



**Southwest Power Pool
SYSTEM PROTECTION AND CONTROL WORKING GROUP and SPP UFLS
Standard Drafting Team Meeting
MINUTES
July 8, 2010
9:00 a.m. – 11:00 a.m.
Net conference**

Item 1 – Administrative:

Shawn Jacobs, Chairman, called the System Protection and Control Working Group (SPCWG) meeting to order at 9:00 a.m. The agenda was approved (Attachment 1 – Agenda).

Following members were available for this meeting:

Shawn Jacobs	: OG&E
Tim Hinken	: KCPL
Ken Zellefrow	: SPRM
Ron McIvor	: OPPD
Bud Averill	: GRDA
Mathew Thykkuttathil	: SUNC
Jason Speer	: SPP Staff

Other meeting attendees were:

David Kelley	: SPP Staff
Brent Carr	: AECC
David Shockley	: AEP
Darrell Piatt	: FERC

Item 2: SPP UFLS Standard

The Standard Drafting Team reviewed the latest version of the 4th draft of SPP's UFLS Regional Standard. (Attachment 2 – SPP UFLS Regional Standard) The SDT made revisions to each of the Requirements.

The SDT went through the Requirements from the 4th draft and assigned the following people to create the Measures and the Violation Severity Levels (VSLs) for each of the Requirements listed below. Each of the people listed below are also responsible for coordinating their Measures and VSLs with other members of the SDT before the next meeting.

Requirement 1 – Ken Zellefrow
Requirement 2 – Ken Zellefrow
Requirement 3 – Shawn Jacobs
Requirement 4 – Shawn Jacobs
Requirement 5 – Shawn Jacobs
Requirement 6 – Bud Averill
Requirement 7 – Bud Averill
Requirement 8 – Bud Averill

Requirement 9 – Heidt Melson
Requirement 10 – Heidt Melson
Requirement 11 – Heidt Melson

Jason Speer will update the Implementation Plan based the SDT's discussion. The SDT decided to move several parts of the Requirements over to the Implementation Plan. (Attachment 3 – Implementation Plan)

Item 3: Closing Administrative Duties

The next net conference has been scheduled for August 5 (9am-11am).

The net conference was adjourned at 10:30 a.m.

Respectfully submitted,

Jason Speer, Secretary

**SOUTHWEST POWER POOL
SYSTEM PROTECTION AND CONTROL WORKING GROUP and SPP REGIONAL
STANDARD DEVELOPMENT MEETING
July 8, 2010 (9:00 a.m. till 11:00 a.m.)
Net Conference**

- AGENDA -

Item 1 – Administrative

- Call to order
- Proxies
- Approve agenda

Item 2 – SPP UFLS Standard (All)

- 4th Draft
- Responses to comments received for 3rd Draft

Item 3 – Closing Administrative Duties

- Next meeting place & date
- Upcoming meeting topics
- Adjourn meeting



Implementation Plan for SPP Underfrequency Load Shedding, PRC-006-SPP-01

Prerequisite Approvals

None

Proposed Effective Date

Requirements R1, R6 and R7 shall become effective the first day of the first calendar quarter one year after regulatory approval. The one year phase in for compliance is needed for the Planning Coordinator to perform the studies necessary to assess the effectiveness of the UFLS program.

The remaining requirements shall become effective the first day of the first calendar quarter three years after regulatory approval. The additional two year phase in for compliance is needed for any necessary changes to be made to the existing UFLS schemes.

Applicability

Other Considerations

UFLS Participating Distribution Providers and UFLS Participating Transmission Owners may implement an aggregated UFLS program with other UFLS Participating Distribution Providers or UFLS Participating Transmission Owners. In R4 and R5, the 100 MW limit refers to the aggregated UFLS program, if one exists.

Each UFLS Participating Distribution Provider and UFLS Participating Transmission Owner will have until June 1st of each current calendar year to implement changes to their UFLS scheme as required by R4. These changes may include changes in relay locations, frequency set points, relay time delays, or any other items requested in R7.

Title: SPP Automatic Underfrequency Load Shedding

A. Introduction

1. **Title:** Southwest Power Pool (SPP) Automatic Underfrequency Load Shedding
2. **Number:** PRC-006-SPP-01
3. **Purpose:** To develop, coordinate and document 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 Coordinator
 - 4.2. UFLS Participating Distribution Provider
 - 4.3. UFLS Participating Transmission Owner
 - 4.4. Generator Owners
5. **Effective Date:** Requirements R1, R6 and R7 shall become effective the first day of the first calendar quarter one year after regulatory approval.

The remaining requirements shall become effective the first day of the first calendar quarter three years after regulatory approval.

B. Requirements

- R1. Each Planning Coordinator shall identify one or more islands, as a basis for designing a UFLS program, selected by considering historical events, system studies, any portion 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, or any other islands necessary to ensure that all portions of the region's BES are included in at least one island. [VRF: High][Time Horizon: Long-term Planning]
- R2. The UFLS Participating Distribution Provider, UFLS Participating Transmission Owner and Generator Owner identified by the Planning Coordinator as having assets within the island(s) identified in R1 shall participate in an engineering assessment and develop a mitigation plan that specifically addresses the Generation/Load imbalances within the identified island(s). [VRF: High][Time Horizon: Long-term Planning]
- R3. Each UFLS Participating Distribution Provider and UFLS Participating Transmission Owner shall develop and implement an automatic UFLS program that meets the following specifications:[VRF: High][Time Horizon: Long-term Planning]

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- 3.1.** The intentional relay time delay for UFLS shall be less than or equal to 30 cycles.
 - 3.2.** Undervoltage inhibit shall be less than or equal to 85 percent of nominal voltage.
- R4.** Each UFLS Participating Distribution Provider and UFLS Participating Transmission Owner that has a total forecasted peak Native Load greater than or equal to 100 MW shall develop and implement an automatic UFLS program designed in three separate steps as indicated in the table below. [VRF: High][Time Horizon: Long-term Planning]

(1) UFLS Step	(2) Frequency (hertz)	(3) Minimum accumulated load relief as percentage of forecasted peak Native Load (%)	(4) Maximum accumulated load relief as percentage of forecasted peak Native Load (%)
1	59.3	10	15
2	59.0	20	30
3	58.7	30	45

- R5.** Each UFLS Participating Distribution Provider and UFLS Participating Transmission Owner that has a total forecasted peak Native Load less than 100 MW shall develop and implement an automatic UFLS program, that meets the following requirements:
- 5.1.** A minimum of one UFLS step with the frequency set point as assigned by the Planning Coordinator.
 - 5.2.** The minimum accumulated Load relief shall be at least 30% of the forecasted peak Native Load.
- R6.** Each UFLS Participating Distribution Provider and UFLS Participating Transmission Owner electing to use islanding schemes shall be designed to operate after all 3 steps of UFLS have been exhausted and the frequency

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continues to fall below 58.5Hz. Islanding schemes shall be designed with a minimum time delay of 2 seconds for frequencies at or between 58.5 Hz and 58.0 Hz.

- R7.** Each Planning Coordinator shall maintain an annually updated UFLS database for use in event analyses and assessments of the UFLS program. This database shall include all information identified in R9 and R10. [VRF: Lower][Time Horizon: Long-term Planning]
- R8.** The Planning Coordinator shall perform and document a UFLS technical assessment to determine that the UFLS program meets the performance characteristics in Requirements R2, R3 and R4 for each island identified in Requirement R1. This assessment shall be performed at least once every five years or within one year for any of the following situations. [VRF: Medium][Time Horizon: Long-term Planning]
- An actuation of UFLS resulting in 500 MW or greater loss of load.
 - Design changes are made to the scheme parameters.
 - Changes to the boundaries of a specified island are identified.
- R9.** Each UFLS Participating Distribution Provider and UFLS Participating Transmission Owner shall maintain and submit the following UFLS data based on the forecasted peak Native Load to the Planning Coordinator within (30) calendar days upon request from the Planning Coordinator: [VRF: Medium][Time Horizon: Long-term Planning]
- 9.1.** Location of installed UFLS equipment
- 9.2.** Trip frequency(s) for each location
- 9.3.** Total relay operating time of each location (time required for the relay to reliably sense the frequency + intentional delay time (if any))
- 9.4.** Breaker operating time of each location
- 9.5.** Percentage and/or MW of bus load to be shed at the location
- 9.6.** Total amount of load shed by each trip frequency and the total amount of load the entity has
- 9.7.** Tie tripping schemes
- 9.8.** Islanding schemes and the frequency and time delay at which they operate

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R10. Each Generator Owner shall maintain and submit the following UFLS data to the Planning Coordinator within (30) calendar days upon request from the Planning Coordinator::

- 10.1.** Underfrequency trip set points
- 10.2.** Overfrequency trip set points
- 10.3.** Time delays
- 10.4.** Data specified in R9 for any additional arranged load shed per R11. Specify the provider of the additional arranged load shed.

R11. Each Generator Owner shall verify by review of relay settings, generator control system settings, and generator operating guides that their generating unit(s) will not trip above the Generator underfrequency curve in Attachment 1 and will not trip below the Generator overfrequency curve in Attachment 2. Should this not be practical due to the operating characteristics of certain units, the Generator Owner shall arrange for Load shedding to be installed in addition to that required Load shedding as listed in R2, R3 and R4. [VRF: Medium][Time Horizon: Long-term Planning]

- 11.1.** This additional Load shedding shall be equal to or greater than the maximum amount of generation that can be tripped, instituted at the same frequency and time delays as the generator would be expected to trip and shall be within the same island.

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C. Measures

The following documentation will be used to determine compliance with the above requirements.

- M1.** The Planning Coordinator shall have evidence that islands were studied as required in R1.
- M2.** Each UFLS Participating Distribution Provider, UFLS Participating Transmission Owner, Generator Owner and the Planning Coordinator identified in areas of island shall have evidence of an engineering assessment and mitigation plan per requirement R2.
- M3.** Each UFLS Participating Transmission Owner and UFLS Participating Distribution Provider shall have evidence that its UFLS scheme meets requirement R3.
- M4.** Each UFLS Participating Distribution Provider and UFLS Participating Transmission Owner shall have evidence of reporting load requirement per R4.
- M5.** The Planning Coordinator shall have evidence that it established and maintained an UFLS database as required in R5.
- M6.** The Planning Coordinator shall have evidence that it performed technical assessment per requirement R6.
- M7.** Each UFLS Participating Distribution Provider, UFLS Participating Transmission Owner and Generator Owner shall have evidence that the information as required in R7 was supplied to the Planning Coordinator.
- M8.** Each Generator Owner shall have evidence that it complies with the R8 or has made arrangements for additional Load shedding, if appropriate, as required in R8.

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

SPP Regional Entity
SERC

1.2. Data Retention



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The Planning Coordinator and each UFLS Participating Distribution Provider, UFLS Participating Transmission Owner and Generator Owner shall keep data or evidence to show compliance as identified below unless directed by SPP Regional Entity to retain specific evidence for a longer period of time as part of an investigation:

- Each UFLS Participating Distribution Provider, UFLS Participating Transmission Owner and Generator Owner shall retain evidence of UFLS data transmittal to the SPP Regional Entity since the last compliance audit in accordance with Requirement Rx, Measure Mx.

1.3. Compliance Monitoring and Assessment Process

- Compliance Audit
- Self-Certification
- Spot Checking
- Compliance Violation Investigation
- Self-Reporting
- Complaint

1.4. Additional Compliance Information

Not applicable

2. Violation Severity Levels

R #	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	N/A	N/A	N/A	The Planning Coordinator did not have documentation that identified an island(s).
R2	N/A	N/A	N/A	UFLS Participating Distribution Provider, UFLS Participating Transmission Owner or Generator Owner did not participate with the Planning Coordinator in an engineering assessment and mitigation plan that

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				specifically address the Generation/Load imbalances
R3.1	N/A	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner did not demonstrate one of the three separate steps as indicated in the table	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner did not demonstrate two of the three separate steps as indicated in the table	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner did not demonstrate any of the three separate steps as indicated in the table
R3.2	N/A	N/A	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner did not demonstrate one UFLS step with the frequency set point as assigned by the Planning Coordinator OR Did not demonstrate the accumulated load relief of 30 % or greater of forecasted peak Native Load	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner did not demonstrate one UFLS step with the frequency set point as assigned by the Planning Coordinator AND Did not demonstrate the accumulated load relief of 30 % or greater of forecasted peak Native Load
R4	UFLS Participating Distribution Provider or UFLS Participating Transmission	UFLS Participating Distribution Provider or UFLS Participating Transmission	UFLS Participating Distribution Provider or UFLS Participating Transmission	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner did not report until after August 1 st to the

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	Owner did not report by April 1 st to the Planning Coordinator the amount of load as a percentage of forecasted peak Native Load it expects to automatically shed for each step identified in R3.1 or R3.2 for the current calendar year	Owner did not report by June 1 st to the Planning Coordinator the amount of load as a percentage of forecasted peak Native Load it expects to automatically shed for each step identified in R3.1 or R3.2 for the current calendar year	Owner did not report by August 1 st to the Planning Coordinator the amount of load as a percentage of forecasted peak Native Load it expects to automatically shed for each step identified in R3.1 or R3.2 for the current calendar year	Planning Coordinator the amount of load as a percentage of forecasted peak Native Load it expects to automatically shed for each step identified in R3.1 or R3.2 for the current calendar year
R5	The Planning Coordinator did create and maintain UFLS equipment database with part of the information identified in R7	The Planning Coordinator did create but failed to maintain UFLS equipment database with all the information identified in R7	N/A	The Planning Coordinator did not create or maintain UFLS equipment database with all the information identified in R7
R6	The Planning Coordinator did not conduct and perform technical assessment within five years or within one year after one of the situations listed in 6.1	N/A	N/A	The Planning Coordinator did not conduct and perform technical assessment within six years or within two years after one of the situations listed in 6.1
R7	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner or Generator Owner provided required	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner or Generator Owner provided required	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner or Generator Owner provided required	UFLS Participating Distribution Provider or UFLS Participating Transmission Owner or Generator Owner did not provide required data after the request was made.

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	data within 31 to 45 days after the request was made	data within 46 to 60 days after the request was made. OR UFLS Participating Distribution Provider or UFLS Participating Transmission Owner or Generator Owner did not provide one piece of information listed in R7 (e.g., 7.1.1)	data within 61 to 75 days after the request was made. OR UFLS Participating Distribution Provider or UFLS Participating Transmission Owner or Generator Owner did not provide two pieces of information listed in R7 (e.g., 7.1.1. and 7.1.2)	OR UFLS Participating Distribution Provider or UFLS Participating Transmission Owner or Generator Owner did not provide three or more pieces of information listed in R7 (e.g., 7.1.1. and 7.1.2 and 7.1.3)
R8	N/A	The Generator Owner did not comply with one of the requirements listed in R8 and 8.1	The Generator Owner did not comply with two of the requirements listed in R8 and 8.1	The Generator Owner did not comply with three or more of the requirements listed in R8 and 8.1

E. Associated Documents

Version History

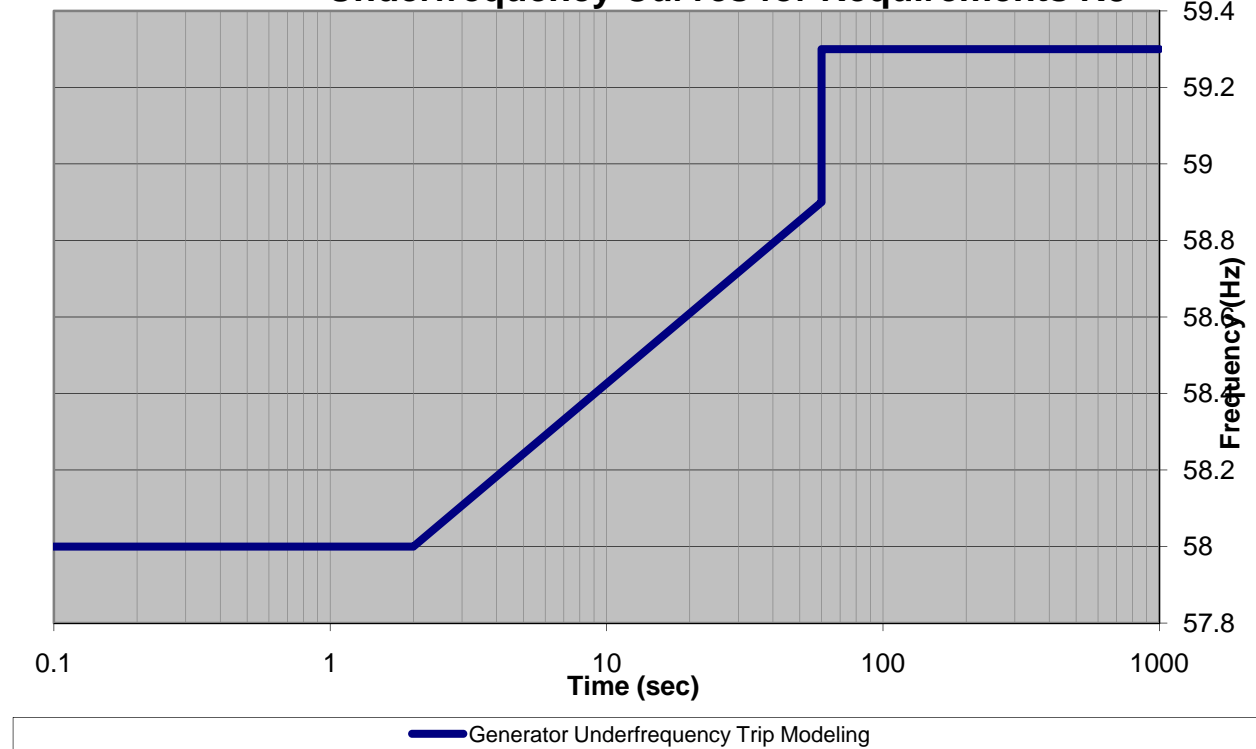
Version	Date	Action	Change Tracking
Draft 1	3/31/2009 thru 4/30/2009	Posted for 1 st Comment Period	Initial version
Draft 2	8/31/2009 thru 9/30/2009	Posted for 2 nd Comment Period	Revised to address comments from Draft 1
Draft 3	3/29/2010 thru 4/28/2010	Posted for 3 rd Comment Period	Revised to address comments from Draft 2

Regional Reliability Standard: PRC-006-SPP-01

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**PRC-006-SPP-1 - Attachment 1
Underfrequency Curves for Requirements R8**



**PRC-006-SPP-1 - Attachment 2
Overfrequency Curves for Requirements R8**

