NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Meeting Notes
Underfrequency Load Shedding SDT — Project 2007-01

June 10, 2009 | 8:30 a.m.–5 p.m. PST
June 11, 2009 | 8:30 a.m.–5 p.m. PST
Northwest Power Pool (NWPP)

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)
- Paul Attaway — Georgia Transmission Corporation
- Brian Bartos — Bandera Electric Cooperative
- Jonathan Glidewell — Southern Company Transmission Co. (on phone)
- Gerald Keenan — Northwest Power Pool Corporation
- Robert W. Millard — ReliabilityFirst Corporation
- Steven Myers — Electric Reliability Council of Texas, Inc.
- Mak Nagle — Southwest Power Pool
- Robert J. O'Keefe — American Electric Power
- Brian Evans Mongeon — Utility Services, LLC
- Tony Rodrigues — PacifiCorp
- Si Truc Phan — TransEnergie
- Stephanie Monzon — NERC

Observers
- Anthony Jablonski — ReliabilityFirst Corporation
- Scott Sells — FERC Staff
- Scott Berry — Indiana Municipal Power Agency
- Steve Wadas — Nebraska Public Power District
- Laura Elsenpeter — Midwest Reliability Organization
- Carol Gerou — Midwest Reliability Organization

NERC Antitrust Compliance Guidelines

Stephanie Monzon reviewed the NERC Antitrust Compliance Guidelines provided in **Attachment 1b**. It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition. It is the responsibility of every NERC participant and employee who may in any way affect NERC's compliance with the antitrust laws to carry out this commitment.

2. Review of the Agenda and Objectives for Meeting

The drafting team reviewed the agenda. Stephanie gave a high level overview of the project schedule that originally had the project completion date of December 2009. To make this schedule the team will have to publish compliance elements with the next posting (third and last posting — potentially). Gerry A. suggested that the team may consider posting compliance elements with the draft standard (without changing requirements) to allow the industry time to review the compliance elements more than once. This would not replace the third posting but would avoid a fourth posting. Maureen talked this over with Stephanie and suggested that if the team waits for late summer early fall to post the revised process manual probably will be approved with modifications to the development of compliance elements. In the revision the compliance elements are developed by the industry but they will no longer ballot the standard with the compliance elements — instead a non-binding poll of the compliance elements will be conducted. The team decided that it would not pursue this parallel posting but would revise requirements, address comments, and develop compliance elements for the third posting. This being the case the team decided that it would not focus on developing compliance elements in this meeting but rather defer to the next face to face meeting (late summer). The focus of this meeting will be to review the comments, major issues, and begin responding to comments.

3. Response to Comments — Major Issues

The draft standard was posted for a 30-day period ending May 21, 2009. The team will began reviewing major issues in the comments. The team assigned sub-groups to draft initial responses to comments on the May 29, 2009 conference call.

The sub-groups presented the major issues identified during their review of the comments. The groups are as follows:

Question 1 — Bob Millard (has to do with Functional Model), Tony Jablonski, Carol Gerou, and Steve Myers

Question 2 — Bob Millard (has to do with Functional Model), Tony Jablonski, Carol Gerou, and Steve Myers

Question 3 — Rob O'Keefe (already provided responses to Q3)

Question 4 — Jonathan Glidewell

Question 5 — Gary Keenan, Tony Rodrigues, and Si Truc Phan

Question 6 — Phil Tatro

Question 7 — Brian Evans Mongeon

Question 8 Parsing — Stephanie Monzon

Major Issues
Question 1 a
1. How are regional variances created?
2. Inconsistent application of the word "region" — caps in the supporting document and lower case in the draft standard. Consider defining the word "region"
Question 1 b
1. Concern with compliance related to the group of planning coordinators The team conducted a round robin to determine if the team needs to re-evaluate the concept of the group of planning coordinators. The majority of the team expressed that if there is a way to conceive of eliminating the word "group" with preserving the intent that Planning Coordinator collaboration. Bob reminded the team that the concept of "group" ensures coordination.
2. Why isn't the team applying requirements to the RRO's?
3. Why does this standard not include requirements for Generator Owners?
4. The RC specifies load shed set points in some regions (AEP)
5. The Transmission Owner with end use load connected ... is out of line with the NERC Functional Model knowing that if a Transmission Owner has end use load connected, by definition, the Transmission Owner must register as a Distribution Provider. Therefore, using just the Distribution Provider in the UFLS standard is adequate and complete
Question 2
1. The Transmission Owner with end use load connected ... is out of line with the NERC Functional Model knowing that if a Transmission Owner has end use load connected, by definition, the Transmission Owner must register as a Distribution Provider. Therefore, using just the Distribution Provider in the UFLS standard is adequate and complete. The team went around the room to determine where individuals are on the issue. Bob and Tony

J. sited the NERC Glossary term for Distribution Provider. Two of the team members want to keep 4.3 and the rest of the team generally agrees that removing transmission owner would not create a reliability gap in the continent wide standard. The issue is with the registration process and the standard should not compensate for the process that may not appropriately register entities.
Question 4
1. Majority in support of automatic load restoration. Comments made by some what if auto restoration is insignificant and should allow for exemptions in the model if they are insignificant. The team discussed and a possible clarification in response to comment is that requirement R7.3 states that auto load restoration should be modeled if it is designed to assist in stabilizing frequency and any other auto load restoration is considered insignificant. Stephanie modified requirement 7.3 to reflect that auto restoration that impacts stabilizing frequency and operates within 30 seconds should be modeled.
2. Some feel that automatic load restoration is generally a bad idea for use with UFLS.
3. Some feel this requirement does not go far enough to include ALL automatic load restoration schemes which may impact UFLS, not just the ones designed to impact UFLS. See team's revision of requirement 7.3
Question 5
1. Some commenter's indicated that four seconds is too long and others indicated that it is too short. Gary looked up the manufacturer's report for steam and gas and four seconds (and up to 10 seconds) is achievable. The team reviewed the generator curve presented at the UFLS webinar. The team agreed that considering a curve that provides a constant margin to the PRC-024 curve would "better" coordinate with the generator tripping curve as opposed to the three discrete points.
2. One comment indicated the cost implications with establishing this performance requirement
3. Coordination with PRC-024 is a good step forward
Question 6 26 agree/12 disagree (38 Total Comments)
1. Unanimous support for this requirement but concerns with the selection of the busses and generators Need to determine the size for the generators we are monitoring for volts/Hz Does the team want to promote consistency? 20 MVA / 75 MVA aggregate connected at 60 kV and above (this is the level used in WECC and why 69 kV is not appropriate) is ok with the team — capturing 99% of generation on the BES but we also need a provision for wind/
Question 7

1. One comment indicated that the proposed requirements may conflict with AGC requirements — 4 seconds in the UFLS standard may conflict with 6 seconds in AGC.
Question 8
1. One commenter indicated that the BA should be added to the applicability
2. NERC should create a governor response standard
3. Generator exemptions in PRC-024 will get in the way of creating a reliable UFLS program The generator would have to provide a technical basis and documentation for the exemption — to the RC. TOPs, etc. This is not a concern because realistically the number of exemptions will be low.
4. Database (R8) responsibility should be assigned to one entity not a group. There are compliance issues related to this requirement. The team agreed that this is an issue and will give it more thought and attempt to revise. One option is to have each planning coordinator create and maintain a database. When the group meets each PC will bring the database to perform the assessment.
5. Does ERCOT have to create a procedure to coordinate with other PC's in their region when there is only one PC in ERCOT?
6. Should the imbalance calculation include losses? Phil explained that NPCC has discussed this issue and will determine if including losses yields a more conservative result. He will work on a response to this comment.
7. Do not agree with the islanding requirements instead the standard should develop criteria for identifying islands
8. Remove the word "consistent"
9. The standard should specify the agreement between the group of PC's to clearly identify roles and responsibilities amongst the PC's The team discussed with Carol and determined that the Measures for Requirement R1 and R4 would clarify the types of acceptable evidence to comply with these requirements.
10. Annual data is not necessary if the assessments occur only five years The purpose of the database is not only for the five year assessment but rather the data is needed for event analysis and needs to be annually maintained for this purpose.
11. R10 should say "implement UFLS program" rather than provide UFLS tripping The team agreed that implement UFLS is not measureable but they will discuss during the review of the standard.
12. R4 should be deleted — or procedure for identifying islands should be specified in the standard Identification of islands in different regions varies and the standard cannot come up with common

criteria that would apply across regions. The standard does; however, provide guidance in R5 on identifying islands.
13. Must the performance characteristics be met for 25% imbalance or for less? The real question is how would an audit be performed to show that the program meets the performance criteria for a discrete point — 25% imbalance? The Measures may clarify the required type of evidence to demonstrate compliance with the performance characteristics. The requirement says that the performance criteria be met at lower imbalances too — the team agrees with this statement but does not agree with that the performance characteristics must be met only at 25%. The Measure would say that the entity must identify the imbalance point (between 0-25percent) that produces the highest frequency overshoot and will demonstrate through simulation that Requirement R6 performance characteristics are met.
14. R7.1 should not require the modeling trip settings of all generators that trip at or above 58 Hz. The team agrees and will modify requirement 7.1 to reference the UFLS curve (to be determined).
15. R8 should specify more — including the participating planning coordinators and entities that contribute information. The team discussed that there is no clear reliability need to specify this particular information in the standard. The team's approach which is reflected in the standard indicates that the PC's specify what information needs to be provided and the standard would be silent on the matter.
16. Should modify R10 - Each TO, DP and LSE 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. The team agreed that the requirement needs clarification because it is unclear if the action is RT — the team needs to debate this issue and determine if it is RT action or simulated action. The team agreed that adding the word provide tripping of "forecast" load. This makes the requirement a look ahead requirement as opposed to a real time requirement.
17. Concerns about PRC-024 — some UFLS programs include generation and this standard does not but rather there is another standard that addresses generation. The team agreed that the response to comments should reinforce the coordination between the PRC-024 team and this standard drafting team.
18. Revise 6.2 and 6.3 — to say no less than 58.0 Hz per simulated event… The team agreed earlier that they would be replacing the discrete points with a curve.
19. R8 — annually should be revised to say every calendar year and within 15 months of the last update The team does not agree with the comment and will leave the requirement as is…
20. Since reactive power device overvoltage or underfrequency protection should be included in the UFLS program design for a specific island added wording should be added to the standard — R12 Each DP and Top shall provide reactive power device tripping in accordance with the UFLS program designed by the PC. Also, the database should include (R11) reactive

power device information. Phil suggested that the team should revisit this philosophical issue — should it be included in the standard? The team revised the standard to make the creation of the database more generic to include reactive information if needed…see revised wording.
21. R13 — add a requirement that each GO shall provide it's off nominal frequency protection information in the format and according to the schedule specified by PC. Add R14 — since coordination of generator off nominal frequency protection should be included in the UFLS program design for a specific island suggest adding a requirement — Each GO shall have evidence that they provided any coordination that is required by the applicable regional group of PCs to meet UFLS program specifications.
22. The MRO suggested a reference paper be created — an evaluation should be made to determine if the minimum load shedding requirement is sufficient and appropriate for a given region. We don't think a reference document is necessary to support the standard — these considerations should take place between the planning coordinators.
23. The standard should not specify performance characteristics without sound engineering judgment. Some existing UFLS programs do not fit into the performance characteristics — The team thinks that if the UFLS programs do not fit the performance characteristics the program is unsound and can cause cascading. The performance characteristics are intended to establish common… (Perhaps dig up previous response to comments).
24. The standard is missing generator owner information. Recommend that the SDT consider including generator information in the appropriate places in the requirements. The team agreed to add Generator Owner to R9 (to provide data as required by the PC) and to the applicability of the standard.
25. Recommend developing an islanding stress test — the team does feel like developing a common stress test is necessary for the standard - applying a common stress test to the entire continent is not technically feasible. One size does not fit all — and the team thinks that the group of PC's are best suited to determine criteria for identifying islands. 26. delete the fourth bullet in R5 — the team does not agree because the intent to ensure that the system be in at least one island as specified in the fourth bullet of requirement 5
27. The standard should include an exclusion for DP's that do not have a material impact on the grid — and consider cost implications if included in the standard. This standard specifies how the program should perform in its entirety and does not specify the specific methods the programs will achieve the performance characteristics. The regional programs may exempt entities of a particular size.
28. All DP's should not be responsible for providing UFLS. Similar to the response above — and the team had a discussion about potential conflicts with registration.
29. The development of criteria for identifying islands should be included in the standard because an open process will be utilized; however, if the PC's are delegated this task the process will

not necessarily be open. Similar to the discussion above the team feels that coming up with common criteria that applies to the entire continent is not technically sound due to variations between the regions. The SDT recognizes that the PC's may not use an open process to create the criteria; however, entities may request a regional SAR to develop the criteria using the regional open process.
30. Recommend clarifying requirement R7.1 and R7.2 to ensure that intentional trip settings are not modeled?
31. standard should say that the planning coordinators may elect to use their regional standards development processes to develop programs The team agrees that this is a possible outcome; however, this is not required. The team will only include requirements in the standard.
32. Recommend that the RE's do not apply to PC, TP and DP in the applicability of their region specific standard The team does not agree — the RE's can specify applicability as they see fit as long as it does not conflict with the continent wide standard
33. Isn't requirement 5 an SPS? Phil will write a response to this comment (AEP)
34. What is an assessment? when the Measure is written the team will clarify what is intended by assessment
35. What happens when an entity is included in overlapping islands and have varying trip settings? The team reconfirmed that this is why there should only be one program in each region.
36. definitions should be created for island, UFLS program and region The team does not feel that defining these terms will improve the standard….
37. the standard does not address the requirements in PRC-009 Bob speculated that since PRC-009 is a FERC approved standard eliminating the requirements (by arguing they are covered in the ROP) is possibly a regression of reliability.
38. Is it gross load or net load? The team looked up the glossary term. The load should be gross load but the regional program design will define other definition.
39. The use of the word region in requirement R1 is unclear — do you mean the eight regions, if so the team should clarify. The team does not agree.
40. R6.4 is not complete without consideration of other DEC component such as transformers and reactive devices. To ensure excessive voltage does not cause further damage or perpetuate the situation we deal these additional components should be considered.

The team had some discussion but did not draw a conclusion on approach. The team could not think of a good way to include it in the standard. Phil will draft a response.
Barry Francis
1. Question 1 - technical approach is inappropriate — technical justification is required to establish performance criteria
2. Question 3 - PC's should determine the analysis (dynamic simulation or other simulation) The team feels that dynamic simulation is necessary and that the commenter has not presented alternatives to dynamic simulation — dig up response to the first comment period.
Question 5 3. Canadian portion of MRO can't meet performance criteria The team is not certain that this portion of MRO cannot meet the performance characteristics — dig up response from first posting. 4. Over load shedding performance and coordination with generator protection should be regional Generators across continent have the same characteristics and in cases where it is appropriate (physical differences) a variance may be needed. We are not aware of any exemptions except for Quebec. 5. Frequency limits drives to lowest common denominator 6. A comparison of the MRO program to the performance characteristics The team thinks that changing the three discrete points to a curve may resolve some of the timing issues the MRO program will have based on the performance criteria. 7. Load shedding program design should be based on achieving the quickest frequency recovery that is possible subject to satisfying al of the other conflicting design requirements, constraints, such as minimizing overfrequency problems. Phil will prepare a response to protecting the equipment is defined by in part by coordinating with UFLS — starting off with the UFLS program and then setting the equipment settings. 8. PRC-024 should define off-nominal frequency settings for generation. Question 6 9. Technical justification for BES busses @ 20, 75MVA — this requirement should not be included because this cannot be properly simulated because the voltage regulator V/Hz controls are not presently included in generator exciter/voltage regulator models that are used for stability simulation. Phil will also look into the IEEE standards referenced. The team will continue to debate whether it is appropriate to keep this requirement — Phil will look into whether during 8/14 generators tripped because of v/hz
10. frequency setting in standard leads to lowest common denominator
11. the objective of this standard is to prevent a black out following an islanding event that creates an imbalance between load and generation

4. Project Schedule

Stephanie Monzon briefly reviewed the project schedule during the meeting. Stephanie's goal will be to schedule two conference calls prior to mid-July and an in person meeting in August (see schedule of conference calls and meetings below).

5. Hydro-Quebec Variance

The team spent some time discussing the approach for integrating the variance requirements into the draft standard. Si Truc indicated that based on the draft requirements there needs to be one variance requirement to the continent wide standard for Quebec — the 58 Hz requirement. Si Truc will propose the variance requirement for the team's review when the team revises the draft standard.

6. Action Items

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

Action Items:	Status:	Assigned To:
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.	**Created 2/11** **By 2/20 conference call**	Stephanie
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.	**Created 6/11/09**	Stephanie
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.		Team
The sub-teams will begin writing formal responses to the comments based on the discussion of issues at the June 10th meeting. **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 **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. **Question 4:**		

Action Items:	Status:	Assigned To:
The team will discuss on the August 6th call **Question 5:** The team will discuss on the August 6th call **Question 6:** August 24th call **Question 7:** By exception **Question 8:** August 24th call		

7. Next Steps

Date	Location	Comments
January 30, 2009 from 1–3 p.m. EST	Conference Call	Complete 1/13/09 agenda
February 11, 2009 from noon–5 p.m. With Lunch February 12, 2009 from 8 a.m.–5 p.m. With Lunch February 13, 2009 from 8 a.m.–noon	Austin, TX ERCOT Offices	ERCOT to host — confirmed with Steve
February 20, 2009 from 1–3 p.m. EST	Conference Call and WebEx	To discuss Question 6 and Question 7 (response to comments) and to discuss Requirement R6.4
February 27, 2009 from 1–3 p.m. EST	Conference Call and WebEx	To discuss Question 8 and Question 9, General Response to Comments (summary) and the Mapping Document.
March 2, 2009 from 2–5 p.m. EST	Conference Call and WebEx	To complete Question 9, Review Summary Responses to Comments and the Mapping document.
March 4, 2009 from 1–3 p.m. EST	Conference Call and WebEx	To discuss the Comment Form and one final review of the response to comments.
March 13, 2009 from 1–3:30 p.m. EST	Conference call and WebEx	To discuss the comment form, a final pass (by exception) of the mapping document and the

		response to comments and a review of the draft standard.
April 2, 2009	Conference call and WebEx	To discuss the call with the PRC-024 team.
May 29, 2009	Conference call and WebEx	
June 10 -11, 2009 from 8 a.m.–5 p.m. (both days)	In Person Meeting — NWPP Offices in Portland, Oregon	
June 24, 2009 from 1–3:30 p.m. EST	Conference call and WebEx	Compile and agree with list of major issues Barry's comments
July 7, 2009 from1–3:30 p.m. EST	Conference Call and WebEx	Question 1–2 — can be done by exception on the conference call
August 6, 2009 from 9:30 a.m.–noon EST	Conference Call and WebEx	Question 4 and 5
August 24, 2009 from 1–3:30 p.m. EST	Conference Call and WebEx	Question 6, 7 and 8
September 1-2, 2009 from 8 a.m.–5 p.m. (both days)	In person meeting — Montreal	Si Truc will check availability

8. Adjourn

The meeting adjourned at approximately 5:02 p.m. PST.

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

   4.3. Transmission Owners with end-use Load connected to their Facilities where such end use load is not part of a Distribution Provider's load (6/10 – the team conducted an informal poll and determined that the majority of the team feels that eliminating the TO from applicability is appropriate because the concern driving to include the TO with the qualifier was to fix a registration issue – those TO's w end use load that are not registered as Distribution Providers. However, the TO might have to remain in the applicability if the TO is to provide data in requirement R9).

   4.4. Generator Owners

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.

Each Planning Coordinator shall design an underfrequency load shedding program in collaboration with all the Planning Coordinators within the region in which it performs the Planning Coordinator function that will result in one program for the region. consistent application across the region

R2. Each group of Planning Coordinators shall design an underfrequency load shedding program for consistent application across the region.

R3. Each group of Planning Coordinators shall develop criteria, considering historical events and system studies, to select portions of the Bulk Electric System (BES) that may form islands.

R4. Each group of Planning Coordinators shall develop a procedure for coordinating with groups of Planning Coordinators in neighboring regions within an interconnection to identify and reach agreement on islands between its region and neighboring regions within the interconnection. The procedure shall identify how the neighboring entities will assist in the UFLS assessments and document concurrence of assessment results.

R5. Each group of Planning Coordinators shall identify an island(s) as a basis for designing a UFLS program. The identified island(s) shall include:

- Those islands selected by applying the criteria in Requirement R3, if any.
- 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.
- Interregional islands agreed on by the Planning Coordinators.
- Any other islands necessary to ensure that all portions of the region's BES are included in at least one island.

R6. Each group of Planning Coordinators shall specify the technical design parameters of the underfrequency load shedding program 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):

~~R6.1.~~6.1. Arrest frequency decline at no less than 58.0 Hz.

~~R6.2.~~6.2. 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.

~~R6.3.~~6.3. 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.

~~R6.4.~~6.4. 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:

~~R6.4.1.~~6.4.1. Individual generating unit greater than 20 MVA (gross nameplate rating) and connected at 60 kV and above. ~~directly connected to the BES.~~

~~R6.4.2.~~6.4.2. Generating plant/facility greater than 75 MVA (gross aggregate nameplate rating) and directly connected connected at 60 kV and above.~~to the BES.~~

R7. Each group of Planning Coordinators shall conduct a UFLS assessment at least once every five years that determines through dynamic simulation whether the UFLS program design meets the performance characteristics in Requirement R6. The simulation shall include;

~~R7.1.~~7.1. Modeling the underfrequency trip settings of any generators that trip at or above the UFLS curve TBD ~~58~~.0 ~~Hz~~.

~~R7.2.~~7.2. Modeling the overfrequency trip settings of any generators that trip at or below the UFLS curve TBD ~~61.8 Hz.~~

~~R7.3.~~7.3. Modeling any automatic load restoration that ~~is designed to assist in~~impacts stabilizing frequency and operates within the simulated event.

R8. Each group of Planning Coordinators shall specify the content and create a database 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 and assessments of the UFLS program.

R9. Each Transmission Owner, Generator Owner and Distribution Provider shall provide data to its group of Planning Coordinators according to the schedule and format specified by the group of Planning Coordinators to support maintenance of the database.

R10. Each Transmission Owner and Distribution Provider shall provide ~~load~~ tripping of forecast load in accordance with the UFLS program designed by the group of Planning Coordinators for each region in which it operates.