

## Standard Authorization Request Form

Title of Proposed Standard Project 2007-01	Underfrequency Load Shedding (UFLS) Standards
Request Date <b>Revised</b>	November 14, 2006 <b>March 28, 2007</b>

SAR Requestor Information	SAR Type <i>(Check a box for each one that applies.)</i>
Name Regional Reliability Standards Working Group	<input type="checkbox"/> New Standard <input type="checkbox"/>
Primary Contact Robert W. Millard Director of Standards ReliabilityFirst Corporation	<input checked="" type="checkbox"/> Revision to existing Standards PRC-006, PRC-007, <del>PRC-008</del> , and PRC-009
Telephone (630) 261-2621 Fax (630) 691-4222	<input type="checkbox"/> Withdrawal of existing Standard <input type="checkbox"/>
E-mail bob.millard@rfirst.org	<input type="checkbox"/> Urgent Action <input type="checkbox"/>

**Purpose** (Describe the purpose of the standard — what the standard will achieve in support of reliability.)

PRC-006— Development and Documentation of Regional Reliability Organizations' Underfrequency Load Shedding Programs

PRC-007 — Assuring Consistency with Regional UFLS Programs

~~PRC-008 — Underfrequency Load Shedding Equipment Maintenance Programs~~

PRC-009 — UFLS Performance Following an Underfrequency Event

The purpose of revising the above ~~four~~ standards is to:

1. Provide an adequate level of reliability for the North American bulk power systems ~~==~~ ensure each of the standards are complete and the requirements are set at an appropriate level to ensure reliability.
2. Ensure they are enforceable as mandatory reliability standards with financial penalties - the applicability to bulk power system owners, operators, and users, and as appropriate particular classes of facilities, is clearly defined; the purpose, requirements, and measures are results-focused and unambiguous; the consequences of violating the requirements are clear.
3. Incorporate other general improvements described in ~~the~~NERC's Reliability Standards Development Plan: 2007-2009 (summarized and outlined in the Reliability Standard Review Guidelines attached as Appendix A).
4. Consider the items mentioned in the Standard Review Forms (excerpted from NERC's Reliability Standards Development Plan: 2007-2009) attached as Appendix B, prepared by the NERC staff, which attempt to capture comments from the:
  - FERC NOPR (Docket # RM06-16-00 dated October 20, 2006) .
  - FERC staff report dated May 11, 2006 concerning NERC standards submitted with ERO application.
  - Version 0 standards development ~~work plan.~~(see note 1), and
4. ~~Consider comments received during the initial development of the standards and other comments received from ERO regulatory authorities and stakeholders, as noted in the attached review sheets.~~
  - Regional Fill-in-the-Blank Team (RRSWG – a NERC working group involved with regional standards development).

The standard drafting team should also consider any other issues that were not completely captured but were stated or referenced in the above materials.
5. Consider issues raised by the industry during the posting of the SAR for Project 2007-01 during the first comment period from November 29, 2006 through January 12, 2007, attached as Appendix C.
6. Satisfy the standards procedure requirement for five-year review of the standards.

**Industry Need** (Provide a detailed statement justifying the need for the proposed standard, along with any supporting documentation.)

The ~~four~~ standards in this set are all Version 0 standards. As the electric reliability organization begins enforcing compliance with reliability standards under Section 215 of the Federal Power Act in the United States and applicable statutes and regulations in Canada, the industry needs a set of clear, measurable, and enforceable reliability standards. The Version 0 standards, while a good foundation, were translated from historical operating and planning policies and guides that were appropriate in an era of voluntary compliance. The Version 0 standards and recent updates were put in place as a temporary starting point to stand up the electric reliability organization and begin enforcement of mandatory standards. However, it is important to update the standards in a timely manner, incorporating improvements to make the standards more suitable for enforcement and to capture prior recommendations that were deferred during the Version 0 translation.

**Brief Description** (Describe the proposed standard in sufficient detail to clearly define the scope in a manner that can be easily understood by others.)

PRC-006 is one of the few reliability standards identified by the Regional Reliability Standards Working Group as a standard that has some requirements that need to be defined by each regional entity in a regional standard.

The standard drafting team (SDT) will work with stakeholders to review PRC-006 and each of the current regional programs developed in accordance with that standard, including any other associated programs and/or requirements related to and contained with the UFLS procedures to program documentation. The SDT shall determine which requirements should be continent-wide requirements and which requirements should be included in regional standards.

PRC-007 ~~through and~~ PRC-009 have some 'fill-in-the-blank' characteristics, as identified in the Regional Reliability Standards Working Group work plan, which need to be removed. These standards shall be included with PRC-006 for consideration as one or more revised standards as necessary for consistency and clarity of overall program requirements and any other associated programs and/or requirements that affect or impact the UFLS program.

The standard drafting team may include other improvements to the standards deemed appropriate by the drafting team, with the consensus of stakeholders, consistent with establishing high quality, enforceable and technically sufficient bulk power system reliability standards.

### Reliability Functions

<b>The Standard will Apply to the Following Functions</b> (Check box for each one that applies.)		
<input checked="" type="checkbox"/>	<b>Reliability Authority Coordinator</b>	<del>Ensures Responsible for</del> the <u>real-time operating</u> reliability of <del>the bulk transmission system within its Reliability Authority area. This is the highest</del> <u>Coordinator Area in coordination with its neighboring Reliability Authority Coordinator's wide area view.</u>
<input checked="" type="checkbox"/>	<b>Balancing Authority</b>	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within its metered boundary and supports system frequency in real time.

<input type="checkbox"/>	<b>Interchange Authority Coordinator</b>	<del>Authorizes</del> Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced <del>Interchange Schedules</del> interchange schedules between Balancing Authority Areas.
<input checked="" type="checkbox"/>	<b>Planning Authority Coordinator</b>	<del>Plans the Bulk Electric System.</del> Assesses the longer-term reliability of its Planning Coordinator Area.
<input type="checkbox"/>	<b>Resource Planner</b>	Develops a <del>long-term (&gt;one year)</del> plan for the resource adequacy of specific loads within a Planning <del>Authority Coordinator</del> area.
<input checked="" type="checkbox"/>	<b>Transmission Planner</b>	Develops a <del>long-term (&gt;one year)</del> plan for the reliability of <del>transmission systems</del> interconnected Bulk Power System within its portion of the Planning <del>Authority Coordinator</del> area.
<input type="checkbox"/>	<b>Transmission Service Provider</b>	<del>Provides</del> Administers the transmission tariff and provides transmission services <del>to qualified market participants</del> under applicable transmission service agreements ( <u>e.g., the pro forma tariff</u> ).
<input checked="" type="checkbox"/>	<b>Transmission Owner</b>	Owens <u>and maintains</u> transmission facilities.
<input checked="" type="checkbox"/>	<b>Transmission Operator</b>	<del>Operates and maintains the transmission facilities, and executes switching orders.</del> Ensures the real-time operating reliability of the <u>transmission assets within a Transmission Operator Area</u> .
<input checked="" type="checkbox"/>	<b>Distribution Provider</b>	<del>Provides and operates the "wires" between the transmission system and the customer.</del> Delivers electrical energy to the <u>End-use customer</u> .
<input checked="" type="checkbox"/>	<b>Generator Owner</b>	Owens and maintains generation <del>unit(s)</del> facilities.
<input checked="" type="checkbox"/>	<b>Generator Operator</b>	Operates generation unit(s) <u>to provide real</u> and <del>performs the functions of supplying energy and</del> <u>Interconnected Operations Services</u> reactive power.
<input type="checkbox"/>	<b>Purchasing-Selling Entity</b>	<del>The function of purchasing</del> Purchases or <del>sellingsells</del> energy, capacity, and <del>all necessary</del> <u>Interconnected Operations Services</u> reliability-related services as required.
<input type="checkbox"/>	<b>Market Operator</b>	<del>Integrates energy, capacity, balancing, and transmission resources to achieve an economic, reliability-constrained dispatch.</del> Interface point for reliability functions with commercial functions.
<input checked="" type="checkbox"/>	<b>Load-Serving Entity</b>	Secures energy and transmission (and related <u>generation</u> reliability-related services) to serve the <del>end-user</del> End-use Customer.

**Reliability and Market Interface Principles**

<b>Applicable Reliability Principles</b> <i>(Check box for all that apply.)</i>	
<input checked="" type="checkbox"/>	<b>1.</b> Interconnected bulk electric systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
<input checked="" type="checkbox"/>	<b>2.</b> The frequency and voltage of interconnected bulk electric systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
<input checked="" type="checkbox"/>	<b>3.</b> Information necessary for the planning and operation of interconnected bulk electric systems shall be made available to those entities responsible for planning and operating the systems reliably.
<input checked="" type="checkbox"/>	<b>4.</b> Plans for emergency operation and system restoration of interconnected bulk electric systems shall be developed, coordinated, maintained and implemented.
<input checked="" type="checkbox"/>	<b>5.</b> Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk electric systems.
<input type="checkbox"/>	<b>6.</b> Personnel responsible for planning and operating interconnected bulk electric systems shall be trained, qualified, and have the responsibility and authority to implement actions.
<input type="checkbox"/>	<b>7.</b> The security of the interconnected bulk electric systems shall be assessed, monitored and maintained on a wide area basis.
Does the proposed Standard comply with all of the following Market Interface Principles? <i>(Select 'yes' or 'no' from the drop-down box.)</i>	
<input checked="" type="checkbox"/>	<b>1.</b> The planning and operation of bulk electric systems shall recognize that reliability is an essential requirement of a robust North American economy. Yes
<input checked="" type="checkbox"/>	<b>2.</b> An Organization Standard shall not give any market participant an unfair competitive advantage. Yes
<input checked="" type="checkbox"/>	<b>3.</b> An Organization Standard shall neither mandate nor prohibit any specific market structure. Yes
<input checked="" type="checkbox"/>	<b>4.</b> An Organization Standard shall not preclude market solutions to achieving compliance with that Standard. Yes
<input checked="" type="checkbox"/>	<b>5.</b> An Organization Standard shall not require the public disclosure of commercially sensitive information. All market participants shall have equal opportunity to access commercially non-sensitive information that is required for compliance with reliability standards. Yes

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*Related Standards*

Standard No.	Explanation
<u><del>EOP-003-1</del></u>	<u><del>This standard may not be changed because of the work associated with Project 2007-01 but the standard drafting team should keep it in mind as they work on this set of standards.</del></u>

*Related SARs*

SAR ID	Explanation

*Regional Differences*

Region	Explanation
ERCOT	
FRCC	
MRO	
NPCC	
SERC	
RFC	
SPP	
WECC	

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## **Appendix A: Reliability Standard Review Guidelines**

### **Applicability**

Does this reliability standard clearly identify the functional classes of entities responsible for complying with the reliability standard, with any specific additions or exceptions noted? Where multiple functional classes are identified is there a clear line of responsibility for each requirement identifying the functional class and entity to be held accountable for compliance? Does the requirement allow overlapping responsibilities between Registered Entities possibly creating confusion for who is ultimately accountable for compliance?

Does this reliability standard identify the geographic applicability of the standard, such as the entire North American bulk power system, an interconnection, or within a regional entity area? If no geographic limitations are identified, the default is that the standard applies throughout North America.

Does this reliability standard identify any limitations on the applicability of the standard based on electric facility characteristics, such as generators with a nameplate rating of 20 MW or greater, or transmission facilities energized at 200 kV or greater or some other criteria? If no functional entity limitations are identified, the default is that the standard applies to all identified functional entities.

### **Purpose**

Does this reliability standard have a clear statement of purpose that describes how the standard contributes to the reliability of the bulk power system? Each purpose statement should include a value statement.

### **Performance Requirements**

Does this reliability standard state one or more performance requirements, which if achieved by the applicable entities, will provide for a reliable bulk power system, consistent with good utility practices and the public interest?

Does each requirement identify who shall do what under what conditions and to what outcome?

### **Measurability**

Is each performance requirement stated so as to be objectively measurable by a third party with knowledge or expertise in the area addressed by that requirement?

Does each performance requirement have one or more associated measures used to objectively evaluate compliance with the requirement?

If performance results can be practically measured quantitatively, are metrics provided within the requirement to indicate satisfactory performance?

### **Technical Basis in Engineering and Operations**

Is this reliability standard based upon sound engineering and operating judgment, analysis, or experience, as determined by expert practitioners in that particular field?

### **Completeness**

Is this reliability standard complete and self-contained? Does the standard depend on external information to determine the required level of performance?



**Consequences for Noncompliance**

In combination with guidelines for penalties and sanctions, as well as other ERO and regional entity compliance documents, are the consequences of violating a standard clearly known to the responsible entities?

**Clear Language**

Is the reliability standard stated using clear and unambiguous language? Can responsible entities, using reasonable judgment and in keeping with good utility practices, arrive at a consistent interpretation of the required performance?

**Practicality**

Does this reliability standard establish requirements that can be practically implemented by the assigned responsible entities within the specified effective date and thereafter?

**Capability Requirements versus Performance Requirements**

In general, requirements for entities to have ‘capabilities’ (this would include facilities for communication, agreements with other entities, etc.), should be located in the standards for certification. The certification requirements should indicate that entities have a responsibility to ‘maintain’ their capabilities.

**Consistent Terminology**

To the extent possible, does this reliability standard use a set of standard terms and definitions that are approved through the NERC reliability standards development process?

If the standard uses terms that are included in the NERC Glossary of Terms Used in Reliability Standards, then the term must be capitalized when it is used in the standard. New terms should not be added unless they have a ‘unique’ definition when used in a NERC reliability standard. Common terms that could be found in a college dictionary should not be defined and added to the NERC Glossary.

Are the verbs on the ‘verb list’ from the DT Guidelines? If not – do new verbs need to be added to the guidelines or could you use one of the verbs from the verb list?

**Violation Risk Factors (Risk Factor)**

**High Risk Requirement**

A requirement that, if violated, could directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures;

or a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly cause or contribute to bulk electric system instability, separation, or a cascading sequence of failures, or could place the bulk electric system at an unacceptable risk of instability, separation, or cascading failures, or could hinder restoration to a normal condition.

**Medium Risk Requirement**

This is a requirement that, if violated, could directly affect the electrical state or the capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system. However, violation of a medium risk requirement is unlikely to lead to bulk electric system instability, separation, or cascading failures;

or a requirement in a planning time frame that, if violated, could, under emergency, abnormal, or restorative conditions anticipated by the preparations, directly and adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. However, violation of a medium risk requirement is unlikely, under emergency, abnormal, or restoration conditions anticipated by the preparations, to lead to bulk electric system instability, separation, or cascading failures, nor to hinder restoration to a normal condition.

**Lower Risk Requirement**

A requirement that, if violated, would not be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor and control the bulk electric system. A requirement that is administrative in nature;

Or a requirement in a planning time frame that, if violated, would not, under the emergency, abnormal, or restorative conditions anticipated by the preparations, be expected to adversely affect the electrical state or capability of the bulk electric system, or the ability to effectively monitor, control, or restore the bulk electric system. A planning requirement that is administrative in nature.

**Mitigation Time Horizon**

The drafting team should also indicate the time horizon available for mitigating a violation to the requirement using the following definitions:

- **Long-term Planning** — a planning horizon of one year or longer.
- **Operations Planning** — operating and resource plans from day-ahead up to and including seasonal.
- **Same-day Operations** — routine actions required within the timeframe of a day, but not real-time.
- **Real-time Operations** — actions required within one hour or less to preserve the reliability of the bulk electric system.
- **Operations Assessment** — follow-up evaluations and reporting of real time operations.

**Violation Severity Levels**

The drafting team should indicate a set of violation severity levels that can be applied for the requirements within a standard. ('Violation severity levels' replaces the existing 'levels of non-compliance.') The violation severity levels may be applied for each requirement or combined to cover multiple requirements, as long as it is clear which requirements are included.

**The violation severity levels should be based on the following definitions:**

- **Lower: mostly compliant with minor exceptions** — the responsible entity is mostly compliant with and meets the intent of the requirement but is deficient with respect to one or more minor details. Equivalent score: 95% to 99% compliant.
- **Moderate: mostly compliant with significant exceptions** — the responsible entity is mostly compliant with and meets the intent of the requirement but is deficient with respect to one or more significant elements. Equivalent score: 85% to 94% compliant.
- **High: marginal performance or results** — the responsible entity has only partially achieved the reliability objective of the requirement and is missing one or more significant elements. Equivalent score: 70% to 84% compliant.

- **Severe: poor performance or results** — the responsible entity has failed to meet the reliability objective of the requirement. Equivalent score: less than 70% compliant.

**Compliance Monitor**

Replace, ‘Regional Reliability Organization’ with ‘Regional Entity’

**Fill-in-the-blank Requirements**

Do not include any ‘fill-in-the-blank’ requirements. These are requirements that assign one entity responsibility for developing some performance measures without requiring that the performance measures be included in the body of a standard – then require another entity to comply with those requirements.

Every reliability objective can be met, at least at a threshold level, by a North American standard. If we need regions to develop regional standards, such as in under-frequency load shedding, we can always write a uniform North American standard for the applicable functional entities as a means of encouraging development of the regional standards.

**Requirements for Regional Reliability Organization**

Do not write any requirements for the Regional Reliability Organization. Any requirements currently assigned to the RRO should be re-assigned to the applicable functional entity.

**Effective Dates**

Must be 1<sup>st</sup> day of 1<sup>st</sup> quarter after entities are expected to be compliant – must include time to file with regulatory authorities and provide notice to responsible entities of the obligation to comply. If the standard is to be actively monitored, time for the Compliance Monitoring and Enforcement Program to develop reporting instructions and modify the Compliance Data Management System(s) both at NERC and Regional Entities must be provided in the implementation plan.

**Associated Documents**

If there are standards that are referenced within a standard, list the full name and number of the standard under the section called, ‘Associated Documents’.

**Appendix B: PRC-006, PRC-007, and PRC-009 Standard Review Forms**

Excerpted from NERC's Reliability Standards Development Plan: 2007 - 2009

Standard Review Form Project 2007-01 Underfrequency Load Shedding		
Standard #	PRC-006-0	Comments
<b>Title</b>	Development and Documentation of Regional Reliability Organizations' Underfrequency Load Shedding Programs	Too long – slight difference with header.
<b>Purpose</b>		Implement vs. develop & document. Underfrequency spelled differently.
<b>Applicability</b>		RRO not in FM.
<b>Requirements</b>	<i>Conditions</i>	Okay
	<i>Who?</i>	R1.1 – includes sub-regions.
	<i>Shall do what?</i>	R1.3 – define sufficient; model at RRO or others or both? R1.4.2 – check grammar and capitalization; loosely worded. R2 & 3 – format of documentation.
	<i>Result or Outcome</i>	Missing
<b>Measures</b>		No real measures and definition of evidence required.
<b><u>To-Do</u></b> <b><u>List Issues to</u></b> <b><u>Consider</u></b>	<p>FERC NOPR</p> <ul style="list-style-type: none"> <li>o Commission will not propose to accept or remand this Reliability Standard until the ERO submits additional information. (see recommendations for improvement)</li> </ul> <p>FERC staff report</p> <ul style="list-style-type: none"> <li>o Concern with Blackout items (especially #21)</li> <li>o Fill in the blank</li> <li>o Definition of RRO as user of system</li> <li>o Lack of coordination</li> </ul> <p>Regional Fill-in-the-Blank Team Comments</p> <ul style="list-style-type: none"> <li>o Modify R1 to require each Region to develop a regional standard, and</li> <li>o Determine what elements (if any) of UFLS should be included in the North American standard and what elements should be included in the regional standards.</li> <li>o Development of regional standards needs to be coordinated with Regional entities. Regional entities should begin process for developing regional standards once the drafting team for the North American standard has determined what elements of UFLS should be included in the continent-wide standard and what elements should be included in the regional standards.</li> <li>o PRC-006 will be a continent-wide standard supported by Regional Reliability Standards.</li> <li>o Related PRC-007, PRC-008, and 009.</li> </ul> <p>V0 Industry Comments</p> <ul style="list-style-type: none"> <li>o Not a standalone standard</li> <li>o Who do you submit compliance material to?</li> <li>o Need to define evidence</li> </ul>	

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<b>Standard Review Form</b>		
<b>Project 2007-01 Underfrequency Load Shedding</b>		
<b>Standard #</b>	<b>PRC-007-0</b>	<b>Comments</b>
<b>Title</b>	Assuring Consistency of Entity Underfrequency Load Shedding Programs with Regional Reliability Organizations' Underfrequency Load Shedding Program Requirements	Too long and different than header.
<b>Purpose</b>		Same as 006 and doesn't address 007. No value proposition or benefit. Spelling of Underfrequency.
<b>Applicability</b>		Okay
<b>Requirements</b>	<i>Conditions</i>	Okay
	<i>Who?</i>	Okay
	<i>Shall do what?</i>	R1 – what about coordination? R2 – provide format, etc. and define 'as necessary'.
	<i>Result or Outcome</i>	Missing
<b>Measures</b>		2 M for 3 R. M1 – define consistency M2 – define evidence
<b><del>To Do</del> List Issues to Consider</b>	FEREC NOPR <ul style="list-style-type: none"> <li>o No changes identified.</li> </ul> Regional Fill-in-the-Blank Team Comments <ul style="list-style-type: none"> <li>o Change "program" to "standard" in R1.</li> <li>o Coordinated with PRC-006.</li> <li>o The regional procedures need to be converted to a standard to implement this.</li> </ul> VO Industry Comments <ul style="list-style-type: none"> <li>o Need to include RA</li> <li>o Need to refine levels of non-compliance</li> </ul>	

**Standards Authorization Request Form - Project 2007-01 Underfrequency Load Shedding (UFLS)**

<b>Standard Review Form</b>		
<b>Project 2007-01 Underfrequency Load Shedding</b>		
<b>Standard #</b>	<b>PRC-008-0</b>	<b>Comments</b>
<b>Title</b>	Implementation and Documentation of Underfrequency Load Shedding Equipment Maintenance Program	Too long and different than header. Doesn't cover testing element.
<b>Purpose</b>		Same statement that has been carried forward and doesn't fit here. No benefit or value proposition.
<b>Applicability</b>		Okay
<b>Requirements</b>	<i>Conditions</i>	Not clear how this differs from 005.
	<i>Who?</i>	Okay
	<i>Shall do what?</i>	R2 -- format, etc. missing.
	<i>Result or Outcome</i>	Missing
<b>Measures</b>		M2 needs to define evidence.
<b>To Do List</b>	FERC NOPR ☉ Include a requirement that maintenance and testing of UFLS programs must be carried out within a maximum allowable interval appropriate to the relay type and the potential impact on the Bulk Power System. FERC staff report ☉ Maintenance intervals not addressed Regional Fill-in-the-Blank Team Comments ☉ Okay if PRC-006 is fixed VO Industry Comments ☉ Consistent wording from standard to standard required ☉ Definition of evidence required	

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<b>Standard Review Form</b>		
<b>Project 2007-01 Underfrequency Load Shedding</b>		
<b>Standard #</b>	<b>PRC-009-0</b>	<b>Comments</b>
<b>Title</b>	Analysis and Documentation of Underfrequency Load Shedding Performance Following an Underfrequency Event	Too long and different than header.
<b>Purpose</b>		Same as previous and it doesn't fit. No benefit or value proposition.
<b>Applicability</b>		Okay
<b>Requirements</b>	<i>Conditions</i>	Okay
	<i>Who?</i>	Okay
	<i>Shall do what?</i>	Okay
	<i>Result or Outcome</i>	Missing
<b>Measures</b>		M1 not really a measure. M2 needs definition of evidence.
<b><del>To Do</del> <u>List Issues to Consider</u></b>	FERC NOPR o No changes identified. FERC staff report o No corresponding standard for under-voltage Regional Fill-in-the-Blank Team Comments o Change "program" to "standard". o See notes for PRC-007. VO Industry Comments o Define evidence o 90 days vs. 30 days o Exemptions for those with shunt reactors who don't shed load	



## Appendix C: Issues Raised by Industry during 1<sup>st</sup> Posting of SAR for Project 2007-01

With respect to Question #2 of the comment form: Do you agree with the scope of the proposed project? (The scope includes all the items noted on the 'Standard Review Forms' attached to the SAR as well as other improvements to the standards that meet the consensus of stakeholders, consistent with establishing high quality, enforceable, and technically sufficient bulk power system reliability standards.)

### NCMPA:

NCMPA1 agrees with the need to develop measures to shed load during an underfrequency event that are consistent across the interconnected electric system. However, NCMPA1 disagrees with the approach that has been taken by the regions in responding to this requirement, and we are concerned that the same approach is suggested in this SAR. We are specifically concerned that it is simply not practical for smaller entities to comply with the requirements proposed by this SAR.

As a result of the Energy Policy Act, many small utilities are required to register with their respective RROs, and these entities are now subject to mandatory compliance with the reliability standards. Some of these entities have peak annual loads that are smaller than 10 MW. Some are even smaller than 1 MW. Requirements within most, if not all, of the regions state that load must be shed in multiple steps (three steps in SERC, for example) at different underfrequency set points. While shedding load in multiple steps is perfectly rational for larger systems, most small loads are served by one distribution feeder bus. Furthermore, the entire peak demand on a small entity is a mere fraction of the amount of load that is shed by a larger entity in just one step. Furthermore, larger utilities have the advantage of aggregating load from multiple delivery points that can be shed in one step. Smaller entities do not have this advantage, and face the possibility of large expenditures in order to meet the multiple step shedding criteria.

NCMPA1 questions the benefit to reliability by requiring all utilities, regardless of size, to shed load in multiple steps as a result of an underfrequency event. We urge the SAR/standard drafting teams to address this issue and establish simplified requirements for small entities, whereby,

- Compliance with the UFLS standards be non-compulsory for entities with annual peak demands less than 10 MW
- Load shedding can be carried out in one step for entities with annual peak demands less than 100 MW.

### American Electric Power

We would request that the drafting team consider geographic dispersion of the underfrequency response load.

We would request that this SAR apply to all entities that have an impact on the bulk energy system.

### MRO

MRO believes that the UFLS standards, PRC-007 through PRC-009 could be broadly applied to ALL entities that comply with a customized Regional UFLS standard. Therefore, for simplification purposes, the MRO would support combining standards PRC-007 through PRC-009 into one UFLS NERC standard.

### BPA Transmission Services

## Standards Authorization Request Form

The To Do List for PRC-009 notes a consideration from V0 Industry Comments of an exemption for those with shunt reactors who don't shed load. As these devices are more associated with UVLS than UFLS, BPA recommends the removal of this item.

### PJM

There should only be 7 requirements in this standard. These seven would be split between NERC and the entity that has installed UFLS devices.

- NERC establish what the UFLS criteria should be, which would include transmission and generation UFLS set-points, time-delays, etc.
- NERC should establish acceptable maintenance intervals
- NERC shall establish and maintain a database of all UFLS information
- NERC should conduct an assessment of its criteria every five years
- Each entity shall meet the established criteria
- Each entity shall update its information in the NERC database each year
- Each entity shall investigate and analyze all UFLS events

The remaining requirements in the four standards should all go away. The entities would all be subject to compliance audits to verify their compliance

### KCP&L

"Lack of coordination" - It is probably a good idea to know and understand the UFLS program requirements of neighboring regions.

"Develop Continent Standard" - The current standard is sufficient in scope and requirements to stand as a national standard. As stated above, the requirements are clear and complete to allow Regional Entities and their members to develop their unique UFLS programs, to implement them, to monitor the UFLS regional effectiveness and Regional member effectiveness in maintaining their UFLS equipment. This standard serves a comprehensive national standard for development and implementation of UFLS in the regions.

"Who submit compliance material to?" - I think it is understood by the industry all compliance programs are administered by Reliability Coordinators and does not need to be included in this standard.

The remaining comments in this part of the SAR lack sufficient information to provide a specific response.

### PRC-007

"Need language to implement" - I do not agree with the notion mentioned in the SAR document that it is necessary to add language requiring "implementation" of programs. The UFLS regional programs are required to specify in PRC-006 the frequency steps and load shed at a given step for TO's and Distribution Providers to adhere to. PRC-008 requires TO's and Distribution Providers to maintain and test their UFLS equipment. It is not possible to comply with these standards without equipment installed in the field.

### PRC-008

"Maintenance intervals not addressed" - I do agree that a minimum maintenance interval should be included in the standard for the industry to comment on. I imagine solid state relays and electromechanical relays probably have differing maintenance needs.

### PRC-009

"No corresponding standard for under-voltage" - This comment is outside the scope of this standard. Any development of an under-voltage standard should be separate and distinct from the UFLS standard. Both UFLS and under-voltage involve shedding of load but to address different operating condition recovery.

General comments:

## Standards Authorization Request Form

The remainder of the SAR items in the "To Do Lists" are basically editorial in nature and do not change the substance of the standard. I do not have any fundamental problems with making the suggested modifications to the standards, but I also do not see any great need either. It is unclear who the entity responsible for determining the interconnections setpoints should be.

### LADWP

Comments regarding the scope of the project (Question #2) and additional revisions that needs to be incorporated into the standards (Question #3).

The Reliability Functions checked off on page 3 of the SAR should include the Generator Owner and Generator Operator. This is because of the need to closely coordinate load tripping frequency settings to the generating unit off-nominal protection frequency and time delay settings. The objective is to provide enough separation between the load tripping and generating unit protection frequency and time delay settings. This will allow load tripping to be completed and thereby arrest system frequency decline without activating any generating unit off-nominal frequency protection.

The recommended generating unit off-nominal frequency protection settings vary depending on the unit manufacturer and type of unit. The number of generating units in an interconnection is numerous so will the variety of manufacturer's recommended off-nominal frequency and time delay settings. The worst case of these generating unit off-nominal protection settings have to be taken into account in determining the size of load tripped at each load-shedding step. If some units are not included in the consideration, it is possible for these units to have off-nominal settings that would trip the unit during load shedding, exacerbating the situation. A solution to this problem is requiring the owner of the generating unit to trip additional load to cover the additional loss of generation. But this solution is discriminatory if an extensive survey of generator off-nominal frequency protection was not conducted prior to the design of the load shedding steps. It would be similar to adding insult to injury to require generator owners to trip additional load when their generating units were excluded in the design of Regional Reliability Organization's (RRO) UFLS Program, in the first place. Besides these generator owners may not have load available for load shedding.

It is therefore important to add a requirement to "Standard PRC-006-0 – Development and Documentation of Regional UFLS programs that a thorough survey of all the off-nominal frequency protection settings of all interconnection generating units be conducted and the results used in the design of the RRO's Regional UFLS Program.

### Manitoba Hydro

#### PRC-007 - To Do List:

- Need to include RA. [This should refer to the new functional model.]
- Need to refine levels of compliance. [In what manner? Different percentages of insufficient UFLS at stated non-compliance levels? Perhaps 90%-80%-70% instead of the 95%-90%-85% presently stated?]

#### PRC-008 - To Do List:

- Include a requirement that maintenance and testing of UFLS programs must be carried out with in a maximum allowable interval appropriate to the relay type and the potential impact on the Bulk-Power System. [ A maximum maintenance interval based on the relay type and system impact should not be defined by the standard. The required maintenance frequencies can not only be dependent upon relay type and system impact, but also many factors, including relay construction, age, maintenance practices, maintenance philosophies, environment, and operating context. The responsible entities are best situated to determine the maintenance requirements of their equipment. Revising PRC-008-0 requirements to be similar to the PRC-005-1 requirements provides more consistency across the standards and includes R1.1. Maintenance and testing intervals and their basis. R1.2. Summary of maintenance and testing intervals.

## Standards Authorization Request Form

Both these requirements make available information which can be used for a review of an entity's maintenance frequencies and practices.]

### PRC-009:

- Requirements – Result or Outcome. [Do not agree the “results” are “missing”. The results are inherently implied by adhering to the conditions stated in the requirements. Same as for PRC-007.]

Measures - [M1 - Disagree.]

### To Do List:

- Change “program” to “standard” in R1. [Disagree. Using “standard” in this location of R1 could easily be confused with using the word “standard” in the rest of the document. There is nothing inappropriate with the word “program” in the context of R1. Same as for PRC-007.]

-90 days vs 30 days. [Depending on complexity of UFLS involved disturbance, 90 days may be required to properly analyze event and document results.]

-Exemptions for those with shunt reactor who don't shed load. [Do not understand context of comment. Whether or not shunt reactors are tripped out by UF relays ( possibly via UFLS relay facilities ) is not relevant. Dumping reactors will increase voltages, but provide no significant ( if any ) improvements to sagging network frequency compare

### So. Company Transmission, Generation, and Alabama Power

The term Evidence should be used in the Measurements in this standard as in other standards- it includes but is not limited to, operator logs, voice recordings or transcripts of voice recordings, electronic communications, computer printouts or other equivalent evidence.

*With respect to Question #3 of the comment form: Please identify any additional revisions that should be incorporated into this set of standards, beyond those that have already been identified in the SAR.*

### IRC Standards Review Committee

Please take a closer look at the applicability of each of the standard requirements. We believe some of them may not cover all the responsible entities. For example:

#### a. PRC-007-0

TOP's & LSE's are missing from R1, R2 & M1.

#### b. PRC-008-0

TOP's & LSE's are missing from the Applicability, Requirements & Measures sections.

### MISO Stakeholders Committee

One major change needed in all the standards is to separate the standard into two pieces. The first is the set of core reliability requirements. The second portion is the supporting text. More than half the text in the current standards is supporting text that explains the true requirements. Now NERC is in the process of developing measures for and assigning risk to sentences that were never intended to be measured.

### ATC

The SDT should also develop a new standard that addresses Generator Frequency Response. It's our opinion that Generator Frequency Response goes hand-in-hand with Under Frequency Load Shedding and therefore should be included in this set of standards.

### American Electric Power

## Standards Authorization Request Form

We would request clarity regarding compliance measures. Some requirements will lend themselves to plus or minus tolerances for a prescribed value, while others may be best described in terms of greater than or less than the prescribed value.

Standard PRC-009 requires a simulation of the event (in addition to a description, a review of the set points and tripping times, and a summary of the findings). The time frame associated with providing documentation of the analysis, following the underfrequency event, is 90 calendar days (Requirement R2). Based on our experiences, we would request that the drafting team consider a longer time frame, such as 120 days.

### ISO-NE

Because PRC-005, -008, -011, and -017 are related in the maintenance issues that they cover, there would be a benefit in consolidating these requirements of the standards into one standard.

PRC-006-0 would benefit from greater description as to the technical requirements. Specifically, R1.2.4 needs to be defined as to what particular generator protection schemes will be included in the requirement e.g. U/F trip settings.

R1.2.8 is too broad & encompassing in scope covering "any other schemes that are part of or impact the UFLS programs". The schemes that may be impacted by this requirement need to be defined in order to be measurable.

The levels of non-compliance should be augmented in PRC-006-0. For example, a level 2 non-compliance should be added for not meeting 2 or more elements of R1. A level 3 non-compliance should be added for not meeting R2. Level 4 non-compliance should be modified to target only those entities that do not complete a UFLS assessment within the last five years or those entities who do not provide this assessment to the regional entity.

As indicated by FERC, PRC-008 should be modified "to include a requirement that maintenance and testing of programs must be carried out within a maximum allowable interval appropriate to the relay type and the potential impact on the Bulk-Power System."

The PRC Standards need to be reviewed to ensure applicable entities/functions are appropriately identified. TOP's & LSEs' are missing from: (i) R1, R2 & M1 in PRC-007, and (ii) the Applicability, Requirements and Measures sections in PRC-008. In addition, in certain instances (PRC-007 & -008), because independent system operators and regional transmission organizations are TOPs, the PRC-007 and PRC-008 may not be appropriately applied to these entities, because such entities do not own/operate UFLS.

The SAR should consider deleting PRC-009, and add the requirements to PRC-006-0 as R1.4.3.

### KCP&L

The standards would be better organized by separating the reliability requirements from the supporting text that explains the requirements. Measures should then be applied only to the requirements and not the text.

### Manitoba Hydro

#### PRC – 007:

- Purpose -If each standard included a list of all other closely related standards, the individual non-repeated purposes of related standards could be more easily compared by readers when necessary.
- Requirements – Shall Do What?
- R2 – "As necessary" should be removed. Annual updates of UFLS data to the RRO are necessary, even if they just only confirm that the previous year's data is still valid. Please refer to R3 comment below.

## Standards Authorization Request Form

- R3 – Recommend further revision of R3. As well as RRO requested data within 30 days, there should be a mandatory requested annual update. This will coordinate with comment of R2.

- Measures - 2M for 3R.

- By making revisions to R2 and R3 as shown above, measure M2 will now appropriately cover both R2 and R3 for annual data updating and appropriate documentation transmission to RRO.

PRC-008-0:

Measure M1 needs to be revised to clearly reflect the measures applied to Requirement R1.

So. Company Transmission, Generation, and Alabama Power

Under PRC-006, Requirement 1.2, it is recommended the Regions have the responsibility for design details for determining Load Shedding Blocks (MWs), intentional and total tripping time delays, Generation protection, Islanding Schemes, Tie tripping schemes (within a Region), frequency set points (excludes BAL standard) and Load Restoration schemes. Also, the reporting of the time delay should only include the total time and not include the intentional time delay. The intentional time delay is included in the total time.

In PRC-006, Requirement 1.3, the Regional UFLS database is required to be updated at least every 5 years. However, under PRC-007, R2, the Transmission Owner is required to update its underfrequency data at least annually. These two timing update requirements should be consistent with one another.

In PRC-008 it is unclear how often the Transmission Owners are required to assess its maintenance and testing program. We recommend adding language to the SAR that says on a "as needed" basis.

Under PRC-008, Requirement 2, it states that Transmission Owner must implement its maintenance and testing program that is required in R1. It would seem more appropriate to include the implementation portion of R2 into R1 to say the Transmission Owner must have and implement a maintenance and testing program.

The SAR drafting team should recognize that individual generator frequency trip set points are established by the manufacturer of the generator and not by the Generator Owner. Therefore, in the development of the underfrequency load shedding scheme, each Transmission Owner should recognize that these generator frequency trip settings cannot be adjusted and the load shedding schemes should take this into account. This standard should not require a Generator Owner to operate beyond the limits set by the manufacturer.