

Title: SPP Automatic Underfrequency Load Shedding Program

A. Introduction

- 1. Title:** Southwest Power Pool (SPP) Automatic Underfrequency Load Shedding Program
- 2. Number:** PRC-006-SPP-01
- 3. Purpose:** Provide an adequate level of reliability for the Bulk Electric System by implementing a Regional Underfrequency Load Shedding (UFLS) program in accordance with NERC UFLS Continent Wide Reliability Standard.

4. Applicability:

4.1 Transmission Owners

4.2 Distribution Providers

4.2.1. Any supplier of end-use Load not registered as a Distribution Provider may be required to register as a Distribution Provider if the Planning Coordinators or Transmission Planner determines that shedding this load is crucial to the reliability of the Bulk Electric System.

4.3 Load-Serving Entities with a peak integrated hourly load greater than 25 MW

4.4 Generator Owners of generators with an individual nameplate rating or plants, including Wind Generating Stations, with an aggregate nameplate rating of 10 MVA or greater.

4.4.1. Generator Owners not meeting the above criteria may be required to register as a Generator Owner if the Planning Coordinators or Transmission Planner determines the generating unit(s) is crucial to the reliability of Bulk Electric System.

4.5 Planning Coordinator

4.6 Transmission Planner

5. Effective Date: TBD

B. Requirements



Title: SPP Automatic Underfrequency Load Shedding Program

R1. Each Distribution Provider, Load-Serving Entity, and Transmission Owner with end-use Load customer(s) connected to their facilities shall implement an automatic UFLS program or shall participate with one or more Distribution Providers, Load-Serving Entities, and Transmission Owners with end-use Load customer(s) connected to their facilities to collectively implement by mutual agreement a single automatic UFLS program. Entities that participate with other Distribution Providers, Load-Serving Entities, or Transmission Owners by mutual agreement shall designate and report to the Planning Coordinator a single entity responsible for compliance reporting purposes. The automatic UFLS program shall include the following requirements:

R1.1. Have the capability of automatically shedding at least 30 percent of forecasted peak native load for the current year.

R1.2. Automatic UFLS program shall be initiated in three steps as indicated in the table below.

(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	25
3	58.7	30	45

R1.3. The Distribution Provider, Load-Serving Entity, or Transmission Owner shall annually certify by April 1st of each year with the SPP region the amount of load as a percentage of forecasted peak native load it expects to automatically shed for each step identified in R1.2 for the current year.

R1.4. The intentional relay time delay for UFLS shall not be greater than 30 cycles.

R1.5. Undervoltage inhibit shall be set as low as practical, but shall not be greater than 85 percent of nominal voltage.

R1.6. Islanding schemes shall only operate after all 3 steps of UFLS have been exhausted and the frequency continues to fall below 58.5Hz.

Title: SPP Automatic Underfrequency Load Shedding Program

- R2.** Each Generator Owner shall verify their generating unit(s) will not trip during low frequency conditions above levels as listed in R1. Should this not be practical due to the operating characteristics of certain units, the Generator Owner may become compliant by arranging for Load shedding to be installed by mutual agreement with Distribution Providers, Load-Serving Entities, or Transmission Owners with end-use Load customer(s) connected to their facilities, in addition to that required Load shedding as listed in R1.
- R2.1.** This additional Load shedding shall be equal to or greater than the generator MW dispatch, instituted at the same frequency and time as the generator would be expected to trip. For non-dispatch generators, this additional Load shedding shall be equal to or greater than the amount of generation interrupted by UFLS.
- R2.2.** If the generator is located within a credible island, arrangement for additional Load shedding shall be within the credible island.
- R3.** Each Distribution Provider, Load-Serving Entity, Transmission Owner and Generator Owner listed in Applicability Section shall maintain and submit the following UFLS data to the Planning Coordinator every 5 years or within (30) calendar days upon request from the Planning Coordinator:
- R3.1.** Number of UFLS relays installed.
- R3.2.** Facility Location of installed UFLS relays.
- R3.3.** Identification of breaker, circuit switcher, or device tripped by the UFLS relays.
- R3.4.** Trip frequency for each installed relay.
- R3.5.** Total Time Delay of each UFLS relay scheme, including the relay delay, intentional and unintentional.
- R3.6.** Forecasted peak native load and total amount of forecasted peak native load shed by each trip frequency.
- R3.7.** Under-frequency trip set points and time delays of generating units.
- R3.8.** Tie line tripping schemes.
- R3.9.** Islanding schemes and the frequency at which they operate.

Title: SPP Automatic Underfrequency Load Shedding Program

- R4.** Each Transmission Owner, Distribution Provider, and Generator Owner shall analyze and document underfrequency events that occur below the initiating set point of their UFLS program. Documentation shall include relay operational data and any associated event analyzing data from such devices as fault, disturbance, or long term trend recorders associated with the UFLS event. Documentation of the analysis shall be provided to the Planning Coordinator and NERC on request. Responsible entities shall provide the requested data within (30) calendar days. Upon review of documentation, a formal presentation to the Planning Coordinator may be required.

Entities that participate with other Distribution Providers, Load-Serving Entities, or Transmission Owners by mutual agreement shall designate and report to the Planning Coordinator a single entity responsible for documentation of the UFLS event.

The documentation shall include:

- R4.1.** Overall summary of UFLS event
- R4.2.** Pre-disturbance system condition
 - R4.2.1.** Electrical overview of system
 - R4.2.2.** System constraints
 - R4.2.3.** System status of generators, transmission lines, and major equipment
- R4.3.** Initiating UFLS event(s)
 - R4.3.1.** Root cause(s) of the event
 - R4.3.2.** Contributing factors
 - R4.3.3.** Additional factors and events during UFLS not contributing to event
- R4.4.** Detailed sequence of events to include data requested in R3 and any other significant information.
- R4.5.** Corrective Actions and Implementation Status
 - R4.5.1.** Including equipment description, discussion, conclusion and recommendations
 - R4.5.2.** Incomplete corrective actions shall be reported to the Planning Coordinator quarterly.

Title: SPP Automatic Underfrequency Load Shedding Program

- R5.** The Planning Coordinator shall maintain a database with information of the UFLS program.
- R5.1.** The Planning Coordinator shall update and maintain the UFLS equipment database. This database shall include all information identified in R3 which responsible entities or their designated representatives are required to submit to the Planning Coordinator every 5 years or as requested by the Planning Coordinator.
- R5.2.** The Planning Coordinator shall periodically conduct and document a technical assessment of the effectiveness of the design and compliance to the latest approved NERC Continent-Wide Standard PRC-006-01. These assessments shall be completed at least every 5 years or as required by significant changes in system conditions.
- R6.** The Planning Coordinator shall determine appropriate islands to study as a design basis for UFLS. These islands shall be chosen from system studies, actual system operations, or other islands as deemed appropriate by the Transmission Planner. Identified islands will be assessed to determine if any additional UFLS capability should be installed and how it should be designed and implemented.
- R7.** Transmission Owner, Distribution Provider, LSE or Generator Owners identified in areas of credible island shall participate in the engineering assessment and mitigation that specifically address Generation/Load imbalances in the area of credible islanding. UFLS capability should cover potential generation/load imbalances.
- Upon determination of a new credible island the Transmission Owners, Distribution Providers, Generator Owners or Reliability Entity (identified in R1) shall have three years to install UFLS to cover potential generation/load imbalances.
- R8.** The Planning Coordinator shall function as a requesting agent and clearing house for the collection of data following an UFLS event as stated in Requirement 4.

C. Measures

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

- M1.** Each Distribution Provider, Load Serving Entity, and Transmission Owner with end-use Load customer(s) connected to their facilities shall maintain documentation that its UFLS scheme meets the performance requirements in R1.



Title: SPP Automatic Underfrequency Load Shedding Program

- M2.** Each Generator Owner shall have documentation that it complies with the characteristics of R2 or has made arrangements for additional Load shedding, if appropriate, as required in R2.
- M3.** Each Distribution Provider, Load Serving Entity, Transmission Owner and Generator Owner shall have evidence that the information as required in R3 was supplied to the Planning Coordinator.
- M4.** Each Transmission Owner, Distribution Provider, and Generator Owner shall have evidence that the analysis required in R4 was completed and supplied to the Planning Coordinator, if requested.
- M5.** Each Planning Coordinator shall have evidence it established and maintained an UFLS database as required in R5.
- M6.** Each Planning Coordinator shall have documentation that it complies with the requirements of R6.
- M7.** Each Transmission Owner, Distribution Provider, LSE or Generator Owner identified in areas of credible island shall have evidence that it participates in the engineering assessment as required in R7.
- M8.** Each Planning Coordinator shall have evidence of the data that was collected as required by R8.

D. Compliance

- 1. Compliance Monitoring
 - 1.1 Compliance Monitoring Responsibility
Compliance Monitor: Southwest Power Pool
 - 1.2 Compliance Monitoring Period and Reset
On request (within 30 calendar days)
 - 1.3 Data Retention
Five years
 - 1.4 Additional Compliance Information
None
- 2. Violation Severity Levels (TBD)

E. Implementation Plan

Regional Reliability Standard: PRC-006-SPP-01

Title: SPP Automatic Underfrequency Load Shedding Program



TBD

F. Revision History

TBD