energy	John Canavan	Affirmative	
1	Ohio Valley Electric Corp.	Robert Mattey	Abstain	
1	Oklahoma Gas and Electric Co.	Marvin E VanBebber	Affirmative	
1	Omaha Public Power District	Doug Peterchuck	Affirmative	
1	Orlando Utilities Commission	Brad Chase		
1	PacifiCorp	Ryan Millard	Affirmative	
1	Platte River Power Authority	John C. Collins	Abstain	
1	Portland General Electric Co.	John T Walker	Affirmative	
1	Potomac Electric Power Co.	David Thorne	Abstain	
1	PowerSouth Energy Cooperative	Larry D Avery	Affirmative	
1	PPL Electric Utilities Corp.	Brenda L Truhe	Negative	
1	Progress Energy Carolinas	Brett A. Koelsch	Abstain	
1	Public Service Company of New Mexico	Laurie Williams	Abstain	
1	Public Service Electric and Gas Co.	Kenneth D. Brown	Affirmative	
1	Public Utility District No. 1 of Okanogan County	Dale Dunckel	Abstain	
1	Puget Sound Energy, Inc.	Denise M Lietz	Negative	
1	Raj Rana	Rajendrasinh D Rana	Abstain	
1	Rochester Gas and Electric Corp.	John C. Allen	Affirmative	

1	Sacramento Municipal Utility District	Tim Kelley	Affirmative	004673
1	Salmon River Electric Cooperative	Kathryn Spence		
1	Salt River Project	Robert Kondziolka	Affirmative	
1	Santee Cooper	Terry L Blackwell	Affirmative	
1	SCE&G	Henry Delk, Jr.		
1	Seattle City Light	Pawel Krupa	Negative	
1	Sierra Pacific Power Co.	Rich Salgo	Negative	
1	Snohomish County PUD No. 1	Long T Duong	Affirmative	
1	South California Edison Company	Steven Mavis	Affirmative	
1	Southern Company Services, Inc.	Robert A. Schaffeld	Affirmative	
1	Southern Illinois Power Coop.	William Hutchison	Negative	
1	Southwest Transmission Cooperative, Inc.	James Jones	Negative	
1	Southwestern Power Administration	Angela L Summer	Abstain	
1	Sunflower Electric Power Corporation	Noman Lee Williams	Negative	
1	Tampa Electric Co.	Beth Young		
1	Tennessee Valley Authority	Larry G Akens	Affirmative	
1	Tri-State G & T Association, Inc.	Tracy Sliman	Negative	
1	Tucson Electric Power Co.	John Tolo	Negative	
1	United Illuminating Co.	Jonathan Appelbaum	Affirmative	
1	Westar Energy	Allen Klassen	Abstain	
1	Western Area Power Administration	Brandy A Dunn	Affirmative	
1	Xcel Energy, Inc.	Gregory L Pieper	Affirmative	
2	Alberta Electric System Operator	Mark B Thompson	Negative	
2	BC Hydro	Venkataramakrishnan Vinnakota	Abstain	
2	California ISO	Rich Vine	Affirmative	
2	Electric Reliability Council of Texas, Inc.	Charles B Manning	Affirmative	
2	Independent Electricity System Operator	Barbara Constantinescu	Affirmative	
2	ISO New England, Inc.	Kathleen Goodman	Negative	
2	Midwest ISO, Inc.	Marie Knox	Affirmative	
2	New Brunswick System Operator	Alden Briggs	Negative	
2	New York Independent System Operator	Gregory Campoli	Negative	
2	PJM Interconnection, L.L.C.	Tom Bowe	Negative	
2	Southwest Power Pool, Inc.	Charles H. Yeung	Affirmative	
3	AEP	Michael E Deloach	Abstain	
3	Alabama Power Company	Richard J. Mandes	Affirmative	
3	Ameren Services	Mark Peters	Affirmative	
3	APS	Steven Norris	Affirmative	
3	Associated Electric Cooperative, Inc.	Chris W Bolick	Affirmative	
3	Atlantic City Electric Company	NICOLE BUCKMAN	Abstain	
3	BC Hydro and Power Authority	Pat G. Harrington	Abstain	
3	Bonneville Power Administration	Rebecca Berdahl	Negative	
3	City of Alexandria	Michael Marcotte		
3	City of Bartow, Florida	Matt Culverhouse		
3	City of Clewiston	Lynne Mila	Affirmative	
3	City of Green Cove Springs	Gregg R Griffin	Negative	
3	City of Redding	Bill Hughes	Affirmative	
3	Cleco Corporation	Michelle A Corley	Affirmative	
3	Colorado Springs Utilities	Charles Morgan	Affirmative	
3	Consolidated Edison Co. of New York	Peter T Yost	Negative	
3	Constellation Energy	CJ Ingersoll	Negative	
3	Consumers Energy	Richard Blumenstock	Affirmative	
3	CPS Energy	Jose Escamilla	Abstain	
3	Delmarva Power & Light Co.	Michael R. Mayer	Abstain	
3	Detroit Edison Company	Kent Kujala	Affirmative	
3	Dominion Resources Services	Michael F. Gildea	Abstain	
3	Duke Energy Carolina	Henry Ernst-Jr		
3	East Kentucky Power Coop.	Patrick Woods	Affirmative	
3	Entergy	Joel T Plessinger		
3	FirstEnergy Energy Delivery	Stephan Kern	Abstain	
3	Florida Municipal Power Agency	Joe McKinney	Affirmative	
3	Florida Power Corporation	Lee Schuster	Affirmative	
3	Georgia Power Company	Anthony L Wilson	Affirmative	
3	Georgia Systems Operations Corporation	William N. Phinney	Abstain	
3	Grays Harbor PUD	Wesley W Gray		
3	Great River Energy	Brian Glover	Affirmative	
3	Gulf Power Company	Paul C Caldwell	Affirmative	

3	Hydro One Networks, Inc.	David Kiguel	Affirmative	004674
3	Imperial Irrigation District	Jesus S. Alcaraz	Abstain	
3	JEA	Garry Baker	Negative	
3	Kansas City Power & Light Co.	Charles Locke	Negative	
3	Kissimmee Utility Authority	Gregory D Woessner	Affirmative	
3	Lakeland Electric	Norman D Harryhill		
3	Lincoln Electric System	Jason Fortik	Affirmative	
3	Los Angeles Department of Water & Power	Daniel D Kurowski	Affirmative	
3	Louisville Gas and Electric Co.	Charles A. Freibert	Negative	
3	Manitoba Hydro	Greg C. Parent	Affirmative	
3	Manitowoc Public Utilities	Thomas E Reed	Abstain	
3	MidAmerican Energy Co.	Thomas C. Mielnik		
3	Mississippi Power	Jeff Franklin	Affirmative	
3	Modesto Irrigation District	Jack W Savage	Affirmative	
3	Municipal Electric Authority of Georgia	Steven M. Jackson	Affirmative	
3	Muscatine Power & Water	John S Bos	Negative	
3	Nebraska Public Power District	Tony Eddleman	Affirmative	
3	New York Power Authority	Marilyn Brown		
3	Niagara Mohawk (National Grid Company)	Michael Schiavone	Abstain	
3	Northern Indiana Public Service Co.	William SeDoris	Affirmative	
3	Ocala Electric Utility	David Anderson	Affirmative	
3	Orlando Utilities Commission	Ballard K Mutters	Affirmative	
3	Owensboro Municipal Utilities	Thomas T Lyons	Abstain	
3	Pacific Gas and Electric Company	John H Hagen	Affirmative	
3	PacifiCorp	Dan Zollner	Affirmative	
3	Platte River Power Authority	Terry L Baker	Abstain	
3	PNM Resources	Michael Mertz	Abstain	
3	Potomac Electric Power Co.	Robert Reuter	Abstain	
3	Progress Energy Carolinas	Sam Waters		
3	Public Service Electric and Gas Co.	Jeffrey Mueller	Affirmative	
3	Public Utility District No. 1 of Clallam County	David Proebstel		
3	Puget Sound Energy, Inc.	Erin Apperson	Negative	
3	Sacramento Municipal Utility District	James Leigh-Kendall	Affirmative	
3	Salt River Project	John T. Underhill	Affirmative	
3	Santee Cooper	James M Poston	Affirmative	
3	Seattle City Light	Dana Wheelock	Negative	
3	Seminole Electric Cooperative, Inc.	James R Frauen	Affirmative	
3	Snohomish County PUD No. 1	Mark Oens	Affirmative	
3	South Carolina Electric & Gas Co.	Hubert C Young	Abstain	
3	Tacoma Public Utilities	Travis Metcalfe	Affirmative	
3	Tampa Electric Co.	Ronald L Donahey		
3	Tennessee Valley Authority	Ian S Grant	Affirmative	
3	Tri-State G & T Association, Inc.	Janelle Marriott	Negative	
3	Westar Energy	Bo Jones	Affirmative	
3	Wisconsin Electric Power Marketing	James R Keller	Affirmative	
3	Xcel Energy, Inc.	Michael Ibold	Negative	
4	Alliant Energy Corp. Services, Inc.	Kenneth Goldsmith	Affirmative	
4	American Municipal Power	Kevin Koloini	Affirmative	
4	Blue Ridge Power Agency	Duane S Dahlquist	Affirmative	
4	City of Austin dba Austin Energy	Reza Ebrahimian	Affirmative	
4	City of Clewiston	Kevin McCarthy	Affirmative	
4	City of New Smyrna Beach Utilities Commission	Tim Beyrle	Negative	
4	City of Redding	Nicholas Zettel	Affirmative	
4	City Utilities of Springfield, Missouri	John Allen	Affirmative	
4	Consumers Energy	David Frank Ronk	Affirmative	
4	Detroit Edison Company	Daniel Herring	Affirmative	
4	Flathead Electric Cooperative	Russ Schneider	Abstain	
4	Florida Municipal Power Agency	Frank Gaffney	Affirmative	
4	Fort Pierce Utilities Authority	Thomas Richards		
4	Georgia System Operations Corporation	Guy Andrews	Abstain	
4	Imperial Irrigation District	Diana U Torres		
4	Indiana Municipal Power Agency	Jack Alvey	Abstain	
4	Integrys Energy Group, Inc.	Christopher Plante	Abstain	
4	LaGen	Richard Comeaux		
4	Madison Gas and Electric Co.	Joseph DePoorter	Affirmative	
4	Northern California Power Agency	Tracy R Bibb		

4	Ohio Edison Company	Douglas Hohlbaugh	Abstain	004675
4	Public Utility District No. 1 of Douglas County	Henry E. LuBean	Affirmative	
4	Public Utility District No. 1 of Snohomish County	John D Martinsen	Affirmative	
4	Sacramento Municipal Utility District	Mike Ramirez	Affirmative	
4	Seattle City Light	Hao Li	Negative	
4	South Mississippi Electric Power Association	Steven McElhaney		
4	Tacoma Public Utilities	Keith Morisette	Affirmative	
4	Wisconsin Energy Corp.	Anthony Jankowski	Affirmative	
5	AEP Service Corp.	Brock Ondayko	Abstain	
5	AES Corporation	Leo Bernier	Affirmative	
5	Amerenue	Sam Dwyer	Affirmative	
5	Arizona Public Service Co.	Edward Cambridge	Negative	
5	Avista Corp.	Edward F. Groce	Negative	
5	BC Hydro and Power Authority	Clement Ma	Abstain	
5	Boise-Kuna Irrigation District/dba Lucky peak power plant project	Mike D Kukla	Negative	
5	Bonneville Power Administration	Francis J. Halpin	Negative	
5	BP Wind Energy North America Inc	Carla Bayer		
5	BrightSource Energy, Inc.	Chifong Thomas	Affirmative	
5	City of Austin dba Austin Energy	Jeanie Doty	Affirmative	
5	City of Redding	Paul A. Cummings	Affirmative	
5	City of Tacoma, Department of Public Utilities, Light Division, dba Tacoma Power	Max Emrick	Affirmative	
5	City of Tallahassee	Brian Horton		
5	City Water, Light & Power of Springfield	Steve Rose	Affirmative	
5	Colorado Springs Utilities	Jennifer Eckels	Affirmative	
5	Consolidated Edison Co. of New York	Wilket (Jack) Ng	Negative	
5	Consumers Energy Company	David C Greyerbiehl	Affirmative	
5	CPS Energy	Robert Stevens	Negative	
5	Detroit Edison Company	Christy Wicke	Affirmative	
5	Dominion Resources, Inc.	Mike Garton	Abstain	
5	Duke Energy	Dale Q Goodwine	Affirmative	
5	East Kentucky Power Coop.	Stephen Ricker	Affirmative	
5	Edison Mission Energy	Ellen Oswald		
5	Electric Power Supply Association	John R Cashin		
5	FirstEnergy Solutions	Kenneth Dresner	Abstain	
5	Florida Municipal Power Agency	David Schumann	Affirmative	
5	Gainesville Regional Utilities	Karen C Alford		
5	Great River Energy	Preston L Walsh	Affirmative	
5	Green Country Energy	Greg Froehling		
5	Imperial Irrigation District	Marcela Y Caballero		
5	Indeck Energy Services, Inc.	Rex A Roehl		
5	JEA	John J Babik	Negative	
5	Kissimmee Utility Authority	Mike Blough	Affirmative	
5	Lakeland Electric	James M Howard	Affirmative	
5	Liberty Electric Power LLC	Daniel Duff	Abstain	
5	Lincoln Electric System	Dennis Florom	Affirmative	
5	Los Angeles Department of Water & Power	Kenneth Silver	Affirmative	
5	Lower Colorado River Authority	Tom Foreman	Affirmative	
5	Luminant Generation Company LLC	Mike Laney	Affirmative	
5	Manitoba Hydro	S N Fernando	Affirmative	
5	Massachusetts Municipal Wholesale Electric Company	David Gordon	Abstain	
5	MEAG Power	Steven Grego	Affirmative	
5	Michigan Public Power Agency	Gary Carlson		
5	MidAmerican Energy Co.	Christopher Schneider	Affirmative	
5	Muscatine Power & Water	Mike Avesing	Negative	
5	Nebraska Public Power District	Don Schmit	Affirmative	
5	New York Power Authority	Gerald Mannarino		
5	NextEra Energy	Allen D Schriver	Negative	
5	Northern California Power Agency	Hari Modi		
5	Northern Indiana Public Service Co.	William O. Thompson	Affirmative	
5	Omaha Public Power District	Mahmood Z. Safi	Affirmative	
5	Orlando Utilities Commission	Richard K Kinas	Affirmative	
5	Pacific Gas and Electric Company	Richard J. Padilla	Affirmative	
5	PacifiCorp	Sandra L. Shaffer	Affirmative	
5	Platte River Power Authority	Roland Thiel	Abstain	

5	Portland General Electric Co.	Gary L Tingley	Negative	004676
5	PowerSouth Energy Cooperative	Tim Hattaway	Abstain	
5	PPL Generation LLC	Annette M Bannon	Negative	
5	Progress Energy Carolinas	Wayne Lewis		
5	PSEG Fossil LLC	Tim Kucey	Affirmative	
5	Public Utility District No. 1 of Lewis County	Steven Grega	Abstain	
5	Puget Sound Energy, Inc.	Tom Flynn		
5	Sacramento Municipal Utility District	Bethany Hunter	Affirmative	
5	Salt River Project	William Alkema	Affirmative	
5	Santee Cooper	Lewis P Pierce	Affirmative	
5	Seattle City Light	Michael J. Haynes	Negative	
5	Seminole Electric Cooperative, Inc.	Brenda K. Atkins	Affirmative	
5	Siemens PTI	Edwin Cano		
5	Snohomish County PUD No. 1	Sam Nietfeld	Affirmative	
5	Southern California Edison Co.	Denise Yaffe	Affirmative	
5	Southern Company Generation	William D Shultz	Affirmative	
5	Tampa Electric Co.	RJames Rocha	Affirmative	
5	Tenaska, Inc.	Scott M. Helyer	Abstain	
5	Tennessee Valley Authority	David Thompson	Affirmative	
5	Tri-State G & T Association, Inc.	Barry Ingold	Negative	
5	U.S. Army Corps of Engineers	Melissa Kurtz	Affirmative	
5	Wisconsin Electric Power Co.	Linda Horn	Affirmative	
5	Wisconsin Public Service Corp.	Leonard Rentmeester	Affirmative	
5	Xcel Energy, Inc.	Liam Noailles	Negative	
6	ACES Power Marketing	Jason L Marshall	Abstain	
6	AEP Marketing	Edward P. Cox	Abstain	
6	Ameren Energy Marketing Co.	Jennifer Richardson	Affirmative	
6	APS	Randy A. Young	Affirmative	
6	Bonneville Power Administration	Brenda S. Anderson	Negative	
6	City of Redding	Marvin Briggs	Affirmative	
6	Cleco Power LLC	Robert Hirchak	Affirmative	
6	Colorado Springs Utilities	Lisa C Rosintoski		
6	Consolidated Edison Co. of New York	Nickesha P Carrol	Negative	
6	Constellation Energy Commodities Group	Brenda L Powell	Negative	
6	Dominion Resources, Inc.	Louis S. Slade	Abstain	
6	Duke Energy Carolina	Walter Yeager		
6	Entergy Services, Inc.	Terri F Benoit		
6	FirstEnergy Solutions	Kevin Querry	Abstain	
6	Florida Municipal Power Agency	Richard L. Montgomery	Affirmative	
6	Florida Municipal Power Pool	Thomas Washburn	Affirmative	
6	Florida Power & Light Co.	Silvia P. Mitchell	Negative	
6	Imperial Irrigation District	Cathy Bretz	Abstain	
6	Kansas City Power & Light Co.	Jessica L Klinghoffer	Negative	
6	Lakeland Electric	Paul Shipps	Affirmative	
6	Lincoln Electric System	Eric Ruskamp	Affirmative	
6	Los Angeles Department of Water & Power	Brad Packer	Affirmative	
6	Luminant Energy	Brad Jones	Affirmative	
6	Manitoba Hydro	Daniel Prowse	Affirmative	
6	MidAmerican Energy Co.	Dennis Kimm	Affirmative	
6	Northern Indiana Public Service Co.	Joseph O'Brien	Affirmative	
6	Omaha Public Power District	David Ried	Affirmative	
6	Orlando Utilities Commission	Claston Augustus Sunanon	Affirmative	
6	PacifiCorp	Scott L Smith	Affirmative	
6	Platte River Power Authority	Carol Ballantine	Abstain	
6	PPL EnergyPlus LLC	Mark A Heimbach		
6	Progress Energy	John T Sturgeon		
6	PSEG Energy Resources & Trade LLC	Peter Dolan	Affirmative	
6	Public Utility District No. 1 of Chelan County	Hugh A. Owen		
6	Sacramento Municipal Utility District	Diane Enderby	Affirmative	
6	Salt River Project	Steven J Hulet	Affirmative	
6	Santee Cooper	Michael Brown	Affirmative	
6	Seattle City Light	Dennis Sismaet	Negative	
6	Seminole Electric Cooperative, Inc.	Trudy S. Novak	Affirmative	
6	Snohomish County PUD No. 1	William T Moojen		
6	South California Edison Company	Lujuanna Medina	Affirmative	
6	Southern Company Generation and Energy Marketing	John J. Ciza	Affirmative	

6	Tacoma Public Utilities	Michael C Hill	Affirmative	004677
6	Tampa Electric Co.	Benjamin F Smith II		
6	Tennessee Valley Authority	Marjorie S. Parsons	Affirmative	
6	Westar Energy	Grant L Wilkerson	Affirmative	
6	Western Area Power Administration - UGP Marketing	Peter H Kinney	Affirmative	
6	Xcel Energy, Inc.	David F Lemmons	Affirmative	
8		Roger C Zaklukiewicz	Affirmative	
8		James A Maenner	Abstain	
8		Robert Blohm	Affirmative	
8		Edward C Stein	Affirmative	
8	Energy Mark, Inc.	Howard F. Illian	Affirmative	
8	JDRJC Associates	Jim Cyrulewski	Affirmative	
8	Power Energy Group LLC	Peggy Abbadini	Affirmative	
8	Utility Services, Inc.	Brian Evans-Mongeon	Abstain	
8	Volkmann Consulting, Inc.	Terry Volkmann	Affirmative	
9	California Energy Commission	William M Chamberlain		
9	Commonwealth of Massachusetts Department of Public Utilities	Donald Nelson	Affirmative	
9	National Association of Regulatory Utility Commissioners	Diane J. Barney	Negative	
9	New York State Department of Public Service	Thomas G. Dvorsky	Negative	
9	Oregon Public Utility Commission	Jerome Murray	Abstain	
9	Public Utilities Commission of Ohio	Klaus Lambeck		
10	Florida Reliability Coordinating Council	Linda Campbell	Abstain	
10	Midwest Reliability Organization	James D Burley	Affirmative	
10	New York State Reliability Council	Alan Adamson	Affirmative	
10	Northeast Power Coordinating Council	Guy V. Zito	Affirmative	
10	ReliabilityFirst Corporation	Anthony E Jablonski	Affirmative	
10	SERC Reliability Corporation	Carter B. Edge	Affirmative	
10	Southwest Power Pool RE	Emily Pennel	Abstain	
10	Texas Reliability Entity, Inc.	Donald G Jones	Affirmative	
10	Western Electricity Coordinating Council	Steven L. Rueckert	Affirmative	