

# SPP PC UFLS Plan

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## Revision History

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Date or Version Number	Author	Change Description	Comments
<b>7/2/2013</b>	SPCWG	Rev. 0	Initial draft
<b>7/16/2013</b>	SPP Planning Coordinator	Rev. 1	MOPC approved SPCWG's Recommendation to endorse the UFLS Plan from the Consent Agenda
<b>6/03/2014</b>	SPP Planning Coordinator	Rev. 2	Incorporated RCWG revisions. Added Appendices A-E. Grammatical and formatting edits.
<b>6/20/2014</b>	SPP Planning Coordinator	Rev. 2.1	RCWG, SPCWG, UFLS Entities comments
<b>6/24/2014</b>	SPP Planning Coordinator	Rev. 3	For final RCWG, SPCWG recommendations
<b>10/21/2014</b>	SPP Planning Coordinator	Rev. 3.1	Stakeholder process cleanup. Section 6.0 – UFLS Program < 100MW: specified frequency setpoints. Appendix B – UFLS Data: enhanced instructions.

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# Introduction

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The Southwest Power Pool Planning Coordinator (SPP PC) Automatic Underfrequency Load Shedding Plan (UFLS Plan) is designed to develop, coordinate, and document requirements for automatic underfrequency load shedding (UFLS) programs to arrest declining frequency and to assist with the recovery of frequency following underfrequency events. In order to evaluate the UFLS Plan, the SPP PC will collect UFLS data annually and perform the design assessment at least once every five years.

The SPP PC UFLS Plan applies to Generator Owners and UFLS entities. UFLS entities are entities responsible for the ownership, operation, or control of UFLS equipment as required by the UFLS program established by the PCs. Such entities may include one or both of the following: Transmission Owners (TO) and Distribution Providers (DP). This UFLS Plan requires annual updates to the UFLS data by UFLS entities.

An SPP PC UFLS entity can be either a TO or a DP. In order to meet the definition of a UFLS entity, a DP must meet all the following conditions:

- Owns and operates (armed) automatic UFLS equipment to arrest frequency decline for UFLS events defined by PRC-006-1 as of October 1, 2013.
- Has total DP load greater than or equal to what is specified by NERC in the most current Statement of Compliance Registry Criteria for a Distribution Provider.

In order to meet the definition of a UFLS entity, a TO must meet the following condition:

- Owns and operates (armed) automatic UFLS equipment to arrest frequency decline for UFLS events defined by PRC-006-1 as of October 1, 2013.
- UFLS entities seeking changes to the status of their UFLS equipment shall coordinate with TOs/DPs that are directly impacted by the operation of UFLS equipment and obtain SPP PC approval.
- New Entities being added to the SPP PC footprint who qualify as UFLS entities based on the criteria above shall coordinate their UFLS equipment data with the SPP PC UFLS contact and adhere to the SPP PC UFLS implementation schedule [Appendix C](#). These New Entities shall also coordinate with TOs/DPs that are directly impacted by the operation of UFLS equipment if applicable.

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## SPP PC UFLS Plan

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### **Section 1.0 - Study Island Identification (PRC-006-1.R1)**

PRC-006-1-R1 requires criteria be specified for the selection of a study island. The SPP PC will examine historical events as well as conduct future studies to determine the adequacy of its UFLS system. When the SPP PC has evidence to warrant investigation of including more than one UFLS island, it will coordinate the analysis with the System Protection and Control Working Group (SPCWG), UFLS entities, and other affected PCs to develop a subsequent UFLS Plan to meet NERC PRC-006-1.

## **Section 2.0 - Island Selection (PRC-006-1.R2)**

The SPP PC has identified one island consisting of the SPP PC footprint to serve as a basis for designing its UFLS program. The SPP PC island was selected by considering the following:

- Those islands selected by applying the criteria in Section 1.
- Any portions of the bulk electric system (BES) designed to detach from the Interconnection (planned islands) as a result of the operation of a relay scheme or Special Protection System.
- A single island that includes all portions of the BES in either the Regional Entity area or the Interconnection in which the PC's area resides. If a PC's area resides in multiple Regional Entity areas, each of those Regional Entity areas will be identified as an island. PCs may adjust island boundaries to differ from Regional Entity area boundaries by mutual consent where necessary for the sole purpose of producing contiguous regional islands more suitable for simulation.
- System studies.
- Changes to the PC island boundary.
- Review of historical events.

## **Section 3.0 – Performance Characteristics (PRC-006-1.R3,R10)**

### **3.1 Volts/Hz (V/Hz) limits (R3.3)**

As a part of the SPP PC UFLS evaluation, V/Hz for all SPP PC UFLS entities' generators at a generator terminal bus and/or a generator step-up (GSU) transformer high-side bus will be studied. This study is performed to assess generators and transformers magnetic flux during a 25% generation loss scenario. The actual magnitude of magnetic flux in the generator stator or transformer core is difficult to measure; however, it can be quantified in terms of per unit V/Hz, since the operating magnetic flux in electric machines is proportional to the ratio of the operating voltage to the electrical frequency. Therefore, V/Hz provides a measure of generator stator and transformer core magnetic flux. Excessive magnetic flux in the transformer or generator results in thermal damages to the generator and GSU transformer. These damages are typically cumulative and include, but are not limited to, generator stator and GSU transformer core damage and degradation of insulation material. Excessive magnetic flux may also cause unwanted operation of protection system. The objective of the study is to identify generator terminal or GSU transformer high-side buses for which V/Hz exceeds stipulated values of 1.18 PU for longer than two seconds cumulatively, or 1.1 PU for longer than 45 seconds cumulatively for the simulated event of 25% generation loss scenario.

Therefore, Volts per Hz (V/Hz) will not exceed 1.18 per unit for longer than two seconds cumulatively per simulated event and will not exceed 1.10 per unit for longer than 45 seconds cumulatively per simulated event at each generator bus and generator step-up transformer high-side bus associated with each of the following:

- Individual generating units greater than 20 MVA (gross nameplate rating) directly connected to the bulk electric system (BES).
- Generating plants/facilities greater than 75 MVA (gross aggregate nameplate rating) directly connected to the BES.
- Facilities consisting of one or more units connected to the BES at a common bus with total generation above 75 MVA gross nameplate rating.

### 3.2 Automatic switching of equipment for over-voltage control (R10)

The SPP PC has not identified the need to require Transmission Owners (TO) to provide automatic switching of its existing equipment (capacitor banks, Transmission Lines, and reactors) to control over-voltage as a result of Underfrequency load shedding. When the SPP PC has identified the need to require Transmission Owner to provide automatic switching of its existing equipment to control over-voltage as a result of Underfrequency load shedding the SPP PC will notify the TOs of the effective date to implement this section of the SPP PC UFLS Plan. The TO will follow the Schedule for Implementation, [Appendix C](#), upon notification by the SPP PC.

## **Section 4.0 – PC Coordination (PRC-006-1.R5 and R7)**

### 4.1 Island and Program Design (R5)

When multiple PCs are included in the SPP PC UFLS island, SPP, as the PC, will coordinate its UFLS program design with adjacent PCs whose areas or portions of whose areas are also part of the same identified island through one of the following:

- Develop a common UFLS program design and schedule for implementation among the PCs whose areas or portions of whose areas are part of the same identified island; or
- Conduct a joint UFLS design assessment at least every five years among the PCs whose areas or portions of whose areas are part of the same identified island; or
- Conduct an independent UFLS design assessment per the SPP PC UFLS Plan, and if the assessment fails to meet SPP PC UFLS Plan, identify modifications to the UFLS program(s) to meet the SPP PC UFLS Plan and report these modifications as recommendations to the other PCs whose areas or portions of whose areas are also part of the same identified island and the ERO.

### 4.2 Data (R7)

The SPP PC will provide its UFLS database containing data necessary to model its UFLS program to other PCs within its Interconnection within 30 calendar days of a request for data.

## **Section 5.0 - UFLS Program > 100MW**

Each UFLS entity that has a total forecasted peak Load greater than or equal to 100 MW will develop and implement an automatic UFLS program that meets the following requirements:

- A minimum of 10% will be shed at each UFLS step in accordance with the table below.

UFLS Step	Frequency (hertz)	Minimum accumulated load relief as percentage of forecasted peak Load (%)	Maximum accumulated load relief as percentage of forecasted peak Load (%)
1	59.3	10	25
2	59.0	20	35
3	58.7	30	45

- The intentional relay time delay for UFLS will be less than or equal to 30 cycles.
- There is no minimum total clearing time (relay operating time + breaker trip time).
- Undervoltage inhibit setting will be less than or equal to 85% of nominal voltage.

UFLS entities may implement an aggregated UFLS program with other UFLS entities. The 100 MW limit refers to the aggregated plan, if one exists.

## **Section 6.0 – UFLS Program < 100MW**

Each UFLS entity that has a total forecasted peak Load less than 100 MW will develop and implement an automatic UFLS program that meets the following sections:

- A minimum of one UFLS step with the frequency set point that can be any of the following: 59.3 Hz, 59.0 Hz, or 58.7 Hz. If the current frequency set point is not 59.3 Hz, 59.0 Hz, or 58.7 Hz then the UFLS Entity will change the set point to the nearest of 59.3 Hz, 59.0 Hz, or 58.7 Hz per the SPP PC UFLS Schedule of Implementation.
- The minimum accumulated Load relief will be at least 30% of the forecasted peak Load.
- The intentional relay time delay for UFLS will be less than or equal to thirty (30) cycles.
- Undervoltage inhibit setting will be less than or equal to 85% of nominal voltage.
- UFLS entities may implement an aggregated UFLS program with other UFLS entities. The 100 MW limit refers to the aggregated plan, if one exists.

## **Section 7.0 – Islanding Schemes**

Each UFLS entity electing to use underfrequency islanding schemes will design those islanding schemes to operate after all three steps of UFLS have been exhausted and the frequency continues to fall to 58.5 Hz or below. For islanding schemes designed to operate at or between 58.5 Hz and 58.0 Hz, the minimum time delay will be two seconds. For islanding schemes designed to operate below 58.0 Hz, no time delay is required.

## **Section 8.0 – Technical Assessment**

The PC will perform and document a UFLS technical assessment within one year after the occurrence of any of the following situations:

- Performance characteristic changes to PRC-006 or the SPP PC UFLS Plan.
- Changes to the boundaries of a specified island are identified.

## **Section 9.0 - UFLS Entity (TO and DP) Data Submittal**

The PC will annually request the completion of an Attestation Form and UFLS data from each registered TO and DP in its PC area. Each TO and DP will provide the requested information to the PC within 30 calendar days. The Attestation Form is in [Appendix D](#). Details on the UFLS data are in [Appendix B](#).

For those entities with TrueShare access upload survey form to:

[www.TrueShare.com](http://www.TrueShare.com)

↳ SPP UFLS Plan Data (folder)

↳ “Individual TO and DP” (sub-folder).

**Note:** **DO NOT** post data in the root folder “SPP UFLS Plan Data” on [www.TrueShare.com](http://www.TrueShare.com).

**Example:** The DP “ABC” will post their signed Attestation Form and Inventory Spreadsheet in the sub-folder “ABC” within [www.TrueShare.com](http://www.TrueShare.com).



For those entities without TrueShare access submit survey form via email to:  
The UFLS subject matter expert, see [Appendix A](#).

## 9.1 Attestation Form

The Attestation Form announces the Submission Period (example, Annual submittal for 2013) and the required Reporting Period (example, October 1 through October 30, 2013) for the Entity to complete the form and if applicable supply the UFLS data. The responding Entity will complete the Form by checking all the following items that apply:

- Entity is a Transmission Owner.
- Entity is a Distribution Provider.
- Entity is a Generator Owner.
- Entity owns Automatic Underfrequency Load Shedding (UFLS) Relay(s). (PRC-006-1).
- Entity does not own any UFLS Relays (PRC-006-1).
- Entity owns Automatic Load Restoration (ALR) Relay(s). (PRC-006-1, Req. 4.7).
- Entity does not own any ALR Relays (PRC-006-1).
- Entity owns frequency generation protection equipment

The Entity must sign and complete the remainder of the form.

## 9.2 UFLS Data (PRC-006-1, R6)

The UFLS data is necessary to model the SPP PC UFLS program for use in event analysis and assessments of the UFLS program. The data and format for the data will be reviewed by the SPCWG. Requirements for the UFLS Data are specified in the data request. Requirements for the UFLS Data or database are in [Appendix B](#).

## 9.3 SPP PC UFLS Contact

If TrueShare access is denied by an entity, the entity is to submit the UFLS Data and Attestation Form via email to the SPP PC UFLS Subject Matter Expert (SME), see [Appendix A](#).

## 9.4 TO/DP Contact and Changes

The SPP PC requires a registered TO/DP in the PC to provide at minimum the Compliance Contact. Changes or additions to the TO/DP contact(s) should be submitted via email to the SPP PC SME, [Appendix A](#).

## 9.5 SPP PC Planning Model

The SPP PC typically uses the next year Summer Peak planning stability model and power flow model to perform required UFLS Plan assessment. The location of the model will be specified in the data request. Percentage of UFLS Entity load shed is based on that entities' total load in the specified model.

**Example 9.5.1:** The October 2013 UFLS request based UFLS load shed amount on the SPP Model Development Working Group (MDWG) 2013 Series, Summer Peak 2014 case.

Registered TO/DPs submitting UFLS data on behalf of their members will group the data in such a way as to clearly identify compliance with the UFLS Plan.

**Example 9.5.2:** A TO who report UFLS data for multiple DP's might show an unbalanced mixture of DP's loads being shed in each UFLS Step 1, 2, and 3 while each step meets the 10% total trip requirement. UFLS data can be grouped by DP's within each Step with subtotals of percent load shed by group within the Step.

Access to the models is controlled through CEII. If you require access to these models please contact the SPP UFLS Plan SME, [Appendix A](#).

## **Section 10.0 – Generator Owner Data Submittal**

Each Generator Owner registered within the SPP PC with armed frequency protection relaying equipment will submit the completed UFLS Data Form, [Appendix B](#) – Generation UF Data, sub-Section 5 to the PC within 30 calendar days upon request from the PC.

## **Section 11.0 – Generator Owner Trip Verification**

Each Generator Owner will verify that their generating unit(s) will not trip above the generator underfrequency curve and will not trip below the generator overfrequency curve in NERC PRC-006-1 Attachment 1 as a result of the unit(s) frequency protective relay settings.

For generating units with operating characteristics that limit the unit's ability to perform in accordance with this requirement, the Generator Owner will provide to the PC technical evidence demonstrating that the unit cannot operate within the specified frequency range without causing equipment damage or violating manufacturer's published equipment ratings.

PRC-006-1 Requirements 4.1 through 4.6 require SPP to consider and model protective relays for generators that trip in the "no trip zone" defined in the diagram during the development of SPP UFLS Program. The diagram in PRC-006-1 Attachment 1 shows the "no trip zone" as the area between the two outside curves. At a minimum, during the UFLS design assessment SPP PC will simulate generator protection systems that trip generation when frequency is in the "no trip zone". This action applies to units that are identified in PRC-006-1 Requirements 4.1 through 4.6.

## **Section 12.0 – Supplemental Load Shedding**

The PC will determine if the Generator Owner has provided technical evidence demonstrating the unit cannot operate within the specified frequency range without causing equipment damage or violating manufacturer's published equipment ratings.

The PC will determine if the UFLS program performance is degraded due to the removal of any generation identified in accordance with Section 11 and verified in accordance with Section 11.

If the PC determines the UFLS program is degraded in accordance with Section 11 and supplementary load shedding is, therefore, required, the PC will notify the Generator Owner or UFLS entity(s) in accordance with the following:

- Where the Generator Owner is a UFLS entity and has the required amount of supplementary load available, the PC will notify the Generator Owner of load the entity is required to shed (in addition to that required in accordance with Section 5 and Section 6).
- Where the Generator Owner is not a UFLS entity, or does not have the required supplementary load available for shedding, the PC will notify any other UFLS entity(s) within the PC's area of load the entity(s) is required to shed (in addition to that required in accordance with Section 5 and Section 6).

### **Section 13.0 – Implementation of Supplemental Load Shedding**

The Generator Owner or other UFLS entity(s) will implement supplementary shedding of load required by the PC in accordance with Section 12.

### **Section 14.0 - Data Coordination with other Planning Coordinators (PRC-006-1.R7)**

SPP PC will provide its UFLS database containing data necessary to model its UFLS program to other PCs within its Interconnection within thirty 30 calendar days of a request for data.

### **Section 15.0 – Post Event UFLS Plan Design Assessment (PRC-006-1.R11-12)**

SPP PC, in whose area a BES islanding event results in system frequency excursions below the initializing set points of the UFLS program, will conduct and document an assessment of the event within one year of event actuation to evaluate the performance of the UFLS equipment and the effectiveness of the UFLS program.

When UFLS program deficiencies are identified, the SPP PC will conduct and document a UFLS design assessment within two years of event actuation to consider the identified deficiencies.

### **Section 16.0 – Post Event Island Assessment Coordination (PRC-006-1.R13)**

The SPP PC, in whose area a BES islanding event occurred that also included the area(s) or portions of area(s) of other PCs in the same islanding event and that resulted in system frequency excursions below the initializing set points of the UFLS program, will coordinate its event assessment with all other PCs whose areas or portions of whose areas were also included in the same islanding event through one of the following:

- Conduct a joint event assessment among the PCs whose areas or portions of whose areas were included in the same islanding event; or
- Conduct an independent event assessment that reaches conclusions and recommendations consistent with those of the event assessments of the other PCs whose areas or portions of whose areas were included in the same islanding event; or
- Conduct an independent event assessment and where the assessment fails to reach conclusions and recommendations consistent with those of the event assessments of the other PCs whose areas or portions of whose areas were included in the same islanding event, identify differences in the assessments that likely resulted in the differences in the conclusions and recommendations and report these differences to the other PCs whose areas or portions of whose areas were included in the same islanding event and the ERO.

### **Section 17.0 – Plan Change Coordination (PRC-006-1.R12)**

Changes to the SPP PC Plan could be initiated by a UFLS study, UFLS event, identified deficiency in the Plan, TO or DP changes in the PC, or UFLS entity requests. UFLS entities may request changes to the SPP PC UFLS Plan through the SPCWG and the PC. Communication to the SPCWG is through the SPCWG Secretary and Chair. The SPCWG contact information is on the SPP corporate web site: [www.spp.org](http://www.spp.org) > Org Groups.

Appeals on the UFLS Plan may be brought to the PC and the SPCWG. If the appeal(s) is accepted by the PC, SPP staff will revise the UFLS Plan and resubmit the revised plan to SPCWG for review.

## 17.1 Modification

- **UFLS entities** and Transmission Owners within its Planning Coordinator area may request changes to the SPP UFLS Plan through the SPCWG and the SPP PC. Modifications to the UFLS Plan may be made by the PC.
- **The SPP PC may designate TO/DP(s) within its PC footprint to meet performance requirements under the SPP PC UFLS Plan per PRC-006-1.**
- The Regional Compliance Working Group (**RCWG**) may request changes to the UFLS Plan.
- The **SPP PC** will consider and respond to all written comments and will approve appropriate changes to the Plan at its discretion.
- The **SPCWG** will review changes to the SPP PC UFLS Plan.
- **Conflicts** that arise in SPP PC changes to the UFLS Plan and UFLS entities will be resolved by the SPCWG.
- The **Appendices** contain information that aids in supporting the SPP PC UFLS Plan. This information may require changes that facilitate the program implementation that should not require SPCWG review. Examples of these changes could include contacts or data formats related to UFLS Data. These changes will be reviewed by the SPCWG Chair. Significant changes to the SPP PC UFLS Plan will follow the above Modification procedures.

## 17.2 Appeal Process

Appeals on the UFLS Plan may be brought to the PC and the SPCWG. If the appeal(s) is accepted by the SPP PC, SPP staff will revise the UFLS plan and resubmit the revised plan to the SPCWG for review.

## 17.3 Comment Period

The SPP PC will provide a comment period of 15 days and respond to comments from its UFLS entities and TOs on changes to the SPP PC UFLS Plan. The revised SPP UFLS Plan will be posted on [www.spp.org](http://www.spp.org), in ORG Groups, System Protection and Control Working Group, SPCWG Documents. Notification will also be sent to the SPCWG, RCWG, and the UFLS entities email lists.

## **Section 18.0 – Notifications (PRC-006-1.R3)**

The SPP PC Plan notifications are by email to SPP PC registered TOs and DPs. The notification will:

- Include the UFLS data submittal 30-day open and close dates.
- Reference the applicable **SPP UFLS Plan**.
- Include the applicable **Implementation Schedule**, [Appendix C](#).
- Include **Reporting Instructions**, [Appendix E](#), which provide details on how the TO/DP is to post and complete data for the request.
- Include the applicable **Attestation Form**, [Appendix D](#), for the TO/DP to complete and post per the Reporting Instructions.
- Provide location and access instructions to the **UFLS Plan Database**, [Appendix B](#), also known as the **Inventory Spreadsheet**.

## **Section 19.0 – Schedule for Implementation (PRC-006-1.R3)**

The initial Schedule for Implementation of the SPP PC UFLS Plan was based on the MOPC approved Plan, July 16, 2013 UFLS Plan, see [Appendix C](#). The Schedule for Implementation will be updated as required by NERC applicable standards or by the SPP PC to reflect changes to the SPP UFLS Plan.

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# Appendices

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## **Appendix A – SPP UFLS Plan Contacts**

The SPP PC contacts are:

- **SPP Planning Coordinator**  
Director of Research Development & Special Studies Department
- **Subject Matter Expert (SME)**  
Engineer
- **Compliance Contact**  
Compliance Engineer (Planning)
- **System Protection and Controls Working Group (SPCWG)**  
**Chairman & Staff Secretary**  
[http://www.spp.org/committee\\_detail.asp?commID=18](http://www.spp.org/committee_detail.asp?commID=18)
- **Data Transfer**  
GIS Analyst Transmission Engineering & Modeling
- **UFLS Data Sharing site**  
[www.Trueshare.com](http://www.Trueshare.com) >> SPP UFLS Plan Data >> UFLS Entity Folders
- **UFLS Model**  
The current UFLS Model is posted on [www.TrueShare.com](http://www.TrueShare.com) with location specified data request.  
Access to the models is controlled through CEII. If you require access to these models please contact the UFLS Plan SME in this Appendix.

## **Appendix B – UFLS Data**

Entities (TO/DP) who submit UFLS data on behalf of their Members or other UFLS Entities that own/operate UFLS equipment will identify their name and total load (MW) responsibility in the “configure” tab of the data Spreadsheet, for details see examples in data Spreadsheet.

The data Spreadsheet will have prepopulated Areas/Zones based on previously submitted data. If modifications are needed, the UFLS Entity will contact the SPP PC contact. Once modifications are approved the PC will send an updated spreadsheet to the UFLS Entity. Requirements for UFLS Data are below. The format for the specific UFLS Data request will be specified in the request.

1. Total Entity Load (MW) responsibility. The Entity total load includes load that is tripped by UFLS relays. The Entity total load is used to determine the percentage of load tripped during each UFLS Step.  
  
Example: Entity Total load is 200 MW. If 20 MW of load trips in UFLS Step 1, 59.3 HZ, then 10 % of the Entity load trips in UFLS Step 1.
2. Entity Name
3. Area Name
4. Area Number.
5. Location of relay, frequency set point and relay total operating time:
  - a. Substation Name.
  - b. Bus Number - powerflow bus number where the relay senses/measures frequency. This location may be different from the breaker location.
  - c. Feeder Number(s) (Optional).
  - d. Relay frequency set point (Hz).
  - e. Relay total operating time (seconds) includes the time required for the relay to reliably sense the frequency + intentional delay time (if any). This is not total clearing time.
6. Feeder or Islanding Scheme Tie Line Information:
  - a. From Bus Number.
  - b. To Bus Number.
  - c. Circuit ID.
  - d. The frequency and time delay at which the feeder or islanding tie line scheme operates.
7. Location & Amount Load to be shed:
  - a. Bus Number.
  - b. Breaker number (Optional).
  - c. Load (MW) to be shed on the study model Bus.
  - d. Percentage of load to be shed on the study model Bus.
  - e. Percentage shed on each study model Bus based upon the total model forecasted load.
  - f. Load ID on load to be shed.

8. Generator Owner (GO) UF data:
  - a. Unit Bus Number.
  - b. Unit ID Number.
  - c. MW shed/tripped - Out-of-service generators will show 0 MW.
  - d. Relay Operating Time is in section 2e (above).
  - e. Breaker Trip Time is in section 6 (below).
  - f. Over-frequency trip (HZ).
  - g. Under-frequency trip (HZ).
9. Breaker Trip Time in seconds – distribution, transmission, or generator. This is not total clearing time.
10. SPP Model Entity TO/DP Total forecasted peak load (MW). This MW value is used to calculate the percent load shed per relay.

**Example:** the October 2013 UFLS request based UFLS load shed amount on the SPP Model Development Working Group (MDWG) 2013 Series, Summer Peak 2014 case.
11. Automatic Load Restoration:
  - a. Bus Number.
  - b. Load ID on load to be restored.
  - c. Restored load (MW).
  - d. Percentage of load to be restored on the study model Bus.
  - e. Total time delay (seconds) include combined relay operating and breaker trip times.
  - f. System voltage for load restoration (PU).
  - g. System frequency for load restoration (Hz).
12. Comments to clarify data supplied (optional).



## **Appendix C – Schedule for Implementation**

### **SPP Underfrequency Load Shedding (UFLS) Plan Implementation Schedule**

The Southwest Power Pool UFLS Plan shall be effective **October 1, 2013**.

- Sections 3, 5, 6, 7, 11, 12, and 13 shall be completed by the first day of the first calendar quarter 36 months after Planning Coordinator (PC) notification.
- Section 8 shall be completed within one year after the occurrence of any of the following situations:
  - Performance characteristic changes to PRC-006-1 or the SPP UFLS Plan.
  - Changes to the boundaries of a specific island are identified.
- Sections 9 and 10 shall be completed within 30 calendar days from PC notification.
- Sections 14 shall be completed by SPP within 30 calendar days from a request for data by a PC with its interconnection.
- Section 15 shall be completed within one year of the event.
  - If UFLS program deficiencies are identified as a result of the islanding event assessment, a UFLS design assessment will be conducted and documented within two years of the event.

**Appendix D – Attestation Form (Example)**

**UFLS Data Submittal**

**PRC-006-1**

Reporting Period: Annual Submittal for “APPLICABLE YEAR”

Submission Period: “30 days from the receipt of the request”

Responding Entity is a:

Transmission Owner                       Distribution Provider                       Generator Owner

Please mark all the following that are applicable:

- Entity owns armed Automatic Underfrequency Load Shedding (UFLS) Relay(s). (PRC-006-1) (Entities that own UFLS Relays are required to upload a UFLS Inventory Spreadsheet. The UFLS Inventory Spreadsheet is available in the document download section in TrueShare)
- Entity does not own any armed UFLS Relays (PRC-006-1)
- Entity owns armed Automatic Load Restoration (ALR) Relay(s). (PRC-006-1, Req. 4.7) (Entities that own UFLS Relays are required to upload a UFLS Inventory Spreadsheet. The UFLS Inventory Spreadsheet is available in the document download section in TrueShare)
- Entity does not own any armed ALR Relays (PRC-006-1)
- Entity does owns generator protective relays (PRC-006-1, Req. 4.4, 4.5, 4.6)
- Entity does not own generator protective relays (PRC-006-1, Req. 4.4, 4.5, 4.6)
- Entity owns automatic equipment (capacitor banks, Transmission Lines, and reactors) used to control over-voltage as a result of Underfrequency load shedding. (PRC-006-1, Req. 10)
- Entity does not own automatic equipment used to control over-voltage as a result of Underfrequency load shedding. (PRC-006-1, Req. 10)
- Entity reports UFLS Plan data on behalf of itself, its membership, or other TO/DPs (PRC-006-1)

As a member of senior management (Vice President, Director, or other senior management), I am the responsible person for the oversight of the entity’s implementation of, and compliance with NERC-approved reliability standard requirements. I certify that the answers provided above are true to the best of my knowledge for the Reporting Period and Submission Period noted above.

Signature: \_\_\_\_\_

Name (print): \_\_\_\_\_

Title: \_\_\_\_\_

Registered Entity: \_\_\_\_\_

NCR: \_\_\_\_\_

Signature Date: \_\_\_\_\_

The completed and signed form should be uploaded to TrueShare prior to submitting the annual UFLS Data Submittal, which is due 30 days from the receipt of the request.

## **Appendix E – Reporting Instructions**

Below is the Reporting Instructions to be used as Guideline for UFLS Data requests.

### ***Southwest Power Pool***

201 Worthen Drive  
Little Rock, AR 72223-4936

[Date]

### **All Transmission Owners and Distribution Provider Primary Compliance Contacts:**

To fulfill the requirements of PRC-006-1, the Southwest Power Pool (SPP) Planning Coordinator (PC) will request UFLS data annually not to exceed fifteen months via TrueShare and Email.

Following are specific guidelines on the Under Frequency Load Shedding (UFLS) and Automatic Load Restoration (ALR) relays data submittal.

All TO's and DP's shall utilize TrueShare to upload the required Attestation Form regarding ownership of UFLS and Automatic Load Restoration (ALR) relays.

For those entities with TrueShare access upload survey form to:

[www.TrueShare.com](http://www.TrueShare.com)

↳ SPP UFLS Plan Data (folder)

↳ *“Individual TO and DP”* (sub-folder).

**Note:** **DO NOT** post data in the root folder “SPP UFLS Plan Data” on [www.TrueShare.com](http://www.TrueShare.com).

**Example:** The DP “ABC” will post their signed Attestation Form and Inventory Spreadsheet in the sub-folder “ABC” within [www.TrueShare.com](http://www.TrueShare.com).

For those entities without TrueShare access submit survey form via email to:  
The UFLS subject matter expert (see Appendix A).

SPP PC is collecting data in *[Year is specified in the request]*. The SPP planning stability model and power flow (SPP Model) to use for this data request is *[Model and location will be specified in the request]*.

The “Total Forecasted Peak Load per SPP Model MW” is the **peak demand** for the TO/DP in the SPP Model.

The *[Year]* UFLS Model is on: (example below)

[www.TrueShare.com](http://www.TrueShare.com)

↳ SPP UFLS Plan Data (folder)

↳ Models

↳ *“UFLS Data Request Year”*

**Note:** The folder “2014” contains the 2015 Summer Peak dynamics model used in the 2014 UFLS request for data.

Access to the models is controlled through CEII. If you require access to these models please contact the SME.

Guidelines on completing the UFLS Inventory Spreadsheet are based on SPP UFLS Plan, Section 9 & 10 – UFLS Entity Data Submittal & Generator Owner Data Submittal.

The Inventory Spreadsheet requirements are:

1. Total Entity Load (MW) responsibility.
  2. Entity Name.
  3. Area Number.
  4. Location of relay, setpoint and time:
    - a. Substation Name.
    - b. SPP Model Bus Number - powerflow bus number where the relay senses/measures frequency. This location may be different from the breaker location.
    - c. Feeder Number (Optional).
    - d. Relay frequency setpoint (Hz).
    - e. Relay operating time (seconds) includes the time required for the relay to reliably sense the frequency + intentional delay time (if any). This is not total clearing time.
  5. Feeder or Islanding Scheme Tie Line Information:
    - a. SPP Model From Bus Number.
    - b. SPP Model To Bus Number.
    - c. SPP Model Circuit ID.
  6. Location & Amount Load to be shed:
    - a. SPP Model Bus Number.
    - b. Breaker number (Optional).
    - c. Load (MW) to be shed on the SPP Model Bus.
  7. Generator UFLS data:
    - a. SPP Model Unit Bus Number.
    - b. SPP Model Unit ID Number.
    - c. SPP Model Generation MW shed/tripped. Out-of-service generators will show 0 MW.
- Note:** The Generator *Relay Operating Time* is in section 2e (above) and the *Breaker Trip Time* is in section 6 (below).
8. Breaker Trip Time in seconds – distribution, transmission, or generator. This is not total clearing time.
  9. SPP Model Entity TO/DP Total forecasted peak load (MW). This MW value is used to calculate the percent load shed per relay.
  10. Automatic Load Restoration:
    - a. SPP Model Bus Number.
    - b. Restored load (MW).
    - c. Total time delay (seconds) include combined relay operating and breaker trip times.

- d. System voltage for load restoration (PU).
- e. System frequency for load restoration (Hz).

11. Comments to clarify data supplied (optional).

12. Review the tab, "Example UFLS 2013" data and formats prior to completing the second tab, "Example UFLS data inventory 2013" worksheet which should include your data.

Please contact the SPP PC Subject Matter Expert (SME) by phone, or by email with any questions.

Sincerely,

*[SME Contact Information goes here]*

Copy to: SPP PC UFLS Entities