

Conference Call Notes Under-frequency Load Shedding SDT — Project 2007-01

September 14, 2009 | 1:30 – 4:00 p.m. Eastern

1. Administrative

Roll Call

Stephanie Monzon welcomed the members and guests of the Standard Drafting Team for Project 2007-01 Underfrequency Load Shedding (see Roster — **Attachment 1a**).

- Philip Tatro — National Grid (Chair)
- Jonathan Glidewell — Southern Company Transmission Co.
- Gary Keenan — Northwest Power Pool Corporation
- Steven Myers — Electric Reliability Council of Texas, Inc.
- Brian Evans Mongeon — Utility Services, LLC
- Tony Rodrigues — PacifiCorp
- Scott Berry — Indiana Municipal Power Agency
- Frank Gaffney — Florida Municipal Power Agency
- Stephanie Monzon — NERC

Observers

- Anthony Jablonski — ReliabilityFirst Corporation
- Steve Wadas — Nebraska Public Power District
- Carol Gerou — Midwest Reliability Organization
- Scott Sells — FERC Staff
- Jason Connell — Peco Energy

NERC Antitrust Compliance Guidelines

Stephanie Monzon reviewed the NERC Antitrust Compliance Guidelines.

2. Review Meeting Agenda

The team did not complete a review of Question 8 responses and will continue their review during this conference call. The review of the requirements will be postponed until the team has completed this task.

3. Review of Question 8 Responses

Phil Tatro provided another version of Question 8 responses prior to the conference call that included more responses. The team picked up at FRCC and completed through Exelon.

The team scheduled another call to take place on **September 22, 2009 from 11 a.m. to 1 p.m. EST to complete the review of Question 8 responses.**

4. Action Items

Stephanie Monzon reviewed the actions that were open at the end of the meeting.

Action Items:	Status:	Assigned To:
<p>Stephanie to follow-up with Compliance and Standards to determine if the draft standard can require that the group of PC's use their regional standards development processes to develop the UFLS program.</p> <p>The standard cannot require "how" the program is established only what is required of the program.</p>	<p>Created 2/11 By 2/20 conference call Closed</p>	<p>Stephanie</p>
<p>Stephanie will follow up with Gerry regarding the FERC direction to include the PRC-009 requirements into the draft standard. FERC did not support the team's argument that they could be covered under the NERC ROP data request.</p>	<p>Created 6/11/09</p>	<p>Stephanie</p>
<p>Barry's Comments: The team will review Barry's comments and will review Stephanie's list of major issues (for Barry's comments) and will email additions to the list by COB June 22, 2009.</p>	<p>Closed</p>	<p>Team</p>
<p>The sub-teams will begin writing formal responses to the comments based on the discussion of issues at the June 10th meeting.</p> <p>Question 1 and 2: Bob and Carol will finalize the responses by June 19 — the team will review and discuss by exception on the July 7th meeting — Complete</p> <p>Question 3: The team will discuss response to comments (not done at the June in person meeting). Jonathan will lead the discussion and identify the major issues for discussion. — Complete</p> <p>Question 4: The team will discuss on the August 6th call — Complete (on the July 20 call)</p> <p>Barry Francis: The team will discuss on the August 6th call — Complete</p> <p>Question 5: The team will discuss on the August 24th — Complete</p> <p>Question 6: August 24th call – the team did not discuss Question 6 responses.</p>		

Action Items:	Status:	Assigned To:
<p>The team will discuss on conference calls after the meeting in Montreal — Completed on the 9/8/09 call</p> <p>Question 7: By exception — Completed on the 9/11/09 call</p> <p>Question 8: August 24th call — the team did not discuss Question 6 responses. The team will discuss on conference calls after the meeting in Montreal. — Completed through Exelon on the 9/14/09 call</p>		

5. Next Steps

Date	Location	Comments
August 6, 2009 from 9:30 a.m.–noon EST	Conference Call and WebEx	Barry Francis
August 24, 2009 from 1–3:30 p.m. EST	Conference Call and WebEx	Question 5, 6, 7 and 8
September 1–2, 2009 from 8 a.m.–5 p.m. (both days)	In person meeting — Montreal	Confirmed
September 8, 2009 from 9 a.m.–noon EST	Conference Call and WebEx	Question 6
September 9, 2009 from 1–3 p.m. EST	Conference Call	FERC Staff review of standard
September 11, 2009 from 12:30–2:30 p.m. EST	Conference Call and WebEx	Question 7 by exception and Question 8
September 14, 2009 from 1:30–4 p.m. EST	Conference Call and WebEx	Question 8
September 22, 2009 from 11 a.m.–1 p.m. EST	Conference Call and WebEx	Question 8
September 24, 2009 from 10 a.m.–noon EST	Conference Call and WebEx	Compliance Elements
September 25, 2009 from 9–11 a.m. EST	Conference Call and WebEx	Implementation Plan, Standard Final Pass
October 5–6, 2009 from 8 a.m.–5 p.m. (both days)	In person meeting FMPA Orlando, FL	Comment Form, Mapping Document, Remaining issues

6. Adjourn

The call adjourned at approximately 4:02 p.m. Eastern.

8. Please provide any other comments (that you have not already provided in response to the questions above) that you have on the draft standard PRC-006-1.

Summary Consideration:

Organization	Question 8 Comments:	
TRE UFLS Standard Drafting Team	The TRE UFLS SDT appreciates the opportunity to provide these comments and commends the NERC UFLS SDT for its efforts.	Formatted: Font: Arial Bold
Response: Thank you for your support.		Deleted: The SDT also observes that if the requirement were assigned as suggested, the standard would lack clarity as to what is the role of the Planning Coordinator and what is the role of the Balancing Authority.
Pepco Holdings, Inc - Affiliates		Formatted: Font: Arial Bold, Bold, Font color: Custom Color(38,77,116)
Bonneville Power Administration	<p>The Applicability should be Planning Coordinators and Balancing Authorities. BPA suggests that everywhere it currently states Planning Coordinator that it be changed to ?Planning Coordinator/Balancing Authority?.</p> <p>Response: The SDT believes the Planning Coordinator is the Functional Model entity with the wide-area view and technical skills required to perform the UFLS assessments. The Balancing Authority cannot take action in the time frame required to arrest frequency decline and recovery frequency to 59.3 Hz within 30 seconds.</p> <p>R3. - This needs to say why they are selecting portions of the BES that may form islands. The reason would be "that may form islands to simulate frequency performance and design the UFLS schemes."</p> <p>Response: The reason is given in R3, "Each group of Planning Coordinators shall identify an island(s) as a basis for designing a UFLS program."</p> <p>R5. Second bullet - This should include both "relay scheme or special protection system."</p> <p>Response: The SDT agrees with this comment and has revised the requirement (now R3) accordingly.</p> <p>Related to R9. - Each Generator Owner also needs to provide data for their under frequency trip settings, if they are within the band specified, 58.0 Hz to 61.8 Hz, since they also need to be considered in the simulations.</p> <p>Response: Per R5 of the first draft of PRC-024-1, the Planning Coordinators will have information on generator under-frequency trip settings that fall outside the acceptable boundary defined by PRC-024-1, Attachment 1 and may include this in their database. Adding such a requirement in PRC-006-2 will create a redundant data requirement already</p>	<p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116)</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116), Not Highlight</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116)</p> <p>Formatted: Font: Arial Bold, Underline, Font color: Custom Color(38,77,116)</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116), Not Highlight</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116)</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116)</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116)</p>

Organization	Question 8 Comments:
	contained in PRC-024-1.
Response:	
Northeast Power Coordinating Council	<p>NPCC has previously commented that the objective to control frequency overshoot cannot be met through UFLS program design alone in the absence of adequate generating unit governing response. Our immediate concern has been addressed by increasing the maximum overshoot limit to 61.8 Hz and we support this modification to the performance requirements. However, we expect this concern will resurface if standards requiring minimum frequency response are not implemented and further declines in system frequency response are observed. NPCC recommends that NERC develop standards for unit governing response that are consistent with and support the reliability objectives of standards PRC-006 (UFLS) and PRC-024 (Generator Performance).</p> <p><u>Response: The SDT agrees, though this is outside the scope of its activities.</u></p> <p>NPCC also notes that it may not be possible for the Planning Coordinators to design a reliable UFLS program that will arrest and recover declining frequency if an excessive number of generators are exempted from meeting the underfrequency performance requirements in PRC-024.</p> <p><u>Response: The SDT agrees, though this needs to be addressed by the Project 2007-09 (Generator Verification) PRC-024 SDT.</u></p> <p>Hydro-Quebec TransEnergie has technical parameters that differ from those specified in Requirements R6 and R7. A Variance will be needed to address those specific concerns.</p> <p><u>Response: A variance for the Québec Interconnection is included in the third posting of the standard.</u></p>
Response:	
Southern Company	--- R8: It is problematic for a loosely organized group of Planning Coordinators to create and maintain a database. There are several practical and compliance issues with this. This should be assigned to an entity with clear responsibilities and pro
<p><u>Response: A precedent for the “group” approach already has been developed and used in the current FERC approved BAL-002-0 which states requirements and compliance elements that direct responsibility to a Reserve Sharing Group composed of Balancing Authorities. In addition the “group” concept was first proven under the predecessor Phase 1 through 3 field testing standards procedure in the early 2000s. The purpose is to exert peer pressure on all individual responsible entities by judging the results of the group effort. This is apparent in the development of simulation model base cases for the Eastern Interconnection. In the event the database is not maintained, each member of the group is deemed non-compliant.</u></p>	

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Organization	Question 8 Comments:	
ERCOT ISO	<p>Comment 1- May need to consider defining the meaning of region (Region) in the NERC Glossary so it is clear for the responsible entities for this standard.</p> <p><u>Response: The SDT intended “region” to relate to the traditional sense of the defined boundaries of a Regional Reliability Organization (RRO) and its successor the Regional Entity. The SDT feels that the concept of a “region” is generally understood throughout the industry and does not believe that a unique definition is required.</u></p> <p>Comment 2 Will it be necessary for ERCOT ISO to have a procedure for coordinating with groups of Planning Coordinators, since we are essentially a group of one? Maybe language could be added to the standard to clarify for this situation.</p> <p><u>Response: The SDT modified this requirement to no longer require a procedure. The revised requirement R6 states that “Each group of Planning Coordinators shall reach concurrence of assessment results with their adjacent region’s group of Planning Coordinators of any islands identified by any one region’s group of Planning Coordinators that straddle the respective interconnected regions.”</u></p> <p>Comment 3 - It would be appropriate for the load referenced in the imbalance calculation in requirement R6 to include system (island) losses. The standard should be clearer.</p> <p><u>Response: The SDT intentionally excluded island losses from the imbalance definition. The losses within an island are difficult to measure because the losses in the steady-state pre-event condition will change upon formation of the island. The SDT notes that excluding losses results in a slightly more conservative assessment because more generation would have to be online for a given deficiency if losses are included in the equation. In most cases the losses are on the order of 1 to 3 percent; thus while excluding losses is conservative, it is not overly conservative.</u></p>	<p>Deleted: copy response to similar comment to question 1 or 2</p> <p>Formatted: Highlight</p> <p>Formatted: Font: Arial Bold, Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Deleted: establish</p> <p>Formatted: Font: Arial Bold, Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Formatted: Font: (Default) Arial Bold, 10 pt, Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Formatted: Font: Arial Bold, Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Comment [pjt1]: I did not locate a response on this topic from the first posting and developed this response based on notes from an NPCC Working Group discussion on this topic in December, 2006.</p> <p>Deleted: look through first comment period responses for something similar</p> <p>Formatted: Highlight</p>
Response:		
Electric Market Policy		
Midwest ISO Stakeholders Standards Collaborators	<p>R3 requires the Planning Coordinator(s) to consider historical events and system studies that may form islands. Creating islanding scenarios that are not historical events will be highly speculative and require a PC(s) to address hypothetical sequence(s) of events that is unlikely to occur. Further, for larger PCs the number of potential islands could grow significantly if an unlimited number of contingencies are considered. Running dynamic simulations to design coordinated UFLS programs for multiple islanding scenarios would be a huge burden. The SDT should provide criteria for the PC to use in determining UFLS islands similar to that developed for the TPL-004 Category D criteria.</p> <p><u>The SDT recognizes the difficulties that could be encountered in identifying islands. Nevertheless, there may be portions of a system that obviously have a higher likelihood of islanding as compared to others. How extensive an analysis to identify islands needs to be is a judgment that cannot be written into a standard and must be left to the discretion of the Planning Coordinators involved. The standard only requires that criteria for identifying islands be</u></p>	<p>Formatted: Highlight</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Deleted: entities</p>

Organization	Question 8 Comments:	
	<p>developed and applied. <u>PHIL TO DRAFT ADDITIONAL LANGUAGE ADDRESSING CATEGORY D CRITERIA</u></p> <p>R2 We would suggest removing the word "consistent" because the program can not be applied consistently across the MRO Region. The Canadian systems need to shed more load than the US portion of MRO. We need to focus on coordination issues between geographic areas, not on consistent application across a NERC region. Perhaps what was intended is to state that load shedding should be applied uniformly across any island footprint.</p> <p><u>The SDT agrees with the comment and revised requirement R4 (that reflects merging of Requirement R2 into R5).</u></p> <p>R4 - Revise text so that the "agreement" between all entities is well documented through several examples: meeting minutes, a formal agreement to work together, results of common drills, examples of coordination of UFLS models, etc.) We would propose that the assessment for non compliance would be located in the formal agreement to work together since all parties should understand the risk or consequences of the group effort.</p> <p><u>Response: Requirement R4 has been deleted and the SDT developed Measures for all requirements that include examples of evidence but do not introduce new requirements on entities.</u></p> <p>These standards do not appear to consider or address if capacitors should be automatically tripped during UFLS to avoid overvoltage conditions. Do other standards address this or does this draft standard need to be modified?</p> <p><u>The SDT feels that requirement R4.4 addresses overvoltage conditions but does not specify how the volts per hertz requirement should be met. The SDT believes that requiring capacitor tripping in the standard is requiring "how".</u></p>	<p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116)), Highlight</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116))</p> <p>Deleted: Note to SDT: I think agree with this or else give them a regional variance</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116))</p> <p>Formatted: Font: Arial Bold, Bold, Font color: Custom Color(38,77,116))</p> <p>Formatted: Font: Arial Bold, Bold, Font color: Custom Color(38,77,116))</p> <p>Deleted: Please see R6.4</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(38,77,116))</p> <p>Deleted: does not</p> <p>Deleted: necessary</p>
<p>Response:</p>		
<p>SERC UFLS Standards Drafting Team</p>	<p>R8: It is problematic for a loosely organized group of Planning Coordinators to create and maintain a database. There are several practical and compliance issues with this. This should be assigned to an entity with clear responsibilities and processes to accomplish the task. Additionally, annually and database is unnecessarily restrictive given the study is only required on a 5 year basis and in light of existing data collection processes. Recommend revision R8 as follows: shall compile/assemble information provided by their Transmission Owners and Distribution Providers for use in UFLS assessments and event analyses. Databases should add value and not create extra work that does not directly contribute to the completion of the study.---</p> <p><u>Response: A precedent for the "group" approach already has been developed and used in the current FERC approved BAL-002-0 which states requirements and compliance elements that direct responsibility to a Reserve Sharing Group composed of Balancing Authorities. In addition the "group" concept was first proven under the predecessor Phase 1 through 3 field testing standards procedure in the early 2000s. The purpose is to exert peer pressure on all individual responsible entities by judging the results of the group effort. This is apparent in the development of simulation model base cases for the Eastern Interconnection. In the event the database is not maintained, each member of the group is deemed non-compliant.</u> R7.1 and 7.2 could have the effect of shifting the generators burden of staying on line to the load customer who must be shed to account for the generators less-than-expected frequency performance. The generators must be</p>	<p>Deleted: ¶</p>

Organization	Question 8 Comments:
	<p>modeled because that is the way they perform, but an exception for frequency support must be difficult for a generator to obtain.- --</p> <p><u>Response: The SDT agrees, though, exceptions for frequency support provided by the generators need to be addressed by the Project 2007-09 (Generator Verification) PRC-024 SDT.</u></p> <p>R10 should say ?shall implement the UFLS program rather than shall provide load tripping in accordance with the UFLS program because the phrase ?provide load tripping could be confusing.---</p> <p><u>Response: The SDT deliberated on the words “shall implement” and while we agree with the intent we feel that “provide load tripping” is more explicit.</u></p> <p>R1 through R8: The concept of PC's joining a group to design a UFLS scheme is flawed. Compliance should never be assessed on a group basis. Each PC (or TP) must be allowed to demonstrate compliance to the standard independently so compliant PCs/TPs are not penalized along with the non-compliant one(s). The standard should be applicable to individual PC's/TPs to design their UFLS scheme to meet the other requirements. The performance characteristics insure that the schemes from different PC's/TPs will coordinate. However, if a group approach is mandated, then sub-regional groups must be allowed in lieu of regional groups.---</p> <p><u>Response: A precedent for the “group” approach already has been developed and used in the current FERC approved BAL-002-0 which states requirements and compliance elements that direct responsibility to a Reserve Sharing Group composed of Balancing Authorities. In addition the “group” concept was first proven under the predecessor Phase 1 through 3 field testing standards procedure in the early 2000s. The purpose is to exert peer pressure on all individual responsible entities by judging the results of the group effort. This is apparent in the development of simulation model base cases for the Eastern Interconnection.</u></p> <p>R4 is an unnecessary complication, and should be deleted. A procedure for identifying islands between Regions is not necessary. What if there are no credible islands between Regions? R5 ensures that when credible islands between Regions are identified that all affected entities jointly study UFLS scheme effectiveness within the island.---</p> <p><u>Response: The SDT agrees and Requirement R4 has been deleted.</u></p> <p>R6: Does this requirement say that performance requirements must be met only at a 25% imbalance? Or is it requiring performance requirements to be met at lower imbalances too? If yes, we recommend performing both a 25% and a 15% imbalance test to add clarification.---</p> <p><u>Response: The requirement indicates that the performance characteristics apply to any percentage between 0 and 25. A number of imbalances need to be simulated to demonstrate that the performance characteristics can be met through the range.</u></p>

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Organization	Question 8 Comments:
	<p>R10: Does each DP have to specifically meet the UFLS scheme? For example, if the UFLS scheme is for 30% load in 3 steps of 10% each, some small DP's may not be able to achieve that fine a resolution. Some allowance should be made for aggregating DP's to meet the overall scheme. This allowance should be achieved by making the TO responsible for implementing the UFLS scheme. The TO has a wider area of control and responsibility and is therefore in a better position to coordinate the implementation.---</p> <p><u>Response: The group of Planning Coordinators can provide in the UFLS program any such allowance as long as compliance with the performance characteristics in requirement R4, (requirement R6 in previous posting) is achieved.</u></p> <p>Unless there is a high bar in PRC-024 to obtain an exception, this passes the responsibility for generators to support frequency on to the loads (to support frequency by shedding). To compensate this standard needs a requirement for generators which do not coordinate with the R6 requirements to arrange for load to be shed to make up for their generator tripping.---</p> <p><u>Response: Per R5 of the first draft of PRC-024-01, Generator Owners will need to document, subject to peer review, any generator under-frequency trip settings that fall outside the acceptable boundary defined by PRC-024-1, Attachment 1. Since this standard does not apply to Generator Owners, the preceding comment should be directed to Project 2007-09 which covers PRC-024-01.</u></p> <p><u>The proposed standard allows the group of Planning Coordinators in each region to determine what measures will be included in the program design to account for the impact of generators with trip settings that trip above the curve in PRC-024.</u></p> <p>R7.1: This should not require the modeling trip settings of all generators that trip at or above 58.0 Hz. Since most generators have trip settings for reduced frequency that holds for long periods (e.g. 30 minutes), this would require modeling trip settings of almost all generators. It should only require the modeling trip settings of generators that would trip within the performance envelope defined by R6.1 and R6.2.---</p> <p>R7.2: This should not require the modeling trip settings of all generators that trip at or below 61.8 Hz. Since most generators have trip settings for higher frequency that holds for long periods (e.g. 30 minutes), this would require modeling trip settings of almost all generators. It should only require the modeling trip settings of generators that would trip within the performance envelope defined by R6.3.---</p> <p><u>Response: The SDT modified requirements R5.1 and R5.2 (R7.1 and R7.2) to require the modeling of generators above and below the curves.</u></p> <p>It is not clear if the standard requires one specific UFLS scheme for the entire Region. One scheme for the Region should not be mandated. Flexibility should be allowed for different schemes within the Region as long as each scheme meets the performance requirements.</p> <p><u>Response: The SDT has addressed this concern by eliminating the word "consistent" from the requirement (now part of R4).</u></p>

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Organization	Question 8 Comments:
Response:	
FRCC Standards & Operations Departments	<p>We appreciate the Drafting Teams efforts on this very difficult standard and would offer the following suggested clarifications:R8. Each group of Planning Coordinators shall create and annually maintain a UFLS database containing relay information provided by their Transmission Owners and Distribution Providers for use in UFLS assessments and event analyses. Suggest rewording R8 as follow: R8. Each group of Planning Coordinators shall maintain a UFLS database which identifies the participating Planning Coordinators, contributing entities and contains information (as defined in R9) provided by their Transmission Owners, Distribution Providers and Load Serving Entities for use in UFLS assessments and event analyses.</p> <p><u>Response: The SDT has revised Requirement R8 (now R7) in response to a number of different suggestions from commenters. However, the SDT has not included requirements to document for the participating Planning Coordinators or for Load Serving Entities (LSEs) to provide data. The group of Planning Coordinators is made up of all Planning Coordinators in the region, so documenting the participating Planning Coordinators is unnecessary. The equipment owners (Distribution Providers and Transmission Owners) are the entities with the data required by the group of Planning Coordinators, so there is no reason to include LSEs in this requirement.</u></p> <p>Suggest adding Load Serving Entities to R9.</p> <p><u>Response: The equipment owners (Distribution Providers and Transmission Owners) are the entities with the data required by the group of Planning Coordinators, so there is no reason to include LSEs in this requirement.</u></p> <p>R10. Each Transmission Owner and Distribution Provider shall provide load tripping in accordance with the UFLS program designed by the group of Planning Coordinators for each region in which it operates. Suggest rewording R10 as follows: Each Transmission Owner, Distribution Provider and Load Serving Entity shall provide forecast load tripping in accordance with the UFLS program designed by the group of Planning Coordinators for each region in which it operates.</p> <p><u>Response: The SDT has not added the word "forecast" to the requirement. Details as to whether forecast or actual load is used as the basis of tripping of load is left to the group of Planning Coordinators in each region.</u></p>
Response:	
Florida Municipal Power Agency and Select Members	
MRO NERC Standards	R1 - Reword the requirement to state the Planning Coordinators within a region shall have an agreement with all the Planning Coordinators rather than creating a new group. (For example similar to agreement requirements between BAs in EOP-001,

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Organization	Question 8 Comments:
Review Subcommittee	<p>between GOs and transmission entites in NUC-001, and RCs to form an agreement in IRO-001 R7.) Proposed wording for R1: "Planning Coordinators shall have agreements with all Planning Coordinators in the region, that shall, at a minimum, contain provisions for cover fulfillment of the subsequent UFLS requirements in the standard."This agreement would clarify how "group" responsibilities for compliance and penalties would be assigned to its member entities. For example, would all Planning Coordinators be non-compliant, if one or more members of the group is non-compliant or if a group could not come to consensus on elements needed to fulfill a requirement? Would the financial penalty be shared among the group or would each member be assessed separate penalties?</p> <p><u>Response: The SDT believes it is not appropriate to dictate how the groups of Planning Coordinators establish their group. The purpose of the requirement is to exert peer pressure on all individual responsible entities by judging the results of the group effort, similar to development of simulation model base cases for the Eastern Interconnection. In the event the overall program fails to meet the performance characteristics, each member of the group is deemed non-compliant.</u></p> <p>R2 We suggest the following revised wording, "shall design a load shedding program or multiple load shedding programs so that all areas of the region are covered." In the MRO, the Canadian portions of the system need to shed more load than the U.S. portion of the system. There needs to be coordination within each potential island, but not necessarily consistent across each, entire NERC region. Perhaps what was intended is to state that load shedding should be applied uniformly across an island footprint.</p> <p><u>Response: The SDT has addressed this concern by eliminating the word "consistent" from the requirement (now part of R4).</u></p> <p>R4 - Revise text so that the "agreement" between all entities is well documented through several examples: meeting minutes, a formal agreement to work together, results of common drills, examples of coordination of UFLS models, etc.) We would propose that the assessment for non-compliance would be located in the formal agreement to work together since all parties should understand the risk or consequences of the group effort.</p> <p><u>Response: Requirement R4 has been deleted and the SDT has developed Measures for all requirements that include examples of evidence, but do not introduce new requirements on entities.</u></p> <p>R6.1 To match the design emphasis that is included in R6.2 and R6.3, we suggest . . . no less that 58.0 Hz per simulated event.</p> <p><u>Response: The SDT has revised these requirements to refer to frequency-time curves rather than specific thresholds and time durations. The SDT believes that the revised requirements (now parts 5.1 and 5.2 of R5) address the commenters' concern.</u></p> <p>R8 - Since the interpretation of "annually" can vary widely, we suggest this rewording, "each calendar year and within 15 months of the last update".</p> <p><u>Response: Since "annually" is not defined a NERC term, it has the meaning "occurring or happening every year or once</u></p>

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Organization	Question 8 Comments:	
	<p><u>a year.” as found in a collegiate dictionary. The SDT believes the reliability objective of this requirement is met without specifying details of when during the year the requirement is fulfilled.</u></p> <p>R9 If the inclusion of Transmission Owner is determined to be redundant, reword to, Each Distribution Provider shall provide. . . , as noted in response to Q1.b.</p> <p><u>Response: The SDT has decided to retain both the Distribution Provider and the Transmission Owner in the applicability for this requirement. The drafting team provided the rationale for keeping Transmission Owner in response to comments to Question 1B.</u></p> <p>R10 If the inclusion of Transmission Owner is determined to be redundant, reword to, Each Distribution Provider shall provide . . . , as noted in response to Q1.b.</p> <p><u>Response: The SDT has decided to retain both the Distribution Provider and the Transmission Owner in the applicability for this requirement. The drafting team provided the rationale for keeping Transmission Owner in response to comments to Question 1B.</u></p> <p>add R11 - Since reactive power device overvoltage or underfrequency protection may be included to the UFLS program assessment, we suggest adding the Requirement, "R11. Each Distribution Provider and Transmission Owner shall provide its reactive power device overvoltage or underfrequency protection information in the format and according to the schedule specified by the applicable Planning Coordinator." [If this requirement is added and includes the Transmission Owner, then the Transmission Owner should be included in the Applicability section.]</p> <p><u>Response: The database is intended to provide documentation that the UFLS program has been implemented as required in the proposed standard. In fulfilling the Planning Coordinator function, the groups of Planning Coordinators have the ability to obtain protection settings they need to model to comply with R6.4 (now 4.4). The team will discuss Requirement R9 and come back to this response based on revisions to the standard.</u></p> <p>add R12 - Since reactive power device overvoltage or underfrequency protection should be included in the UFLS program design for a specific island, we suggest adding the Requirement, "R12. Each Distribution Provider and Transmission Owner shall provide reactive power device tripping in accordance with the UFLS program designed by the applicable Planning Coordinator for each region in which they operate." [If this requirement is added and includes the Transmission Owner, then the Transmission Owner should be included in the Applicability section.]</p> <p><u>Response: The SDT does not believe such requirements are necessary. Any reactive power device overvoltage or under-frequency protection needed to comply with R6.4 (now 4.4) would need to be included in the assessment. The team will discuss Requirement R9 and come back to this response based on revisions to the standard.</u></p> <p>add R13 - Since generator off nominal frequency protection information may be included to the UFLS program assessment, we suggest adding the Requirement, "R13. Each Generator Owner shall provide its off nominal frequency protection information in the format and according to the schedule specified by the applicable regional group of Planning Coordinators."</p>	<p>Formatted: Font: Bold, Font color: Custom Color(RGB(31,73,125))</p> <p>Formatted: Highlight</p> <p>Formatted: Highlight</p> <p>Formatted: Font: Bold, Font color: Custom Color(RGB(31,73,125))</p> <p>Formatted: Highlight</p>

Organization	Question 8 Comments:	
	<p>Response: The SDT does not believe this requirement is necessary. Per R5 of the first draft of PRC-024-1, the Planning Coordinators will have information on generator under-frequency trip settings that fall outside the acceptable boundary defined by PRC-024-1, Attachment 1 and may include this in their database. <u>Adding such a requirement in PRC-006-2 will create a redundant data requirement already contained in PRC-024-1.</u></p> <p>add R14 - Since the coordination of generator off nominal frequency protection should be included to the UFLS program design for a specific island, we suggest adding this Requirement "R14. Each Generator Owner shall have evidence that they provided any coordination that is required by the applicable regional group of Planning Coordinators to meet UFLS program specifications."</p> <p>Response: The SDT does not believe this requirement is necessary. Coordination between generator off-nominal frequency tripping and UFLS is already being achieved between this standard and draft PRC-024-1.</p> <p>It is not clear if the standard requires one specific UFLS scheme for the entire Region. One scheme for the Region should not be mandated. Flexibility should be allowed for different schemes within the Region as long as each scheme meets the performance characteristics.</p> <p>Response: The SDT has addressed this concern by eliminating the word "consistent" from the requirement (now part of R4).</p> <p>Below is a list of technical requirements or issues the MRO NSRS would like the UFLS DT to consider for either a reference document or for regional variances.</p> <p>A. Limited Number of Island Loads - What allowance should be made for Distribution Providers with a limited number of loads in a designated island?</p> <p>Response: The group of Planning Coordinators can provide in the UFLS program any such allowance as long as compliance with the performance characteristics in requirement R4 (requirement R6 in previous posting) is achieved.</p> <p>B. 58 Hz Limit - Consideration should be given to circumstances in some islands where a lower frequency limit would allow better UFLS program performance. For instance the the Canadian example mentioned above.</p> <p>Response: This may be addressed through a variance as outlined in the NERC Rules of Procedure. The SDT encourages the requestor of a variance to submit its request with a SAR which addresses the variance in detail.</p> <p>C. Coordination with the Proposed PRC-024 Standard - Consideration should be given for proper coordination for of this standard (UFLS) with the PRC-024 standard especially with regard to off-nominal frequency settings for generation.</p> <p>Response: The SDT coordinated with the PRC-024 Generator Verification Standard Drafting Team (GV SDT) by providing the underfrequency performance curve to ensure that the performance characteristics do not conflict with the generator off nominal frequency capability curve. The SDT will continue to coordinate with the GV SDT.</p> <p>D. Reference Document - We think it would be valuable to develop a companion reference document that may contain the</p>	<p>Deleted: 0</p> <p>Deleted: 0</p> <p>Deleted: The need for different design criteria (performance characteristics) for sub-regions requiring UFLS percentages substantially larger than 25 percent will need to be addressed through regional variances.</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Deleted: Note to SDT: I think agree with this or else give them a regional variance.</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Deleted: Any allowance is acceptable as long as compliance with the performance characteristics in R6 is achieved.</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Formatted: Font: Bold</p> <p>Formatted: Font: Bold</p> <p>Deleted: Please propose a regional variance.</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(RGB(38,77,116))</p> <p>Deleted: As mentioned above, this standard is being coordinated with PRC-024-01.</p> <p>Formatted: Font: Arial Bold, Font color: Custom Color(RGB(38,77,116))</p>

Organization	Question 8 Comments:
	<p>following expectations and intentions: - The intent of this standard is to ensure UFLS programs are effective, and to the extent possible, that potential problems have been addressed in the design phase.- This standard should achieve an appropriate level of reliability and not just the least common denominator. An evaluation should be made to determine if the minimum load shedding requirement is sufficient and appropriate for a given geographic region. Although no geographic region (potential island) is obligated to exceed the minimum load shedding requirement, load shedding beyond the minimum requirement is encouraged when there is an identified advantage of doing so. - Overall coordination issues are easier to satisfy for programs that shed the minimum amount of load. Such programs will be better behaved over the smaller range of overloads, but the system will collapse if loss of generation (or import) exceeds the amount of load shed. Larger, more aggressive load shedding programs will provide a larger safety net at the expense of wider voltage and frequency deviations, and generation in those areas will need to accept more off-nominal frequency exposure to achieve coordination with load shedding. - UFLS analysis has to deal with considerable uncertainty in a multitude of variables. It is assumed that conflicting performance requirements and tradeoffs will be documented and resolved through application of engineering judgment.- This standard acknowledges that performance measures such as frequency and voltage deviation are subjective. Both voltage and frequency are influenced by hard-to-quantify factors that vary in real time, such as load damping, the net governor response, and inertia of spinning on-line units. Such performance measures can only be applied in consistent fashion to a tightly defined set of qualifying assumptions. - This standard acknowledges that UFLS is basically a last ditch effort to prevent system collapse and that it has limits. It is not possible to achieve desired performance for all of the unlikely events that may occur in real life. - Performance characteristics given in this standard should be treated as design targets or design guidelines. Studies run to develop UFLS programs may indicate different design criteria is appropriate as part of the overall compromise that has to be struck between performance and the level of load shedding coverage that is desired.- There is no perfect tool for studying UFLS, and this standard is not meant to prescribe any particular engineering approach to system analysis and review of UFLS performance. For example, the equivalent inertia method allows for sensitivity analysis and broader insight into the frequency decay dynamics. Likewise, the full transient stability case is more useful for simulating actual disturbance conditions including voltage transients.</p> <p><u>The SDT agrees with many of the guiding principles described above, but does not agree that a reference document is necessary. The SDT notes that UFLS programs have existed for forty years and believes that the Planning Coordinators have adequate expertise to understand the requirements of the proposed standard.</u></p> <p><u>The SDT also disagrees that standard requirements should be viewed as design targets or guidelines. The SDT assumes that reasonable assumptions pertaining to load damping and governor response will be made in the UFLS assessments, and that inertia will be representative of the systems studied. As mentioned above, the need for different design criteria (performance characteristics) for sub-regions requiring UFLS percentages substantially larger than 25 percent will need to be addressed through regional variances. (LOOK THROUGH RESPONSES TO BF'S COMMENTS THAT ADDRESSES VARIANCES OR REQUIREMENTS FOR SUB-REGIONAL REQUIREMENTS) Nothing in the standard precludes the use of Equivalent Inertia Analysis in the UFLS design process, but the SDT believes that dynamic simulations are the only appropriate means of assessing compliance to the performance characteristics in R4 (previously R6).</u></p>

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Organization	Question 8 Comments:
Response:	
Kansas City Power & Light	<p>1. What is the engineering basis for any of the boundary and threshold criteria established by requirement 6 and its sub-requirements? These prescribed requirements may not fit with already established UFLS systems and to justify the expense of changes there should be a sound engineering basis for doing so.2.</p> <p><u>Response: The technical justification for these performance characteristics is to ensure that generation does not trip before the UFLS program has time to operate to arrest frequency decline and recover frequency within acceptable limits. The characteristics in the proposed standard have been coordinated with the trip limitations proposed by the Generator Verification SDT in PRC-024 and with equipment design and protection guides in several IEEE standards. The SDT does not anticipate that existing UFLS programs will need to be redesigned to meet this requirement (now Requirement R4) for load-generation imbalances up to 25 percent.</u></p> <p>R9 requires Transmission Owners and Distribution Providers according to a schedule and format specified by the Planning Coordinator, but does not require Generator Owners to provide generator protection information. Recommend the SDT consider the inclusion of generator information in the appropriate places in these requirements.</p> <p><u>Response: The SDT does not believe this requirement is necessary. Per R5 of the first draft of PRC-024-1, the Planning Coordinators will have information on generator under-frequency trip settings that fall outside the acceptable boundary defined by PRC-024-1, Attachment 1 and may include this in their database. Adding such a requirement in PRC-006-2 will create a redundant data requirement already contained in PRC-024-1.</u></p>
Response:	
IRC Standards Review Committee	<p>R3 requires the Planning Coordinator(s) to consider historical events and system studies that may form islands. Creating islanding scenarios that are not historical events will be highly speculative and require a PC(s) to address hypothetical sequence(s) of events that is unlikely to occur. Further, for larger PCs the number of potential islands could grow significantly if an unlimited number of contingencies are considered. Running dynamic simulations to design coordinated UFLS programs for multiple islanding scenarios would be a huge burden. The SDT should provide criteria for the PC to use in determining UFLS islands similar to that developed for the TPL-004 Category D criteria.</p> <p><u>Response: The SDT recognizes the difficulties that could be encountered in identifying islands. Nevertheless, there may be portions of a system that obviously have a higher likelihood of islanding as compared to others. How extensive an analysis to identify islands needs to be is a judgment that cannot be written into a standard and must be left to the discretion of the Planning Coordinators involved. The standard only requires that criteria for identifying islands be developed and applied. PHIL TO DRAFT ADDITIONAL LANGUAGE ADDRESSING CATEGORY D CRITERIA</u></p> <p>The fourth bullet in R5 is unnecessary since (all assets) (assets in Island 1) (assets in island 2) - .. = (remaining assets not in any other island)Alternatively, the SDT may want to consider a requirement to perform one or more ad hoc stress tests that</p>

Organization	Question 8 Comments:
	<p>can be used to define islanding conditions. If PC passes the stress test, than there is no obligation to define an island within the PC; if the PC fails the stress test, than the PC must use the results as a partial (or complete) basis for defining one or more PC islands</p> <p><u>Response: The SDT feels that part 3.3 to Requirement R3 (fourth bullet to old requirement R5) is necessary to ensure that if islands are not identified through system studies, historical events or planned islands then the region as a whole is studied as an island in the assessment. The SDT thinks that conducting a stress test to define islanding conditions may be part of Requirement R2 (old requirement R3) and may be considered part of the criteria to identify islands.</u></p>
Response:	
Cowlitz County PUD	<p>Past experience has proved from efforts to comply with other data request mandated standards a disconnect on what specific data needs to be on hand for proper modeling. Keep in mind that the DP usually does not have the expertise, including many TOs, on what data will be needed. I would suggest there be a requirement that the PC not only develop the data set required, but actively (not passively) communicate to its DPs and TOs what is required. Simply expecting entities to stumble around in a web site and find the requirements complicates compliance efforts. Please note that I am not an expert in UFLS schemes and offer my limited knowledge as a compliance and distribution engineer. Thank you for the opportunity to join in this venue.</p>
<p><u>Response: The SDT understands the concern and thinks that requiring that the data be provided according to the format and schedule defined by the Planning Coordinators in Requirement R7 establishes the "what" is needed to properly conduct UFLS assessments and events analyses. The SDT expects the PC's and the TOs/DPs to closely coordinate to meet Requirements R7 and R8.</u></p>	
Edward C. Stein	
Colmac Clarion	
City of Bedford	<p>Distribution providers with fewer than 10,000 meter should be exempted for the UFLS program because their ability to effect the stability of the electrical grid is minimal and the cost of installing and maintaining the system would excessive.</p>
<p><u>Response: The group of Planning Coordinators can provide in the UFLS program such an allowance as long as compliance with the performance characteristics in requirement R4 (requirement R6 in previous posting) is achieved.</u></p>	
Alabama Municipal Electric Authority	<p>In requirement 10, "R10. Each Transmission Owner and Distribution Provider shall provide load tripping in accordance with the UFLS program designed by the group of Planning Coordinators for each region in which it operates.", it requires the Distribution Provider to provide load tripping. This seems to imply that the Distribution Provider would not be able to satisfy this obligation in aggregate from its Balancing Authority or Transmission Operator through its power supply contracts. The requiemnt to provide load tripping is especially troublesome for small entities that have only one feeder supplying the load of its end use customers.</p>

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Comment [sm2]: 9/14 - the team highlighted proposed wording to allow some more time to think about what may be missing in the response. will finalize response on the next pass

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Organization	Question 8 Comments:
	Additionally a small entity that is registered as a Distribution Provider that has less than 100 MWs of load will provide little help in affecting the frequency of the BES. The SDT should consider a class of Distribution Providers and not all Distribution Providers.
	Response: <u>The group of Planning Coordinators can provide in the UFLS program such an allowance as long as compliance with the performance characteristics in requirement R4 (requirement R6 in previous posting) is achieved.</u>
US Army Corps of Engineers	
NIPSCO	Any standard neededs to be very general- should include the effect of load on frequency;Define what amount of load they require to trip; Include rate of frequency change protection.Only require planned load tripping; Actual load is much more difficult to predict on lower voltagecircuits.
	Response: <u>The SDT tried to be specific on what needs to be accomplished for reliability without being prescriptive on how to meet what is required. The details of the UFLS program such as amount of load tripping are to be defined by the group of Planning Coordinators.</u>
Public Service Electric and Gas Company	
Central Lincoln	
SPP System Protection and Control Working Group	None at this time.
Long island power Authority	Consider rewoeding R10 to better limit the Compliance aspect for the DP to implement setting UFLS relays based on the forecasted loads projected for the peak period. Suggest this R10 - The DP once per calendar year shall review the forecasted loads it is serving and provide for UFLS in accordance with the UFLS program designed by the group of planning Coordinators for each region in which it operates.
	Response: <u>The SDT has not added the word "forecast" to the Requirement R9. Details as to whether forecast or actual load is used as the basis of tripping of load is left to the group of Planning Coordinators in each region.</u>
Exelon	There is a concern with high frequency requirements because they are not clear as to what should occur or how it should be mitigated. If island frequency is greater then 60.7 HZ for more than 30 seconds what type of action needs to occur? What is the

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Organization	Question 8 Comments:
	<p>technical justification for these levels?</p> <p><u>Response: The technical justification for this requirement is to ensure that generation does not trip as a result of frequency overshoot following operation of the UFLS program. The overfrequency characteristic in the proposed standard has been coordinated with the overfrequency trip limitations proposed by the Generator Verification SDT in PRC-024. If island frequency is greater than 60.7 Hz for more than 30 seconds the group of Planning Coordinators should modify the UFLS program design to reduce the level of overshoot, such as by increasing the number of UFLS stages and decreasing the amount of load shed at each stage.</u></p> <p>In the previous Characteristics document the high voltage levels were different than the levels in this draft standard.</p> <p><u>Response: The SDT believes the commenter is referring to the overfrequency limits having changed. The SDT raised the limits based on industry input during the first posting. The limits have been raised to take advantage of generator capability while maintaining coordination with the generator trip limits proposed in PRC-024. Based on industry input in the second posting the overfrequency limits have been modified again to convert the discrete points to a curve.</u></p> <p>Due to the inherent difficulty in accurately postulating load and generation islands, establishing frequency limits for such islands is even more difficult. There should be a criteria as to how the studies are done (including islanding criteria and size) if there are going to be bounds placed on the frequency result of the simulation.</p> <p><u>Response: The SDT has defined the maximum unbalance between load and generation for which the performance requirements must be achieved. The SDT believes that for unbalances up to 25 percent it is possible to meet the performance characteristics for any island that may form. Details such as the process by which islands are identified are left to the group of Planning Coordinators in each region. The SDT believes that due to differences in physical system characteristics between regions, issue such as how studies are done are best left to the Planning Coordinators in each region. Comments received during the two postings indicate industry support for this approach.</u></p> <p>If the timing components (4,10,20 seconds) are removed, then regions should establish minimum generator tripping standards for load shedding. Unit tripping should be a balance between limiting cumulative damage while at the same time coordinating with load shedding levels in order to arrest frequency decline.</p> <p><u>Response: The SDT agrees that unit tripping limits should achieve a balance between limiting cumulative damage while at the same time coordinating with load shedding levels in order to arrest frequency decline. However, this is being accomplished on a continent-wide basis by the Generator Verification SDT rather than a regional basis as suggested by the commenter.</u></p> <p>Disagree with requirement 5. Criteria for island formation and the resulting requirements for mitigation should be included in a standard where affected parties may participate through the open and fair NERC process. There should not be some unspecified criteria left up to various entities with no oversight or standardized development process. It would be very difficult if not impossible to determine how islands will be formed and where load will remain intact.</p>

Organization	Question 8 Comments:
	<p><u>Response: The SDT believes the standard should define what is required of the Planning Coordinators without being prescriptive as to how the requirements should be fulfilled. The SDT also notes that due to differences in physical system characteristics between regions the process for identifying islands is best left to the Planning Coordinators in each region. Comments received during the two postings indicate industry support for this approach.</u></p>
<p>Response:</p>	
ReliabilityFirst Corporation	SDT has to develop a mechanism to make sure all the loads are accounted for.
	<p><u>Response: The SDT has modified the applicability for Distribution Providers and Transmission Owners to clearly define that implementation of the UFLS program is the responsibility of the Distribution Provider, unless the Distribution Provider has an agreement with a Transmission Owner to provide UFLS, in which case the Transmission Owner is assigned responsibility.</u></p>
Arkansas Electric Cooperative Corporation	<p>R7.2 the wording "... trip at or below 61.8 Hz" implies that any generator with a trip setting below 61.8 must be modeled. If a generator has an UNDER-frequency trip setting below 58 Hz then it falls into this category. Was this the intent? If the intent was to capture those units with OVER-frequency trip setting above 61.8 Hz then the wording needs to be changed to "trip at or above 61.8Hz".The drafting team did a good job.</p>
	<p><u>Response: Thank you for this comment. The SDT has modified these requirements to refer to frequency-time curves rather than specific thresholds, and has incorporated your suggestion specifically refer to overfrequency and underfrequency trip settings.</u></p>
System Protection & Control	<p>There needs to be clarification as to loads and generation in this standard. If the intent is for the System to be secure for loss of xx amount of generation at summer peak and at winter peak in the planning model then that should be stated. In short, there needs to be further clarification on the relationship in regards to compliance within the Planning Model and the actual System Loads and Generation. Some entities in some regions require compliance with load shed percentages real time, 24/7. Others, only for the summer peak, and others for both summer and winter peaks. While these questions relate to measurements, it would be beneficial to know beforehand the SDT's thinking on these before implementation begins.</p>
	<p>Response: <u>Do we need to specify this or is this something that can be decided by each group of Planning Coordinators?</u></p>
Duke Energy	<p>--- Similar to the response for 5, the team should consider simplifying the requirements by stating points that are just an offset of the PRC-024 requirements. As noted in the webinar, the overfrequency points do not coordinate with the PRC-024 curve at</p>
	<p><u>Response: Thank for your comment. Based on industry input the SDT has replaced the discrete points in the proposed standard with a continuous curve that provides consistent 0.2 Hz margin for time up to 30 seconds.</u></p>

Organization	Question 8 Comments:
ReliabilityFirst	
Illinois Municipal Electric Agency	<p>IMEA recommends the following language from the Background/Information section of the comment form be included under Section B. Requirements, R2: Planning Coordinators may elect to use their Regional Standards Development process to develop the programs (but this is not required) or they may determine that their existing programs fully meet the requirements of this proposed continent wide standard.</p> <p><u>Response: The requirements in the standard are intentionally limited to what an entity must do to support a reliability need. While the SDT agrees that the group of Planning Coordinators may elect to use the Regional Standards Development process to develop the programs, such explanatory text is not appropriate within a reliability standard.</u></p> <p>IMEA believes the standard should only apply to areas where there are required UFLS programs that are in existence and not applied to all load if those loads are already covered in an existing UFLS program.</p> <p><u>Response: To ensure reliability and uniformity of UFLS program objectives, all load must be considered in a UFLS program and all UFLS programs must meet the requirements of the proposed standard, regardless of how existing programs are implemented.</u></p> <p>IMEA also recommends that Regional Entities be directed to not include registered functions other than PC, TP, and DP in the applicability section of their region-specific PRC-006 standard.</p> <p><u>Response: Regional Standards may assign applicability to entities not included in the continent-wide standard as long as requirements do not conflict with the continent-wide standard.</u></p>
Response:	
Hydro-Québec TransEnergie (HQT)	<p>HQT recommends that NERC develop standards for unit governing response that are consistent with and support the reliability objectives of standards PRC-006 (UFLS) and PRC-024 (Generator Performance).</p> <p><u>Response: The SDT agrees, though this is outside the scope of its activities.</u></p> <p>HQT also notes that it may not be possible for the Planning Coordinators to design a reliable UFLS program that will arrest and recover declining frequency if an excessive number of generators are exempted from meeting the underfrequency performance requirements in PRC-024.</p> <p><u>Response: The SDT agrees, though this needs to be addressed by the Project 2007-09 (Generator Verification) PRC-024 SDT.</u></p> <p>HQT, being in the Québec Interconnection, has technical parameters that differ from those specified in Requirements R6 and R7. A Variance will be needed to address those specific concerns in regards to frequency thresholds and parameters.</p>

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Organization	Question 8 Comments:
	<p><u>Response: A variance for the Québec Interconnection is included in the third posting of the standard.</u></p>
<p>Response:</p>	
<p>AEP</p>	<p>Wouldn't PRC-006-01 R5 be a SPS with all of it's attendant liabilities. Isn't NERC trying to minimize SPS schemes?</p> <p><u>Response: A relay scheme that intentionally separates a portion of the BES likely would be classified as a Special Protection System (SPS). However, the SDT points out that the proposed standard does not require implementation of such schemes. The standard only acknowledges that such protection schemes may be implemented and requires that in such cases the resulting islands must be included in assessments of the UFLS program design.</u></p> <p>PRC-006-01 R5 and EOP 003-1 philosophy would need to agree. PRC-006-01 R5 is written from the standpoint that one is able to predict island formation whereas EOP 003-1 is written to respond to island formation in whatever form it takes by shedding load (EOP 003-1 R6).</p> <p><u>Response: The SDT also notes that while PRC-006 requirement R5 (now R3) is written from the perspective that one is able to predict some islands to be used as a design basis for the UFLS program, the overall intent of the standard is to design a UFLS program capable of operating reliably in response to island formation in whatever form it takes.</u></p> <p>EOP 003-1's purpose is to protect the interconnection whereas PRC-006-01 R5 would seem to require opening up ties. There seems to be a disconnect here. However, if the UFLSDT does goes forward with this thinking, then AEP would suggest small island formation as likely being more successful than large island formation.</p> <p><u>Response: As noted above, the proposed standard does not require opening ties.</u></p> <p>Another interpretation of the two standards would be that PRC-006-01 R5 is intended to be designed as an automatic first option. If that option fails, then EOP 003-1 is to be followed by the transmission operator.</p> <p><u>Response: The SDT believes the commenter's alternate interpretation of the differences between EOP-003 and PRC-006 is correct.</u></p>
<p>Response:</p>	
<p>Ontario Power Generation</p>	<p>The SDT should be commended for producing a very good standard. There is one issue however that may negate the outcome of UFLS effort. Maximum permissible frequency overshoot of 61.8 Hz specified in R6.3 appears too high. It would quite likely result in hard to predict loss of many large fossil and nuclear units. Past system disturbances provide enough evidence of such thermal power plant response that typically leads to system collapse. This is a fundamental issue for the design of an effective UFLS scheme. What was the reason for not adopting a lower frequency overshoot value, especially considering that multi-step UFLS schemes should be able to accommodate that?</p>

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Organization	Question 8 Comments:
	<p>Response: <u>The 61.8 Hz limit on overshoot was selected to coordinate with the generator tripping limits proposed in PRC-024 by the Generator Verification SDT (GVSDT). The GVSDT developed the tripping limits to coordinate with generating unit capabilities as provided by a number of manufacturers. The SDT notes that even with a multi-step program it may not be possible to limit overshoot to a lower threshold depending on the physical characteristics of the island such as inertia and frequency response.</u></p>
We Energies	<p>We Energies disagrees with the overall approach that the Standard Drafting Team (SDT) has taken with the latest draft of the continent-wide UFLS standard. FERC rejected the original PRC-006 due to its fill-in-the-blank nature. The continent-wide standard is still a fill-in-the-blank standard with the Planning Coordinator (PC) required to fill in the blanks.</p> <p><u>Response: The SDT disagrees that the proposed standard is a fill-in-the-blank standard. The existing PRC-006 requires that the RROs consider a list of items in developing a program. The proposed standard requires that the group of Planning Coordinators within a region design a UFLS program that meets specific performance characteristics. While the proposed standard is not specific on how the program should be designed, it does establish clear requirements on what characteristics the program must meet.</u></p> <p>In addition, the standard does not require the PC to involve the Distribution Provider (DP) and Transmission Owner (TO) in the development of the UFLS program. Also, the standard requires the DP and TO to implement without question whatever UFLS program has been designed by the PC.</p> <p><u>Response: While the standard does not require that the PCs involve other entities, the Planning Coordinator must work closely with other entities in performance of its role. Regardless, the SDT believes the Planning Coordinator is the Functional Model entity with the wide-area view and technical skills required to perform the UFLS assessments. The SDT has not included a requirement to involve the DPs and the TOs in the process because it would be difficult to measure “involvement” and because this involvement is not required to fulfill the reliability objective of the proposed standard.</u></p> <p>We are concerned that the standard places a burden on the DP and TO to shed additional load to make up for generators which trip outside of the criteria specified in draft NERC standard PRC-024.</p> <p><u>Response: The proposed standard does not require the DP and TO to shed additional load as suggested by the commenter. The proposed standard allows the group of Planning Coordinators in each region to determine what measures will be included in the program design to account for the impact of generators with trip settings that trip above the curve in PRC-024.</u></p> <p>A continent wide UFLS standard must set the minimum level of UF tripping for each Interconnection. The continent wide standard must do this by specifying the minimum amount of loadshed, trip frequency steps, and time delay criteria for UFLS relays.</p> <p><u>Response: The SDT disagrees with this statement. The SDT has proposed and industry comments have supported that design of the UFLS programs should be designed on a regional basis by the entities with specific system knowledge.</u></p>

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Organization	Question 8 Comments:
	<p><u>The proposed standard need only specify the performance characteristics that the UFLS program must meet; it is not necessary to specify how the requirement is to be met.</u></p> <p>The continent wide standard must remain silent on criteria, such as islanding, that is above and beyond the minimum amount of loadshed, trip frequency steps, and time delay criteria. Regional UFLS standards must be the vehicle for going above and beyond the minimum requirements of the continent wide UFLS standard. Islanding is one aspect that can be addressed in regional standards if necessary. If the above comments are not adopted by the SDT, the following additional comments address the standard as written.</p> <p><u>Response: The SDT is silent on performance characteristics for islands that may form with a generation-load imbalance greater than 25 percent.</u></p> <p>As mentioned previously, this standard does not have a requirement for the PC to involve the DP and TO in the design of the UFLS program. In addition, the standard requires the DP and TO to implement without question whatever program the PCs design without any concurrence from the DPs and TOs. There must not be any loopholes in this standard which would force the DP or TO to shed additional load for a generator that could meet the criteria specified in draft NERC standard PRC-024. Therefore, R2 must be revised to add a sentence that requires the PC to involve the DP and TO in the design of a mutually agreeable UFLS program. Similarly, R10 must be revised such that it states that the DP and TO will implement the mutually agreed to UFLS program.</p> <p><u>Response: As noted above, the SDT has not included a requirement to involve the DPs and the TOs in the process because it would be difficult to measure “involvement” and because this involvement is not required to fulfill the reliability objective of the proposed standard. Also, the SDT has decided not to be prescriptive as to what measures will be included in the program design to account for the impact of generators with trip settings that trip above the curve in PRC-024.</u></p> <p>Lastly, in the RFC region there are only three PCs. This standard is placing a burden and regulatory risk on these three entities in RFC. It is not consensus for three entities to dictate a UFLS program for an entire region.</p> <p><u>Response: As noted above, the SDT believes the Planning Coordinator is the Functional Model entity with the wide-area view and technical skills required to perform the UFLS assessments. The SDT believes this is appropriate regardless of the number of Planning Coordinators within a region.</u></p> <p>The last sentence of R4 needs two clarifications. First, the text neighboring entities needs to be defined. It is unclear if the text neighboring entities refers to a neighboring PC, DP, TO, GO, Region, etc. Second, the term assessment needs to be referenced in a more specific manner. Does the term assessment refer to island assessments or the UFLS program assessment required in R7</p> <p><u>Response: This requirement (now R6) has been revised to provide clarity that the entities are the groups of Planning Coordinators in adjacent regions. The requirement also now clarifies that the concurrence must be reached for assessment results of any islands identified by any one region’s group of Planning Coordinators that straddle the</u></p>

Organization	Question 8 Comments:
	<p><u>respective interconnected regions.</u></p> <p>The last bullet item in R5 needs clarification. First, what is meant by the text at least one island? Does this mean the default island is the Region's electrical boundaries?</p> <p><u>Response: If no islands were identified in the first two parts of Requirement R3 (formerly R5) then the "default island" would be the regions electrical boundaries.</u></p> <p>Second, if a DP or TO's load is part of multiple islands, what mechanism will prevent the DP or TO being issued conflicting UFLS trip settings (e.g. Island 1 requires the DP to set its relays to trip at 59.0 Hz, while Island 2 requires that same DP to set its relays to trip at 58.7 Hz)?</p> <p><u>Response: The group of Planning Coordinators must design a UFLS program for application across the region. The program design must meet the performance requirements for all islands studied.</u></p> <p>R7.1 and R7.2 need to be revised since as these sub-requirements are currently written all units with automatic UF tripping installed would be required to be simulated. Specifically, R7.1 requires units that trip between 58.0 Hz to positive infinity to be simulated and R7.2 requires units that trip between 61.8 Hz and 0 Hz to be simulated.</p> <p><u>Response: These requirements (now parts 5.1 and 5.2 of Requirement R5) have been revised such that part 5.1 refers specifically to underfrequency and part 5.2 specifically refers to overfrequency.</u></p>
Response:	
PacifiCorp	No comment.
NextEra Energy Resources, LLC	No comment.
American Transmission Company	<p>ATC believes that the SDT should develop official definitions for the following three terms used throughout the document: a) "under-frequency load shedding" (along with under-frequency load shedding program) b) island and region. All three terms warrant a definition in order to be able to assess whether the plans developed pursuant to the standards are consistent between and among the Planning Coordinators. Although these terms may have some generally accepted meaning, there likely is a difference among Planning Coordinators and those differences could potentially lead to enforcement issues. The failure to define these terms by NERC will result in each Planning Coordinator providing their individual perspective that could result in either gaps in the region or difference in what is meant by an island within a region, and what constitutes an under-frequency load shedding program.</p> <p><u>Response: The SDT believes use of these terms is generally understood throughout the industry and unique definitions are not required in the NERC glossary. The SDT believes the meaning of "underfrequency load shedding" is</u></p>

Organization	Question 8 Comments:
	<p><u>understood by industry in implementing the approved PRC standards. The term “island” is used to refer to a portion of the system that is isolated electrically from the rest of the system. The term “region” is used as it relates to the traditional sense of the defined boundaries of a Regional Reliability Organization (RRO). The SDT notes that the majority of commenters did not indicate any concern with ambiguity introduced by using these terms.</u></p> <p>R2 To make the requirement apply to each PC rather than a group, we suggest this rewording, Each Planning Coordinator shall design . . . that was developed in coordination with the applicable regional group(s).</p> <p><u>Response: The SDT has assigned this requirement to the group of Planning Coordinators within a region to provide a measurable requirement that ensures the UFLS program is jointly developed by all Planning Coordinators. The phrase “in coordination with” would create problems in measuring compliance.</u></p> <p>R2 - To allow appropriate UFLS program differences among islands within a single Regional Entity, we suggest this rewording, " . . . under frequency load shedding programs for consistent application across each island within the Region." Some islands in the MRO need to shed more load than other to achieve reasonable frequency recovery.</p> <p><u>Response: The SDT has addressed this concern in an alternate manner by eliminating the word “consistent” from the requirement (now part of R4).</u></p> <p>R3 To make the requirement apply to each PC rather than a group, we suggest this rewording, Each Planning Coordinator shall develop . . . in coordination with the applicable regional group(s) to apply to select portions of the Bulk Electric System that are designated as islands?.R4 To make the requirement apply to each PC rather than a group and include coordination within the Region, we suggest this rewording, Each Planning Coordinator shall develop a procedure for coordinating with groups of Planning Coordinators within its Region(s) and groups of Planning Coordinators in neighboring regions . . .R5 To make the requirement apply to each PC rather than a group, we suggest this rewording, Each Planning Coordinator shall identify . . . as a basis for designing a UFLS program with the applicable regional group(s) R6 To make the requirement apply to each PC rather than a group, we suggest this rewording, Each Planning Coordinator shall specify . . . load shedding program in coordination with the applicable regional group(s) that are required to meet the following . . .</p> <p><u>Response: As noted above, the SDT has assigned this requirement to the group of Planning Coordinators within a region to provide a measurable requirement that ensures the UFLS program is jointly developed by all Planning Coordinators. The phrase “in coordination with” would create problems in measuring compliance with each of these requirements.</u></p> <p>R6.1 To match the design emphasis that is included in R6.2 and R6.3, we suggest . . . no less than 58.0 Hz per simulated event.</p> <p><u>Response: The SDT has revised these requirements to refer to frequency-time curves rather than specific thresholds and time durations. The SDT revised requirements (now parts 5.1 and 5.2 of R5) this addresses the commenters concern.</u></p> <p>R7 To make the requirement apply to each PC rather than a group, we suggest this rewording, Each Planning Coordinator shall</p>

Organization	Question 8 Comments:
	<p>conduct . . . with its applicable regional group(s). R8 To make the requirement apply to each PC rather than a group, we suggest this rewording, Each Planning Coordinator shall create . . . in coordination with its applicable regional group(s) . .</p> <p><u>Response: As noted above, the SDT has assigned this requirement to the group of Planning Coordinators within a region to provide a measurable requirement that ensures the UFLS program is jointly developed by all Planning Coordinators. The phrase “in coordination with” would create problems in measuring compliance with each of these requirements.</u></p> <p>R8 - Since the interpretation of "annually" can vary widely, we suggest this rewording, "each calendar year and within 15 months of the last update".</p> <p><u>Response: Since “annually” is not defined a NERC term, it has the meaning “occurring or happening every year or once a year.” as found in a collegiate dictionary. The SDT believes the reliability objective of this requirement is met without specifying details of when during the year the requirement is fulfilled.</u></p> <p>R9 Since the Transmission Owner reference is redundant, we suggest this rewording, Each Distribution Provider shall provide.. ..</p> <p><u>Response: The SDT has decided to retain both the Distribution Provider and the Transmission in the applicability for this requirement.</u></p> <p>R10 Since the Transmission Owner reference is redundant, we suggest this rewording Each Distribution Provider shall provide . . .</p> <p><u>Response: The SDT has decided to retain both the Distribution Provider and the Transmission in the applicability for this requirement.</u></p> <p>R11 - Since reactive power device overvoltage or underfrequency protection may be essential to the UFLS program assessment, we suggest adding the Requirement, "R11. Each Distribution Provider and Transmission Owner shall provide its reactive power device overvoltage or underfrequency protection information in the format and according to the schedule specified by the applicable regional group of Planning Coordinators." [If this requirement is added and includes the Transmission Owner, then the Transmission Owner should be included in the Applicability section.</p> <p><u>Response: The database is intended to provide documentation that the UFLS program has been implemented as required in the proposed standard. In fulfilling the Planning Coordinator function, the groups of Planning Coordinators have the ability to obtain protection settings they need to model to comply with R6.4 (now 4.4).</u></p> <p>R12 - Since reactive power device overvoltage or underfrequency protection may be essential to the UFLS program design, we suggest adding the Requirement, "R12. Each Distribution Provider and Transmission Owner shall reactive power device tripping in accordance with the UFLS program desinged by the group of Planning Coordinator for each region in which they operate."</p> <p><u>Response: The SDT does not believe such requirements are necessary. Any reactive power device overvoltage or underfrequency protection needed to comply with R6.4 (now 4.4) would need to be included in the assessment.</u></p>

Organization	Question 8 Comments:
	<p>R13 - Since generator off nominal frequency protection information may be essential to the UFLS program assessment, we suggest adding the Requirement, "R13. Each Generator Owner shall provide its off nominal frequency protection information in the format and according to the schedule specified by the applicable regional group of Planning Coordinators."R14 - Since the coordination of generator off nominal frequency protection is essential to the UFLS program design, we suggest adding this Requirement "R14. Each Generator Owner shall have evidence that they provided any coordination that is required by the applicable regional group of Planning Coordinators to meet UFLS program specifications."</p> <p><u>Response: The SDT does not believe this requirement is necessary. Per R5 of the first draft of PRC-024-1, the Planning Coordinators will have information on generator under-frequency trip settings that fall outside the acceptable boundary defined by PRC-024-1, Attachment 1 and may include this in their database. Adding such a requirement in PRC-006-2 will create a redundant data requirement already contained in PRC-024-1.</u></p> <p>Reference Document - Due the number and complexity of the elements that need to be considered to develop effective UFLS program designs and for fulfilling the requirements in this standard (e.g. island identification, number of load tripping steps, frequency settings, time delays, percentage of load per step, system inertia, governor response, etc.), we suggest that a reference document be developed to provide useful information regarding automatic UFLS programs to the applicable entities.</p> <p><u>Response: The SDT appreciates the complexities of designing a UFLS program; however, the SDT notes that regional UFLS programs have been existed for forty years and believes that the Planning Coordinators have adequate expertise to understand the requirements of the proposed standard. The SDT also notes that no other commenters have indicated a need for a Reference Document.</u></p>
Response:	
Luminant Power	Several of the requirements are for a group of Planning Coordinators. From a Compliance perspective, how will the actual requirements be enforced on the group, or will the requirements be enforced on each individual Planning Coordinator?
Response:	
Ameren	There is nothing in the standard that provides direction in terms of measuring whether an entity has effectively implemented a UFLS program.
Response:	
FirstEnergy Corp	1) On requirement R7.1 we suggest adding the words under-frequency before the phrase trip settings for clarity.2) On requirement R7.2 we suggest adding the words over-frequency before the phrase trip settings for clarity.3) As stated in question 5, the frequency requirements for generators should be in this standard PRC-006 not PRC-024.4) The new standard does not properly address the requirements of PRC-009 to analyze the performance of an UFLS program following an under frequency

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Organization	Question 8 Comments:
	<p>event. If the standard is retire PRC-009, it needs to properly cover the analysis of these events and not refer them to ERO Rules of Procedures. Since PRC-004 covers the analysis of System Protection misoperations and PRC-016 covers SPS misoperations, UFLS events including misoperations also must be covered in a standard to ensure review.5) On requirement R.1 the use of the word region should be replaced with Regional Entity territory for clarity so that region may not be misinterpreted to be RTO region or some other sub-region of a Regional Entity territory. We suggest the requirement be written to say Each Planning Coordinator shall join a group consisting of all Planning Coordinators within the Regional Entity territory it performs the Planning Coordinator function.6) We support the following MISO comment. R3 requires the Planning Coordinator(s) to consider historical events and system studies that may form islands. Creating islanding scenarios that are not historical events will be highly speculative and require a PC(s) to address hypothetical sequence(s) of events that is unlikely to occur. Further, for larger PCs the number of potential islands could grow significantly if an unlimited number of contingencies are considered. Running dynamic simulations to design coordinated UFLS programs for multiple islanding scenarios would be a huge burden. The SDT should provide criteria for the PC to use in determining UFLS islands similar to that developed for the TPL-004 Category D criteria.</p>
Response:	
CenterPoint Energy	<p>1. CenterPoint Energy again commends the SDT for addressing the difficult issue of Applicability. CenterPoint Energy suggests the SDT also address the difficult issue of placing requirements within the proper category of reliability standard. CenterPoint Energy recommends placing Requirement 9, dealing with submittal of UFLS data, within a MOD standard (Modeling, Data, and Analysis). CenterPoint Energy believes the UFLS data will be used for modeling to facilitate dynamic simulation studies and, therefore, should be included in an MOD standard. 2. CenterPoint Energy appreciates the SDT attempt to clarify islanding. However, the SDT may have misinterpreted CenterPoint Energy comments on Draft 1. Reiterating our comment, CenterPoint Energy believes regional and/or predetermined islanding is not always applicable in an interconnection-wide region. In addition, the requirements dealing with a group of Planning Coordinators are also not applicable to an interconnection-wide region, such as WECC and ERCOT. With eight of the ten proposed requirements applicable to a group of Planning Coordinators, it appears eight requirements will be problematic for WECC and ERCOT. CenterPoint Energy recommends the following wording be included in Requirements 1 through 8: This requirement is not applicable in an interconnection-wide region.</p>
Response:	
Independent Electricity System Operator	<p>(1) We propose R5 to be expanded to require the Planning Coordinators to develop criteria for identifying potential islands, as follows:Each Planning Coordinator shall develop criteria, considering historical events and system studies, to select portions of the Bulk Electric System (BES) that can form an island(s) as a basis for designing a UFLS program. The identified island(s) shall include: .(2) R6 needs to be more precise regarding load. Suppose a station with 100MW of load has 20MW of distributed generation added that is anticipated to be in service during the ULFS calculation period (e.g. summer peak hour). Is the ULFS arming determined on basis of 100MW or 80MW of load This will make a big difference in Ontario if the GEA attracts significant amounts of the distributed generation.(3) The standard should include a requirement for mandatory testing/re-calibration period</p>

Organization	Question 8 Comments:
	for both ULFS relays and generator under and over frequency relays. The Generator Operator/Owner needs an obligation to provide this information.(4) Governor action can help mitigate adverse effects of disturbances that affect frequency. Should this standard include some requirements for governor response?
Response:	
Xcel Energy	We feel R6.4 is not complete without consideration of other BES components, such as transformers and reactive devices. To ensure excessive voltage does not cause further damage or perpetuate the situation, we feel these additional components should be considered. We feel that the use of the word region in R1 is unclear. We assume the SDT intended to refer to the 8 NERC regions? (MRO, SPP, WECC, RFC, SERC, etc.) If so, please make that clear in the requirement.
Response:	

Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed:

1. The Standards Committee approved the SAR for posting on November 21, 2006
2. SAR posted for comments on November 29, 2006.
3. The Standards Committee appointed a SAR Drafting team on January 11, 2007.
4. SAR Drafting Team responds to comments, revises SAR and posts for comments on February 7, 2007.
5. SAR Drafting Team responds to comments on April 20, 2007.
6. Standards Committee approves development of Standard on April 10, 2007.
7. The Standards Committee appointed the Standard Drafting Team on April 10, 2007.
8. The Standards Drafting Team posted draft performance characteristics for comment on July 2, 2008.
9. Standards Drafting Team responds to comments, revises standard and posts for comments on April 15, 2009.

Proposed Action Plan and Description of Current Draft:

This is the second posting of the proposed standard (the first posting was proposed common continent-wide performance characteristics as a directive to the Regional Entities to develop regional standards) for a 30 day comment period, from April 15 – **May 14, 2009.**

Future Development Plan:

Anticipated Actions	Anticipated Date
1. Respond to comments on the second posting and post revised standard for a 30 day comment period.	July 7, 2009
2. Respond to comments on the draft of the proposed standard and implementation plan.	September 14, 2009
3. Obtain the Standards Committee's approval to move the standard forward to balloting.	September 16, 2009
4. Post the standard and implementation plan for a 30-day pre-ballot review.	October 1, 2009
5. Conduct an initial ballot for ten days.	November 15, 2009
6. Respond to comments submitted with the initial ballot.	November 30, 2009
7. Conduct a recirculation ballot for ten days.	December 15, 2009
8. BOT adoption.	

A. Introduction

1. **Title:** Automatic Underfrequency Load Shedding
2. **Number:** PRC-006-01
3. **Purpose:** To establish design and documentation requirements for automatic underfrequency load shedding (UFLS) programs to arrest declining frequency and assist recovery of frequency following underfrequency events.
4. **Applicability:**
 - 4.1. Planning Coordinators
 - 4.2. Distribution Providers that do not have an agreement with Transmission Owners to provide UFLS
 - 4.3. Transmission Owners that have an agreement with Distribution Providers to provide UFLS
5. **(Proposed) Effective Date:** TBD

B. Requirements

- R1. Each Planning Coordinator shall join a group consisting of all the Planning Coordinators within the region for each of the regions in which it performs the Planning Coordinator function. [VRF: Medium][Time Horizon: Long-term Planning]
- R2. Each group of Planning Coordinators shall develop and document criteria, including consideration of historical events and system studies, to select portions of the Bulk Electric System (BES), including portions of adjacent interconnected regions, that may form islands. [VRF: Medium][Time Horizon: Long-term Planning]
- R3. Each group of Planning Coordinators shall identify an island(s) as a basis for designing a UFLS program including: [VRF: Medium][Time Horizon: Long-term Planning]
 - 3.1. Those islands selected by applying the criteria in Requirement R2 and
 - 3.2. Any portions of the BES that are designed to be detached from the interconnection (planned islands) as a result of the operation of a relay scheme or special protection system (NOTE: as a result of comment made in Q8 by BPS) and
 - 3.3. Any other islands necessary to ensure that all portions of the region's BES are included in at least one island.
- R4. Each group of Planning Coordinators shall develop a underfrequency load shedding program with an implementation schedule for application across the region including technical design parameters required to meet the following performance characteristics in simulations of underfrequency conditions resulting from an imbalance scenario where an imbalance = [(load — actual generation output) / (load)] of up to 25 percent within the identified island(s): [VRF: High][Time Horizon: Long-term Planning]

Comment [pj11]: The SDT needs to consider whether these bullets should be numbered. - 9/2 - agreed that they should be AND statements and agreed to add "and" to each statement to clarify the intent (will make sure this is consistent across the standard)

- 4.1. Arrest frequency decline at no less than 58.0 Hz. –
- 4.2. Frequency shall not remain below 58.2 Hz for greater than four seconds cumulatively per simulated event, and shall not remain below 58.5 Hz for greater than ten seconds cumulatively per simulated event, and shall not remain below 59.3 Hz for greater than 30 seconds, cumulatively per simulated event.
- 4.3. Frequency overshoot resulting from operation of UFLS relays shall not exceed 61.8 Hz for any duration and shall not exceed 60.7 Hz for greater than 30 seconds, cumulatively per simulated event.
- 4.4. Control voltage during and following UFLS operations such that the per unit Volts per Hz (V/Hz) does not exceed 1.18 for longer than two seconds cumulatively per simulated event, and does not exceed 1.10 for longer than 45 seconds cumulatively per simulated event at each generator bus and generator step-up transformer high-side bus associated with any:
 - 4.4.1. Individual generating unit greater than 20 MVA (gross nameplate rating) and connected at 60 kV and above.
 - 4.4.2. Generating plant/facility greater than 75 MVA (gross aggregate nameplate rating) and directly connected at 60 kV and above.
- R5. Each group of Planning Coordinators shall conduct a UFLS assessment at least once every five years or within one year of an actuation of UFLS resulting in 500 MW or greater of loss of load that determines through dynamic simulation whether the UFLS program design meets the performance characteristics in Requirement R4The simulation shall ; [VRF: High][Time Horizon: Long-term Planning]
 - 5.1. Model the underfrequency trip settings of generators (same as generators in 4.4) that trip above the UFLS curve TBD.
 - 5.2. Model the overfrequency trip settings of generators (same as generators in 4.4) that trip at or below the UFLS curve TBD
 - 5.3. Model any automatic load restoration that impacts frequency stabilization and operates within the duration of the simulations run for the assessment
- R6. Each group of Planning Coordinators shall reach concurrence of assessment results with their adjacent region's group of Planning Coordinators of any islands identified by any one region's group of Planning Coordinators that straddle the respective interconnected regions. [VRF: High][Time Horizon: Long-term Planning]
- R7. Each group of Planning Coordinators shall specify the content, format and schedule to create a database and annually maintain the database containing information for use in event analyses and assessments of the UFLS program. [VRF: Lower][Time Horizon: Long-term Planning]

Comment [sm2]: if replaced by a curve (4.1) - Hydro would still require a Variance but WECC would be ok with what is proposed - MRO? of curve would replace 4.1, 4.2 ofc would replace 4.3

Comment [sm3]: need to discuss responses to Question 6 MRO possibly request Variance

Comment [sm4]: 9/1 - the team conducted a poll and concluded that the team does not think that considering 90% of installed capacity is enough but should go beyond - the team needs to determine what voltage will provide appropriate "coverage" of installed capacity

Comment [pjt5]: We will include the proposed PRC-024 curve as the criterion for determining which generator protections must be modeled.

- R8. Each Transmission Owner and Distribution Provider shall provide data to its group of Planning Coordinators according to the format and schedule specified by the group of Planning Coordinators to support maintenance of the database. [VRF: Lower][Time Horizon: Long-term Planning]
- R9. Each Transmission Owner and Distribution Provider shall provide **tripping of load, and switching of reactive power devices and transmission lines** (NOTE: added as a result of a comment made in Question 8 from the MRO) in accordance with the UFLS program designed by the group of Planning Coordinators for each region in which it operates. [VRF: High][Time Horizon: Operations Planning]

Comment [pjt6]: The VRF should be revisited after consideration of requirements in the present PRC-009 and if R7 is reconsidered as to whether the assessment if of the program design or the program implementation.

Comment [sm7]: 9/2 - the team identified the need to have an implementation transition time in this requirement to account for changes in the program. A change was made to Requirement R4 to add that the PC's must come up with a Program and implementation schedule
9/14 - the team added reactive power device tripping to the requirement as noted above - the team will discuss/agree to at the next meeting
one proposal included modifying "tripping of load" to switching of load

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C. Measures (TO BE REVISED BASED ON CHANGES TO REQUIREMENTS)

- M1.** The Planning Coordinator shall provide evidence that it joined a group consisting of all the Planning Coordinators within the region for each of the regions in which it performs the Planning Coordinator function such as roster of participants (including organization), meeting minutes with recorded attendees, agreements, etc.
- M2.** The Planning Coordinator shall provide evidence that their group of Planning Coordinators designed an underfrequency load shedding program for application across the region such as documentation of technical design parameters. [including participation in development of, or consent to, the technical parameters]
- M3.** The Planning Coordinator shall provide evidence that their group developed criteria as specified in Requirement R3.
- M4.** The Planning Coordinator shall provide evidence that their group developed a procedure as specified in Requirement R4.
- M5.** The Planning Coordinator shall provide evidence that their group identified islands as specified in Requirement R5.
- M6.** The Planning Coordinator shall provide evidence that their group developed a UFLS program that specifies the technical design parameters required to meet the performance characteristics in simulations as specified in Requirement R6 of underfrequency conditions resulting from an imbalance scenario where an imbalance = $[(\text{load} - \text{actual generation output}) / (\text{load})]$ of up to 25 percent within the identified island(s). Evidence may include dynamic simulations, basis for load and generation capacity, including unit sizes and connection voltage.
- M7.** The Planning Coordinator shall provide evidence that their group conducted a UFLS assessment as specified in Requirement R7 such as dynamic simulation input data, and dynamic simulation results.
- M8.** The Planning Coordinator shall provide evidence that their group specified the content, created and annually maintained a UFLS database as specified in Requirement R8.
- M9.** The Transmission Owner and Distribution Provider shall provide evidence that they provided data to their respective group of Planning Coordinators as specified in Requirement R9 such as transmittal document and associated data.
- M10.** The Transmission Owner and Distribution Provider shall provide evidence of tripping of forecast load in accordance with the UFLS program designed by the group of Planning Coordinators for each region in which it operates such as relay records, setting sheets, and circuit forecast loading

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

Text

1.2. Compliance Monitoring Period and Reset Time Frame

Not applicable.

1.3. Data Retention

Text

1.4. Compliance Monitoring and Assessment Processes

Text

1.5. Additional Compliance Information

Text

2. Violation Severity Levels

R #	Lower VSL	Moderate VSL	High VSL	Severe VSL

E. Regional Variances

None.

F. Associated Documents

Version History

Version	Date	Action	Change Tracking