NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Project 2010-14.1 Balancing Authority Reliability-based Controls - Reserves
BAL-001-1 Real Power Balancing Control Performance Mapping Document

BAL-001-0.1a Mapping to Proposed NERC Reliability Standard BAL-001-1		
Standard BAL-001-0.1a NERC Board Approved	**Comment**	**Proposed Standard BAL-001-1**
R1. Each Balancing Authority shall operate such that, on a rolling 12-month basis, the average of the clock-minute averages of the Balancing Authority's Area Control Error (ACE) divided by 10B (B is the clock-minute average of the Balancing Authority Area's Frequency Bias) times the corresponding clock-minute averages of the Interconnection's Frequency Error is less than a specific limit. This limit ε_1^2 is a constant derived from a targeted frequency bound (separately calculated for each	This Requirement has been moved into BAL-001-1 Requirement R1	Requirement R1 Each Balancing Authority shall operate such that the Balancing Authority's Control Performance Standard 1 (CPS1), as calculated in Attachment 1, is greater than or equal to 100% for the applicable Interconnection in which it operates for each 12 month period, evaluated monthly, to support interconnection frequency. The calculation equation for CPS1 has been moved to Attachment 1 of BAL-001-1.

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Interconnection) that is reviewed and set as necessary by the NERC Operating Committee. $AVG_{Period}\frac{ACE1}{-10B}$ The equation for ACE is: $ACE = (NI_A - NI_S) - 10B (F_A - F_S) - I_{ME}$ where: • NI_A is the algebraic sum of actual flows on all tie lines. • NI_S is the algebraic sum of scheduled flows on all tie lines. • B is the Frequency Bias Setting (MW/0.1 Hz) for the Balancing Authority. The constant factor 10 converts the frequency setting to MW/Hz. • F_A is the actual frequency. • F_S is the scheduled frequency. F_S is normally 60		

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Hz but may be offset to effect manual time error corrections. • I_{ME} is the meter error correction factor typically estimated from the difference between the integrated hourly average of the net tie line flows (NI_A) and the hourly net interchange demand measurement (megawatt-hour). This term should normally be very small or zero.		
R2. Each Balancing Authority shall operate such that its average ACE for at least 90% of clock-ten-minute periods (6 non-overlapping periods per hour) during a calendar month is within a specific limit, referred to as L_{10}. *AVG*10-minute (ACE_i) ≤ L_{10} where:	This Requirement has been removed from BAL-001-1 and replaced with the proposed Requirement R2 for BAAL.	Requirement R2 Each Balancing Authority shall operate such that its clock-minute average of Reporting ACE does not exceed for more than 30 consecutive clock-minutes its clock-minute Balancing Authority ACE Limit (BAAL), as calculated in Attachment 2, for the applicable Interconnection in which it operates to support interconnection frequency.

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L_{10}=1.65 $\epsilon_{10}\sqrt{(-10B_i)(-10B_s)}$ ε_{10} is a constant derived from the targeted frequency bound. It is the targeted root-mean-square (RMS) value of ten-minute average Frequency Error based on frequency performance over a given year. The bound, ε_{10}, is the same for every Balancing Authority Area within an Interconnection, and B_s is the sum of the Frequency Bias Settings of the Balancing Authority Areas in the respective Interconnection. For Balancing Authority Areas with variable bias, this is equal to the sum of the minimum Frequency Bias Settings.		The calculation equation for BAAL is located in Attachment 2 of BAL-001-1.
R3. Each Balancing Authority providing Overlap Regulation Service shall	This Requirement has been moved into the BAL-001-1	Applicability Section 4.1.1 and Attachment 1 A Balancing Authority providing Overlap Regulation Service

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evaluate Requirement R1 (i.e., Control Performance Standard 1 or CPS1) and Requirement R2 (i.e., Control Performance Standard 2 or CPS2) using the characteristics of the combined ACE and combined Frequency Bias Settings.	Applicability Section and Attachment 1.	to another Balancing Authority calculates its CPS1 performance after combining its Reporting ACE and Frequency Bias Settings with the Reporting ACE and Frequency Bias Settings of the Balancing Authority receiving Regulation Service.
R4. Any Balancing Authority receiving Overlap Regulation Service shall not have its control performance evaluated (i.e. from a control performance perspective, the Balancing Authority has shifted all control requirements to the Balancing Authority providing Overlap Regulation Service).	This Requirement has been moved into the BAL-001-1 Applicability Section and Attachment 1.	Applicability Section 4.1.3 and Attachment 1 A Balancing Authority receiving Overlap Regulation Service is not subject to CPS1 or BAAL compliance evaluation.